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ISSN 0141-0857

Practical Wireless

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The Radio Magazine

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Yaesu

FT1	HF Transceiver	P.O.A	(—)
FT980	HF Transceiver	1750.00	(—)
SP980	Speaker	110.00	(2.50)
FT757GX	HF Transceiver	969.00	(—)
FC757	Auto A.T.U.	349.00	(2.50)
FP757HD	Heavy Duty PSU	239.00	(2.50)
FP757GX	Switched Mode PSU	199.00	(2.50)
FT290	2m M/Mode Port/Transceiver	379.00	(—)
FT290	With Mutek front end fitted	409.00	(—)
MMB11	Mobile Bracket	37.50	(1.50)
NC11	Charger	10.50	(1.50)
CSC1	Carrying Case	6.50	(1.50)
YHA15	2m Helical	7.50	(1.50)
YHA44D	70cm ½wave	12.50	(1.50)
YM49	Speaker Mike	22.00	(1.50)
MMB15	Mobile Bracket	14.55	(1.50)
FT203R	NEW 2m H/Held/C/W FNB3	255.00	(—)
FT209R	NEW 2m H/Held/C/W FNB3	299.00	(—)
FT703R	70cm H/Held	289.00	(—)
FT709R	70cm H/Held	319.00	(—)
FT270R	2m 25W F.M.	399.00	(—)
FT270RH	2m 45W F.M.	469.00	(—)
FT2700R	2m/70cm/25W/25W	499.00	(—)
FRG 9600	60-905MHz Scanning RX	525.00	(—)
MMB10	Mobile Bracket	10.00	(1.50)
NC9C	Charger	10.35	(1.50)
PA3	Car Adaptor/Charger	20.50	(1.50)
FNB2	Spare Battery Pack	25.00	(1.50)
YM24A	Speaker Mike	27.00	(1.50)
FT726R	2m Base Station	999.00	(—)
430/726	70cm Module for above	349.00	(3.00)
FRG8800	HF Receiver	639.00	(—)
FRV8800	Convertor 118-175 for above	100.00	(2.00)
FRT7700RX	A.T.U.	59.00	(2.00)
MH1B8	Hand 600 8pin mic	20.00	(1.50)
MD1B8	Desk 600 8pin mic	79.00	(1.50)
MF1A3B	Boom mobile mic	25.00	(1.50)
YH77	Lightweight phones	19.50	(1.50)
YH55	Padded phones	19.95	(1.50)
YH1	L/weight Mobile H/set-Boom mic	19.00	(1.50)
SB1	PTT Switch Box 208/708	21.00	(1.50)
SB2	PTT Switch Box 290/790	18.00	(1.50)
SB10	PTT Switch Box 270/2700	21.00	(1.50)
FF501DX	Low Pass Filter	37.50	(1.50)
NEW			
FT767GX	HF TXCR	1550.00	(—)
FT727	2M/70CM H/H	425.00	(—)
FL7000	HF Linear	1600.00	(—)
FT290 MkII	Surer 290	429.00	(—)

Linear Amps

TOKYO HI POWER			
HL 160V	2m, 10W in, 160W out	244.52	(2.50)
HL 82V	2m, 10W in, 85W out	144.50	(2.50)
HL 110V	2m, 10W in, 110W out	249.00	(2.50)
HL 35V	2m, 3W in, 30W out	76.00	(2.50)
HL 30	2m, 3W in, 30W out	54.00	(2.50)
HL 20U	70cms, 3W in, 20W out	122.50	(2.50)
MICROWAVE MODULES			
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MML144/50-S	inc preamp, switchable	106.95	(2.50)
MML144/100-S	inc preamp (10w i/p)	149.95	(3.00)
MML144/100-HS	inc preamp (25w i/p)	159.95	(3.00)
MML144/100-LS	inc preamp (1/3w i/p)	169.95	(3.00)
MML144/200S	inc preamp (3/10/25 i/p)	334.65	(3.00)
MML432/30L	inc preamp (1/3w i/p)	169.05	(2.50)
MML432/50	inc preamp (10w i/p)	149.50	(2.50)
MML432/100	linear (10w i/p)	334.65	(3.00)
B.N.O.S.			
LPM 144-1-100	2m, 1W in, 100W out, preamp	197.50	(3.00)
LPM 144-3-100	2m, 3W in, 100W out, preamp	197.50	(3.00)
LPM 144-10-100	2m, 10W in, 100W out, preamp	175.00	(3.00)
LPM 144-25-160	2m, 25W in, 160W out, preamp	255.00	(3.00)
LPM 144-3-180	2m, 3W in, 180W out, preamp	295.00	(3.00)
LPM 144-10-180	2m, 10W in, 180W out, preamp	295.00	(3.00)
LP 144-3-50	2MN 50W out, preamp	125.00	(3.00)
LP 144-10-50	2M 10W in, preamp	125.00	(3.00)
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00	(3.00)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	235.00	(3.00)
LPM 432-10-50	70cm, 10W in, 50W out, preamp	195.00	(3.00)
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00	(3.00)

SWR/PWR Meters

HANSEN			
FS50VP	50-150MHz 20/200 Interval PEP/SWR	106.70	(2.50)
FS300V	50-150MHz 20/200 PWR/SWR	53.50	(2.50)
FS300H	1.8-60MHz 20/200/10W	53.50	(2.50)
FS210	1.8-150MHz 20/200 Auto SWR	63.50	(2.50)
W720	140-430MHz 20/200W	41.50	(2.50)
WELZ			
SP10X	1.8-150MHz PWR/SWR	39.95	(2.50)
SP122	1.8-60MHz PWR/SWR/PEP	79.95	(2.50)
SP220	1.8-200MHz PWR/SWR/PEP	67.95	(2.50)
SP225	1.8-200MHz PWR/SWR/PEP	119.95	(2.50)
SP420	140-525MHz PWR/SWR/PEP	74.95	(2.50)
SP425	140-525MHz PWR/SWR/PEP	119.95	(2.50)
SP825	1.8-200-430-800-1240MHz	179.00	(2.50)
TOYO			
T430	144/432 120 W	52.50	(2.50)
T435	144/432 200 W	58.00	(2.50)

AERIALS BY:- JAYBEAM – MINIBEAM – HYGAIN – G. WHIP – 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	158.00	(4.50)
PS30	Systems p.s.u. 25A	343.85	(—)
SM6	Base microphone for 751/745	46.00	(2.00)
IC505	50MHz multi-mode portable	459.00	(—)
IC290D	2m 25w M/Mode	542.00	(—)
IC271E	2m 25w M/Mode Base Stn	835.00	(—)
IC271H	100W version of above	1029.00	(—)
IC27E	25W FM mobile	399.00	(—)
IC28E	25W FM	325.00	(—)
IC47E	25w 70cm FM mobile	495.00	(—)
ICBU1	B/U Supply for 25/45/290	32.00	(2.00)
ICR71	General Coverage Receiver	825.00	(—)
IC02E	2m H/Held	299.00	(—)
IC2E	2m H/Held	225.00	(—)
ML1	2m 10w Linear	79.35	(2.50)
IC4E	70cm H/Held	285.00	(—)
IC04E	70cm handheld	299.00	(—)
BC35	Base Charger	70.15	(2.00)
HM9	Speaker mic	21.85	(2.00)
LC3	Carry Case	6.90	(2.00)
ICBP3	Std Battery Pack	29.00	(2.00)
BP5	High Power Battery Pack	60.95	(2.00)
CP1	Car Charging Lead	6.90	(2.00)
DC1	12v Adaptor	17.25	(2.00)
R7000	VHF/UHF Scanning Receiver	957.00	(—)
IC3200	2M/70cm Mobile Transceiver	556.00	(—)
IC12	23cm H/H	428.00	(—)
GC4	World Clock	39.00	(2.00)

Scanning Receivers

SMC8400	VHF/UHF Scanner	249.00	(3.00)
SX200	VHF/UHF Scanner	325.00	(3.00)
SX400	VHF/UHF Continuous Coverage	625.00	(3.00)
AOR2002	VHF/UHF Continuous Coverage	487.30	(3.00)

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Datong Products

PC1	Gen Cov Con	137.40	(2.00)
VLF	Very low frequency conv	34.90	(2.00)
FL2	Multi-mode audio filter	89.70	(2.00)
FL3	Audio filter for receivers	129.00	(2.00)
ASP/B	r.f. speech clipper for Trio	82.80	(2.00)
ASP/A	r.f. speech clipper for Yaesu	82.80	(2.00)
ASP	As above with 8 pin conn	89.70	(2.00)
D75	Manual RF speech clipper	56.35	(2.00)
D70	Morse Tutor	56.35	(2.00)
MK	Keyboard morse sender	137.40	(2.00)
RFA	RF switched pre-amp	36.00	(2.00)
AD270-MPU	Active dipole with mains p.s.u	51.75	(2.00)
AD370-MPU	Active dipole with mains p.s.u	69.00	(2.00)
MPU	Mains power unit	6.90	(2.00)
DC144/28	2m converter	39.67	(2.00)
PTS1	Tone squelch unit	46.00	(2.00)
ANF	Automatic notch filter	67.85	(2.00)
SRB2	Auto Woodpecker blanker	86.25	(2.00)

CW/RTTY Equipment

Tono 550	Reader	529.00	(3.00)
ICS/AEA			
PK64	Complete Packet/Amtor terminal	459.00	(3.00)
BENCHER			
BY1	Squeeze Key Black Base	67.42	(2.50)
BY2	Squeeze Key Chrome base	76.97	(2.50)
HI-MOUND MORSE KEYS			
HK703	Up down keyer	38.35	(2.00)
HK704	Up down keyer	26.35	(2.00)
HK706	Up down keyer	21.80	(2.00)
HK707	Up down keyer	20.15	(2.00)
HK710	Up down keyer	39.95	(2.50)
HK802	Up down solid brass	109.00	(2.50)
HK803	Up down solid brass	104.50	(2.50)
HK808	Up down keyer	39.95	(2.00)
MK703	Twin paddle keyer metal base	34.50	(2.00)
MK705	Twin paddle keyer marble base	32.78	(2.00)
MK706		30.48	(2.00)
KENPRO			
KP100	Squeeze CMOS 230/13.8v	109.25	(3.00)
KP200	Memory 4096 Multi Channel	234.55	(3.00)

Trio

TS940S	9 Band TX General Cov RX	1895.00	(—)
TS930S	9 Band TX General Cov RX	1595.00	(—)
TS440	**NEW** 9 Band TX General Cov RX	998.00	(—)
TS830S	160-10m Transceiver 9 Bands	981.59	(—)
AT230	All Band ATU/Power Meter	185.90	(2.50)
SP230	External Speaker Unit	56.03	(—)
TS530SP	160m-10m Transceiver	849.82	(—)
TS430S	160m-10m Transceiver	876.68	(—)
PS430	Matching Power Supply	151.48	(3.50)
SP430	Matching Speaker	39.50	(2.50)
MB430	Mobile Mounting Bracket	14.78	(2.50)
FM430	FM Board for TS430	45.00	(2.50)
SP120	Base Station External Speaker	36.33	(2.50)
MC50	Dual Impedance Desk Microphone	43.10	(2.50)
MC35S	Fist Microphone 50K ohm IMP	20.33	(2.00)
LF30A	HF Low Pass Filter 1kW	30.18	(2.00)
TR9130	2M Multimode	593.64	(—)
TM201A	2M 25W mobile	322.68	(—)
TM401A	70cms FM 12W	392.82	(—)
TH21E	2M Mini-Handhelds	199.00	(—)
TH41E	70cm Mini-Handhelds	240.99	(—)
TM211E	2M FM Mobiles	444.60	(—)
TM411E	70cm FM Mobiles	498.00	(—)
TS711E	2M Base Stations	839.96	(—)
TS811E	70cm Base Stations	999.00	(—)
TR3600	70cm Handheld	353.48	(—)
TR2600	New 2M FM Synthesised Handheld	328.00	(—)
ST2	Base Stand	72.09	(—)
SC4	Soft Case	18.48	(2.00)
SMC25	Speaker Mike	21.55	(2.00)
PB25	Spare Battery Pack	35.11	(2.00)
MS1	Mobile Stand	41.88	(2.00)
R2000	Synthesised 200KHz-30MHz Receiver	565.32	(—)
HS5	Deluxe Headphones	32.02	(2.00)
SP40	Mobile External Speaker	19.70	(—)
TL922	160/10M 2kW Linear	1359.00	(7.50)
TS780	2M/70cm M/M Transceiver	998.00	(5.50)
TS670	6, 10, 15, 40M 10W M/M Transceiver	843.66	(5.50)
TR9300	6M M/M Transceiver	575.16	(5.50)
TR751	**NEW** 2M 25W Multimode	580.70	(—)

Power Supplies

DRAE			**BNOS**		
4 amp	43.40	(2.50)	6 amp	69.00	(3.00)
6 amp	63.00	(3.00)	12 amp	115.00	(3.50)
12 amp	86.50	(3.50)	25 amp	169.00	(4.50)
24 amp	125.00	(4.50)	40 amp	345.00	(4.50)

SMC			
RU1204Ub	4 amp Power Supply	14.95	(3.00)

Aerial Rotators

KR250	Light Duty	78.00	(3.00)
KR200	Light Duty	69.00	(2.50)
AR40	5 core Medium Duty	125.00	(2.50)
KR400	Med/H Duty	139.00	(3.00)
KR500	6 core Elevation	149.00	(3.00)
KR400RC	6 core Medium Duty	169.00	(3.00)
KR600RC	8 core Heavy Duty	219.00	(3.00)
HAM1V	8 core Heavier Duty	P.O.A.	(4.50)
12X	8 core Very Heavy Duty	499.00	(—)
KR5400	Elevation/Azimuth	279.00	(3.00)
KR5600	Elevation/Azimuth	369.00	(3.50)

SMCS 2C	2N 50239	18.95	(2.00)
SMCS 2N	2 way n Skts	23.50	(2.00)
Welz	2 way SO239	29.95	(2.00)
Welz	2 way n Skts	49.00	(2.00)
Drae	3 way SO239	15.40	(2.00)
Drae	3 way n Skts	19.90	(2.00)
Kenpro	KP2/N2 way Switch	27.00	(2.00)

Miscellaneous

DRAE	Wavemeter	27.50	(2.00)
T30	30W Dummy load	8.50	(2.00)
T100	100W Dummy load	38.00	(2.00)
T200	200W Dummy load	56.00	(2.00)
CT20A	20W Dummy Load PL259	15.95	(2.00)
CT20N	20W Dummy Load N Plugs	22.95	(2.00)
CT150	100W Dummy Load (500WHmin)	79.00	(2.50)
DRAE	2m Pre-set A.T.U.	14.50	(2.00)
TOKYO HI-POWER			
HC200	10-80 HF Tuner	115.00	(2.50)
HC400	10-160 HF Tuner	199.00	(3.50)
CAP CO AERIAL TUNERS			
SPC300D	1kW PEP	225.00	(6.00)
SPC3000D	3kW PEP	325.00	(6.00)

Oscar Antennas

20E	2m ¼ SO239	3.15	(1.50)	258	70cm 2 × ⅝ SO239	29.37	(2.00)
2NE	2m ⅝ SO239	8.94	(2.00)	358	70cm 3 × ⅝ SO239	33.73	(2.00)
78F	2m ⅞ SO239	21.15	(2.00)	70N2M	70cm/2m Dual band SO239	24.95	(2.00)
				HS770	70cm/2m Duplexer	24.95	(2.00)
				GCCA	Gutter clamp	14.25	(2.00)
				SOMM	Mag mount	12.75	(2.00)

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Practical Wireless
The Radio Magazine

MARCH 1987 VOL. 63 NO. 3 ISSUE 960

THIS MONTH

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

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

Lowe Electronic 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 needs. 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 Receiver . . . £487.30 inc VAT, carriage £7.00

from TRIO, a **new** short wave receiver, the **R5000**.

The R5000 is a new general coverage receiver. It offers the dedicated short wave listener and radio amateur a receiver that will match the performance of the best transceivers available today.

The R5000's frequency range is continuous from 100 kHz to 30 MHz and its modes of operation are USB, LSB, CW, AM, FM and FSK. An optional VHF converter (VC20) extends the frequency range to include 108 to 174 MHz.

The R5000 uses 2SK 125 junction-type FETs in the high sensitivity direct balanced first mixer resulting in outstanding two signal characteristics and a substantially improved noise floor level.

Operating from either 12 V DC or 240 V AC the receiver can be used both in the home or whilst out in car, caravan or boat.

The receiver has two rates of tuning for each mode selected by a front panel switch. The frequency increments for SSB/CW/FSK are 10 Hz and 100 Hz, for AM 100 Hz and 1kHz and for FM 2.5 kHz and 5 kHz.

Both low (50 ohms) and high (500 ohms) aerial connections are provided on the rear panel of the R5000. The required aerial can be selected by means of a front panel switch. Information on which aerial to be used with a stored frequency can also be held in memory.

The R5000 has 100 memory channels which store frequency, mode and which of the two aerial connections has been selected. Information is easily transferred from one VFO to the other, from memory to VFO and in order to quickly access your favourite station, from VFO to any of the memories. Both memory scan and frequency scan (between frequencies in memories 8 and 9) are included in the receiver. Halt on an occupied channel whilst scanning can either be timed or until the signal drops. The entire one hundred memories can also be quickly scrolled to check the data held and to find the location of an empty channel.

To enhance reception, IF shift and a tunable notch filter are part of the R5000 receiver. Filter selection according to mode is automatic when the front panel selectivity switch is set to AUTO. This automatic selection can, of course, be overridden. Additionally the introduction of optional SSB and CW filters (YK88SN for SSB and either YK88C or YK88CN for CW) will improve the already excellent signal to noise ratio and selectivity. The optional YK88A-1 AM filter will improve the shape factor and enhance reception even further.

The R5000 general coverage receiver also has keyboard frequency entry, dual mode noise blanker, two 24 hour clocks with timer, option VS1 voice synthesizer and CW tone mode indication for the blind operator, a large 100 mm diameter top mounted speaker, switchable AGC (fast or slow), RF attenuation (10, 20 or 30 dB steps) and a F.LOCK switch which protects against frequency shift if the VFO knob is accidentally moved.

R5000 Receiver . . . £895 inc VAT, carriage £7.00

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE
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send £1 for complete mail order catalogue.

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the TRIO TS711E & TS811E, base station rigs for two & seventy.

The TRIO TS711E two metre base station is perfection epitomised; receiver sensitivity and the ability to reject unwanted adjacent signals is outstanding. For the serious operator, any other transceiver is unacceptable.

Similar in specification and appearance to the TS711E but operating on seventy centimetres is the TRIO TS811E. When used alongside the TS711E, the TS811E completes the ideal equipment line-up and provides the best possible access to the satellites for the VHF/UHF enthusiast.

The TS711E (TS811E) covers the two metre (seventy centimetre) band from 144 to 146 MHz (430 to 440 MHz). Operating modes are USB, LSB, CW and FM. When switched to the "auto" position the transceiver correctly selects mode according to frequency, a great advantage for the blind operator. Simple up/down frequency shift is provided on the front panels and also on the microphones.

Power output on all modes is 25 watts. For QRP operation the output can be reduced using a front panel control.

The TS711E (TS811E) has IF shift, an essential feature when the band is crowded during a contest. To help work DX, speech processing is also available.

The transceiver has two separate VFO's and forty memory channels. Each memory stores frequency, operating mode, whether simplex or repeater shift and if the 1750 Hz tone burst is on or off. The VFO can be either free running as for SSB or CW operation or electrically switched to a "click" stop for FM where it changes frequency in 12.5 or 5 kHz steps. Frequencies stored in memory can be readily transferred to either VFO A or B. Depending on how the VFO was set when the information was put into memory ie. click stop or free running VFO, the rig is set the same when the memory information is transferred. It is therefore possible to have SSB frequencies transferred with a free running VFO and FM channels with click stop. A great aid to operating! The second VFO can also be quickly put on the same frequency as the one currently being used, ideal when checking the position of a strong adjacent signal whilst remaining on your operating frequency.

Frequency scan on VFO can either be between or outside user set limits. On memory the transceiver can either scan the entire memory content or be instructed to look at those frequencies of a particular mode. The TS711E (TS811E) has a timed hold on an occupied channel.

Both priority channel and the immediate recall of your local net frequency are possible with the TS711E (TS811E).

For those with failing sight or a blind operator the TS711E (TS811E) is a dream come true; not only is the operating mode identified by the appropriate CW letter sent in tone (F for FM, U for USB etc.) but when fitted with the VS1 optional board, a digitally encoded girl's voice will announce both frequency and, where applicable, whether the rig is switched to repeater shift.

DCS (digital code squelch) is also fitted to the TS711E (TS811E).

TS711E two metre transceiver . . . £839.96 inc VAT, carriage £7.00.
TS811E seventy centimetre transceiver . . . £998.00 inc VAT, carriage £7.00.
VS1 voice synthesizer . . . £30.18 inc VAT, carriage £1.00.

data equipment

CD600 . . . RTTY, CW, ASCII, TOR, AMTOR decoder, output for UHF television, monitor and printer, can also be used as morse tutor.

CD600 . . . £215.14 inc VAT, carriage £7.00.

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

CD670 . . . £327.77 inc VAT, carriage £7.00.

CD660 . . . Similar in specification to the CD670 but without the built-in dot matrix display.

CD660 . . . £264.97 inc VAT, carriage £7.00.

announcement

KENWOOD

In line with the Kenwood Corporation's International marketing policy, it has been decided to officially introduce the brand name "Kenwood" to the United Kingdom.

Special versions will continue to be produced for the different requirements of the United Kingdom but will be introduced with the name "Kenwood" in the future.

As the official distributor for Kenwood equipment in the U.K., we would emphasis that it is now more important than ever to purchase your equipment from an authorised dealer, to ensure that you receive the necessary technical and after sales service which you have received in the past.

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NEW FOR '87.
NEW FOR '87.

NEW! IC-275E

25 WATT 2 METRE MULTIMODE.

The ICOM IC-275E is the most advanced all-mode transceiver available to the Amateur today. It features a new technological breakthrough in frequency synthesizer sytems. This Direct Digital Synthesizer (DDS) operates in just 5 milliseconds, providing one of the fastest transceiver lock-up times available. Ideal for PACKET and AMTOR communication modes. The IC-275E has high sensitivity and dynamic range making it an ideal unit for contests and DX operation.

99 programmable memories can store frequency, mode, offset frequency and direction. A total of four scanning functions for easy access to a wide range of frequencies, memory scan, programmed scan, selected mode memory scan, lock-out scan.

A new LCD uses a soft orange backlight for ease of operating even in bright daylight. The C1-V communications interface for computer control via a serial port is mounted on the rear panel. Pass Band Tuning and Notch Filter Systems have been incorporated to provide clear operating reception.

This transceiver has a built in A.C power supply, but can also be used on 13.8v D.C for mobile or portable operation. Optional accessories available are AG25 Masthead pre-amplifier, VT36 Voice Synthesizer, FL83 CW Narrow Filter and CR64 High Stability XTAL.

To fully appreciate all the facilities of this sophisticated transceiver contact your local ICOM dealer or Thanet Electronics for further information.

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ICOM

NEW! IC-MICRO-2, MINI-HANDPORTABLE.

This is the smallest handportable from ICOM. The Micro-2, 2 metre FM measures only 148 x 31mm with the BP22 nicad battery pack. The Micro-2 is a hand-size transceiver which will equally fit most pockets.

On the top panel a clear LCD readout gives frequency,memory channel number, signal and R.F power bargraph. A LCD backlight is provided for viewing under difficult conditions. ICOM's innovation has replaced thumbwheel tuning with up/down toggle switches to select 1MHz, 100KHz or 12.5KHz steps. Scanning is possible by depressing and hold the 12.5KHz switch. 10 memories are provided and are automatically programmed by retaining what is selected by the toggle switches. Full repeater and simplex operation facilities including repeater access tone. An automatic power saving function reduces battery power consumption when in receiver mode. Output power is 1.5 watts or 100 milliwatts (low) with the BP22 nicad pack. 2.5 watts is possible with the BP24 pack.

The ICOM Micro-2 is very advanced 2 metre miniature handheld and yet still provides a simple mode of operation. This handy transceiver is supplied complete with BP22 nicad pack, A.C wall charger, helical antenna.

Optional accessories include the BC50 desk charger, rapidly charges the Micro-2 nicad packs in one hour, a variety of rechargeable nicad packs, dry cell battery pack, D.C regulator and soft cases. Contact Thanet Electronics or your local ICOM dealer for more details on this exciting new product.

Actual Size Photograph.
This shows the non-standard low capacity battery pack. N.B. Standard battery pack is normally the higher capacity BP22 as mentioned in text.

Telephone us free-of-charge on:

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Mon-Fri 09.00-13.00 and 1400-17.30

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

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ICOM

IC-751A, The New ICOM HF Flagship.

ICOM are proud to launch their new flagship. The IC-751 was good, the new IC-751A is even better, with a general coverage receiver from 100KHz-30MHz, it is a full featured all mode solid state transceiver that covers all the WARC bands. The IC-751A has an excellent 105dB dynamic range and features pass band tuning, a 9MHz notch filter, adjustable AGC, noise blanker, RIT and XIT. A receiver pre-amp provides additional sensitivity when required. On C.W. the electronic keyer is standard, QSK rated up to 40 w.p.m. The FL32A 9MHz/500Hz CW filter is fitted and CW sidetone on RX and TX modes. On SSB the new FL80 2.4KHz high shape factor filter is fitted.

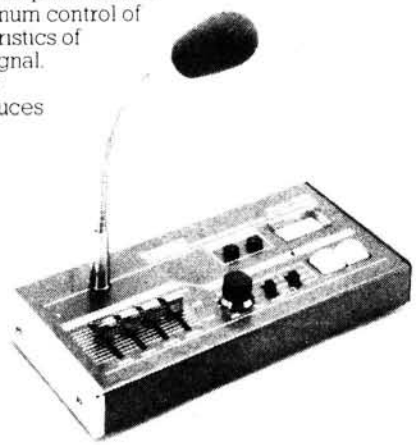
A high reliability transmitter full 100% duty cycle designed for SSB, CW, AM, FM, RTTY and AMTOR, with a high performance compressor for better audio clarity. With 32 memory channels and twin VFO's scanning of frequency and memories is possible from the transceiver or the HM36 supplied.

The IC-751A is supplied for 12 volt operation but can be used with either an internal or external A.C. power supply. It is fully compatible with ICOM auto units such as the IC-2KL linear amplifier and the AT500/100 antenna tuners.

Options available: PS35 internal AC power supply, PS15 external power supply, EX310 voice synthesizer, EX309 microprocessor interface connector, SM8 and SM10 desk mics, SP3 and SP7 external speakers and GC5 world clock.

The SM10 desk top microphone consists of an electret condenser microphone element with a compressor amplifier plus tunable equaliser for maximum control of the audio characteristics of your transmitted signal. The SM10 is highly sensitive and produces clean crisp audio.

SM10 Desk mic.



ICOM HF Filter selection guide:

Transceiver	Mode	Desired Filter Bandwidth	Optional 455KHz Filter Selection (1st Choice)	Optional 9MHz Filter Selection	Special Notes
IC-751A	CW	500Hz	FL-52A	FL-32*	Must remove FL-32 filter to install FL-63 or FL-33.
	CW	250Hz	FL-53A	FL-63	Signal loss with FL-63 is 4dB less than FL-32.
	AM	5.2KHz	–	FL-33	PBT control is not effective when FL-33 is selected.
IC-745	CW	500Hz	FL-52A	FL-45	Add FL-52A before adding FL-45.
	CW	250Hz	FL-53A	FL-54	Add FL-53A before adding FL-54.
	SSB	2.4KHz	FL-44A	–	High skirt selectivity SSB filter. Replaces standard ceramic filter.
IC-735	CW	500Hz	–	FL-32	
	CW	250Hz	–	FL-63	Signal loss with FL-63 is 4dB less than FL-32.

* FL-32 is factory installed in IC-751A.

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ICOM

Total coverage.. 100kHz to 2GHz!

IC-R7000.

The R71E now has a team-mate – the IC-R7000. With these matching receivers it is now possible to tune from 100KHz-2GHz.*

The IC-R7000 covers Aircraft, Marine, FM Broadcast, Amateur Radio, Television and weather satellite bands. The IC-R7000 incorporates FM wide/FM narrow, AM, USB and LSB modes of operation with six tuning speeds:- 0.1, 1.0, 5, 10, 12.5, and 25KHz. *Frequency coverage 25-1000MHz and 1025-2000MHz (25-1000MHz and 1260-1300MHz guaranteed specification). With the IC-R7000 you have normal tuning capability with the front panel tuning knob or for quick tuning of a desired frequency by using the front panel key-pad. A total of 99 memory channels are available for storage of received frequencies and operating mode. Memory channels can be called up by pressing the memory switch then rotating the memory channel knob or by direct keyboard entry.

These receivers are available seperately but together would make a superb listening station for the shortwave listener or licensed amateur.

A sophisticated scanning system provides instant access to specific frequency ranges. By depressing the Auto M switch, the IC-R7000 automatically memorises frequencies that are in use whilst in the scan mode and can be recalled later. The scanning speed is adjustable and the scanning system includes memory selected frequency ranges or priority channels. All functions including memory channel readout are clearly shown on a dual-colour fluorescent display with dimmer switch. Other features include dial-lock, noise blanker, S-meter and attenuator.

Options include: RC12 infra red controller, EX310 voice synthesizer, SP3 and SP7 external loudspeakers, HP1 headphones and the ICOM AH-7000 super wideband discone antenna.

The IC-R71E is a general coverage receiver 100KHz-30MHz featuring direct keyboard frequency entry and infra-red remote controller (optional). SSB, AM, CW, RTTY and FM (optional) modes of operation. With 32 programmable memory channels, twin VFO's scanning systems, selectable AGC, noise blanker, pass band tuning and a deep notch filter. 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: EX257 FM unit, RC11 infra-red controller, CK70 D.C. adaptor for 12 volt operation, CW filter options and a high stability crystal filter, SP3 and SP7 external loudspeakers, EX310 voice synthesizer, HP1 headphones.

IC-R71E.

Computer Control These receivers can be connected to a computer terminal via a suitable interface
JT602 Serial Interface for IC-R7000
JT603 Parallel Interface for IC-R71E (IC-R7000)
The ICOM IC-R71E requires the IC-EX309 interface connector

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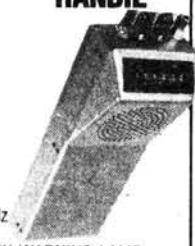

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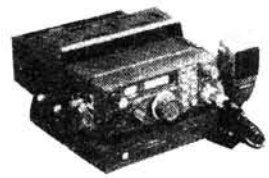

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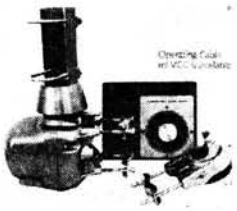

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MML 432/100 P/AMP 10W I/P	**£334.65**
MMG 144V RF P/AMP	**£37.90**
MMC 435/600 ATV-CH35	**£35.65**
MMC 50/28S 6M-10M	**£35.65**
MMC 432/28S 70CMS-10M	**£39.90**
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MMT 28/144 2M-10M	**£129.95**
MMT 432/144R 2M-70CMS	**£199.00**
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MMT 432/28S 10M-70CMS + SAT	**£195.50**
MMT 70/144 2M-4M	**£129.95**

COAX CONNECTORS

UHF COAX PLUGS

PL259PM	UR67/RG8	£0.71
PL259P	UR67 Push Fit	£1.00
PL259A	De Luxe UR67 10MM	£3.49
PL259B	De Luxe UR43/76 5MM	£2.77
PL259E	'L' 5MM	£1.13
PL259M	Metric	£0.95
PL259R	5MM	£0.83
UG175	Reducer 5MM	£0.20
UG176	Reducer 5·6MM	£0.20
PL259PM	PAN/MT 4 Hole	£1.77
PL259SL	Non-solder 10MM	£0.83
PL259SS	Non-solder 5MM	£0.83

UHF COAX SOCKETS

SO239F	4 Hole PAN/MT	£0.71
SO239T	2 Hole PAN/MT	£0.67
SO239NI	Nut Inner	£0.81
SO239NO	Nut Outer	£0.81
PL258	Female B-B	£1.13
PL274	Female B-B Chassis	£1.72
PL/PL	Male B-B	£1.84
M359	Elbow M-F	£1.72
M358	'T' 2F + 1M	£2.06
M358	'T' 3 Female	£2.31
M458	4W 3F + 1M	£3.38

N SERIES PLUGS. 50R

UG536	5MM	£2.48
UG21	11MM	£2.44

N SERIES SOCKETS. 50R

UG58	4 Hole	£1.62
NSNI	Nut Inner	£1.75
UG1052	Free 5MM	£2.60
UG23	Free 11MM	£2.09

N SERIES ADAPTORS. 50R

UG107	'T' 2F-1M	£4.72
UG28	'T' 3F	£4.09
UG57	M-M	£3.78
UG29	F-F	£2.77
UG27	'L' M-F	£3.02

INTERSERIES CONNECTORS. 50R

UG255	UHF SKT-BNC PL	£2.18
UG273	UHF PL-BNC SKT	£2.19
UG146	UHF SKT - 'N' PL	£3.38
UG83	UHF PL - 'N' SKT	£3.38
SO/NF	UHF SKT - 'N' SKT	£3.38
UG201	BNC SKT - 'N' PL	£4.09
UG349	BNC PL - 'N' SKT	£4.09
UG606	BNC SKT - 'N' SKT	£3.80

BNC SERIES PLUGS. 50R

UG88	5.5MM	£1.08
UG959	10MM	£3.70

BNC SERIES SKTS. 50R

UG89	Cable SKT	£1.29
UG290	SKT 4 Hole	£0.99
UG1094	Nut Fix	£0.97
UG914	F B-B	£1.86
UG491	M B-B	£2.20
UG274	'T' 2F + 1M	£2.99
UG306	'L' M-F	£2.54

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CX120A	Cable Entry	£17.75
CX140D	'N' + 2 Cable	£25.15
CX530D	'N' + 2 BNC	£48.30
CX540D	3 BNC	£48.30
CX600N	3 'N'	£48.30
CX600NJ	4 'N'	£71.40
CX600NS	2 'N' + 2 Cable	£71.40

COAX SWITCHES

SMCS2U	2 Way SO239	£18.95
SMCS2N	2 Way 'N'	£23.50
KP2IN	2 Way 'N'	£27.00
AN2	2 Way Slide	£4.60
AN3	3 Way Slide	£5.00

Post and Packing £1.65

COAX CABLE

LDF	2/50A 3/8" Heliax	£3.68
LDF	4/50A 1/2" Heliax	£4.43
UR43	50R 5MM Solid	£0.31
UR76	50R 5MM Stranded	£0.32
UR67	50R 10MM	£0.78
UR70	75R L/Duty	£0.32
UR39	75R M/Duty	£0.56
UR57	75R L/Loss 10MM	£0.71

Above Prices are per Metre
Add Carriage £2.40 up to 20 MTRS. £3.20 over 20 MTRS.

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UR67/100	£70.15 Carriage £4.75
UR76/100	£29.90 Carriage £2.65
UR43/100	£28.75 Carriage £2.65

100 MTR DRUMS 75R

307EP-TV	£20.70 Carriage £2.65
UR70	£29.90 Carriage £2.65
UR39	£52.90 Carriage £3.90
UR57-L/Loss	£67.85 Carriage £4.75

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Surprisingly long distances can be covered with simple QRP (low power) equipment! Many of our customers have worked over 30 countries in the their first couple of weeks on the air with our **CTX80,** 80M CW transmitter. Some have worked most of the USA call areas in the same period! The CTX80 runs up to 5W RF output (adjustable) and comes complete with one crystal. The transmitted "note" is very clean, in fact superior to many expensive transceivers. We also have CW transmitters for 40 and 20 Meters in the form of the **CTX40** and **MTX20.** The MTX20 with its 10W RF output has no trouble in working around the globe.

You can use our transmitters with your existing receiver, or with our **DcRx** Direct Conversion Communications Receiver. This receiver is a good example of how effective simple equipment can be, if it is well designed. Try running a DcRx side by side with the most expensive receiver you can lay your hands on, you will be amazed how well our little set stands up to the comparison! These receivers have also been an introduction to shortwave listening for hundreds of newcomers to the hobby. Add a **CVF** VFO to the DcRx and CTX/MTX and you have the full tranceive facilities of single knob tuning and IRT (clarifier). **HOWES** equipment is great for holiday and portable use, as well as for the fun of QRP operating from home!

	Kit	Assembled PCB
DcRx Direct Conversion Receiver (versions for 160, 80, 40, 30 or 20 Meters)	**£15.30**	**£20.90**
CTX80 80M QRP CW Transmitter (up to 5W RF)	**£13.40**	**£19.40**
CTX40 40M QRP CW Transmitter (up to 3W RF)	**£13.40**	**£19.40**
MTX20 20M QRP CW Transmitter (up to 10W RF)	**£21.90**	**£27.70**
CVF VFOs for above TXs (one version per band)	**£9.90**	**£15.90**
CTU30 Antenna Tuner for all HF bands up to 30W RF	**£24.90**	**£29.90**

Tuning capacitors for the DcRx receiver (except 160M version) are available at £1.50 each, you need two per receiver. One of the same devices can also be used for the CVF.

STOP PRESS . . .

Two new audio CW/Narrow SSB filter kits for use with our **DcRx** or your oriental rig. Send s.a.e. for details.

All the above kits are to build PCB modules. They include a circuit board, full instructions and all board mounted components. For more information on the above, or the rest of our range, simply drop us a line enclosing an SAE. We will send you a copy of our catalogue, and an information sheet on any kit you are particularly interested in.

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P&P is 90p per order. Export prices are as above, but add £2.00 per kit for airmail delivery outside Europe. UK delivery is normally within 7 days.

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£49.00 inc VAT (SO239) **£69.00 inc VAT**

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UK Patent No. 2157894A. Manufactured by S.M.C. Design by G2HCG

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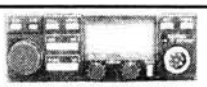

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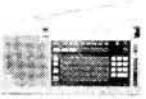

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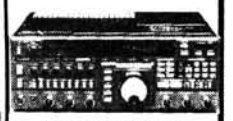

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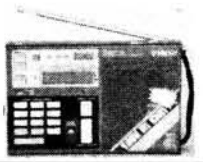

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Gain 17dB Typical

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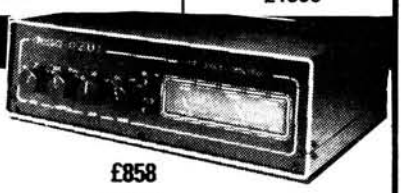

D200	2 MTR 500W SSB	**£858**
D200S	2 MTR 750W SSB	**£1018**
D70	70 CMS 550W SSB	**£1030**

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EVV700SMD	430-440MHz	0.5-0.9	15-18dB	500W PEP	**£117**
EVV2000SMD	144-146	0.6-0.9	16-18dB	1KW PEP	**£117**
EVV200V0X	144-146	0.6-0.9	16-18dB	700W PEP	**£107**
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IP3 order	+18dBM			
ERPA 1296	1.25-1.30	0.8	17-18dB	**£114**
ERPA 435	430-440	0.5	15-18dB	**£65**
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Trio	TS930S	1595.00	(—)
Trio	TS440S	998.00	(—)
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Trio	TS830S	981.00	(—)
Trio	TS530SP	849.00	(—)
Yaesu	FT980	1750.00	(—)
Yaesu	FT757GX	969.00	(—)
Yaesu	FT767GX	1550.00	(—)
Icom	IC735	949.00	(—)

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Yaesu	FRG9600	525.00	(—)
A.O.R.	AR2002	487.30	(—)
Signal	R532 "Airband"	224.00	(—)

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F.D.K.	RX40 141-179 Mhz F.M.	159.00	(2.00)
Signal	R537S "Airband"	69.51	(2.00)

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Yaesu	FC757AT	349.00	(—)
Trio	AT230	185.98	(2.50)
Trio	AT250 auto	342.00	(—)
Daiwa	CNW518 High power	258.00	(—)

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Trio	TR2600E Handheld	199.00	(—)
Trio	TM201A 25w F.M. mobile	322.00	(—)
Trio	TR751E 25w multimode	580.00	(—)
Trio	TS711E base station	839.00	(—)
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Yaesu	FT203R +FNB3 Handheld	255.00	(—)
Yaesu	FT209RH +FNB3 Handheld	309.00	(—)
Yaesu	FT270RH 45w F.M. mobile	469.00	(—)
Yaesu	FT726R base station (70cm optional)	999.00	(—)
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Trio	TR3600E Handheld	353.00	(—)
Trio	TM401A 12w mobile	392.00	(—)
Trio	TS811E base station	998.00	(—)
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Yaesu	FT709R +FNB3 Handheld	319.00	(—)
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Yaesu	6M module for FT726R	249.00	(—)
Yaesu	21/24/28 H.F. module for FT726R	269.00	(—)
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A.K.D.	V.H.F. wavemeter	24.95	(1.50)
Yaesu	FF501DX low pass filter 30MHz 1kW	37.50	(2.00)
Trio	LF30A low pass filter 30MHz 1kW	30.18	(2.00)
Adonis	AM303G desk mic with pre-amp	53.00	(2.00)
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Welz	CH20A 900MHz SO239 skts.	29.95	(1.50)
SA 450N	2way diecast 500MHz N skts.	23.75	(1.00)
SA 450	as above but SO239 skts.	17.50	(1.00)
Drae	3way N skts.	19.90	(1.00)
Drae	3way SO239 skts.	15.40	(1.00)
CS 4	4way B.N.C. skts. 1500MHz	30.39	(2.00)

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UR70	70 ohm coax	per metre	0.35	(0.10)
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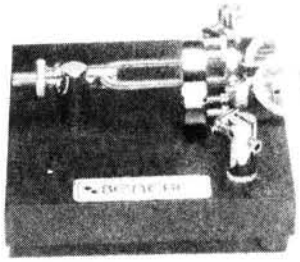

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This is still a best-selling program and it's easy to see why. Superb performance on 4 modes, switch modes at a keypress to catch all the action. Text and picture store with output to screen, printer and tape/disc. An essential piece of software for the SWL (and a lot of licensed hams also!) **SPECTRUM** needs no hardware, **BBC-B, CBM64** and **VIC20** need interface or can use a T.U. on CW and RTTY. Tape £25.

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Thinking of Buying a . . . .

70cm Linear?

When you compare 70cm Linear Amplifiers, it's surprising just what isn't mentioned in the adverts. In looking at the three most popular makes of 70cm amplifier available in Britain, you have to look for the details specifications before you can truly evaluate performance. To make the information more simple to digest we've tabulated it. All of this information is taken from publications which are "in the public domain". There are two sets of tables, one comparing the low input/medium output models and one table for the 100 Watt output models (10W input versions).

Tokyo and Microwave Modules use PIN diode switching. These devices are notorious for the amount of noise they introduce when used on the receive path. They are also well known for their tendency to self-destruct when RF is applied with no DC power supply. This is one of the reasons why there is no "straight through" mode on amplifiers using PIN diodes. BNOS amplifiers use sequentially switched relays throughout – which is why they **can be used straight through** and DO NOT introduce noise.

Although there are BNOS models for drive powers ranging from 1 to 25 Watts, they can all be driven by as little as 250mW – a useful feature which gives full control over the output.

	BNOS	TOKYO	M MODULES
MODEL	LPM432-1-50	HL30U	MM432/30/L
OUTPUT POWER	50W	30W	30W
INPUT POWER	1W	2W	1 or 3W
PREAMP TYPE	GaAsFET	GaAsFET	Bipolar
PREAMP SWITCHING	Pushbutton	None	Wire Link
OVERDRIVE PROTECTION	Yes	No	No
OUTPUT METER	LED Bargraph	None	None
MOBILE MOUNT	Yes	Yes	No
5 YEAR WARRANTY	Yes	No	No

Going the other way, what happens if you stick too much RF in? BNOS's unique overdrive protection feature means that, with too much input power, the unit automatically changes over and pretends that it's an expensive piece of coax. The others **eventually blow up** (After going horribly non-linear and making enemies for you both in and out of band)!

	BNOS	TOKYO	M MODULES
MODEL	LPM432-10-100	HL120'U	MML432/100
OUTPUT POWER	100W	100W	100W
INPUT POWER	10W	12W	1 or 10W
PREAMP TYPE	GaAsFET	GaAsFET	None
PREAMP SWITCHING	Pushbutton	None	N/A
OVERDRIVE PROTECTION	Yes	No	No
VSWR PROTECTION	Yes	No	Yes
THERMAL SHUTDOWN	Not Required	No	Yes
OUTPUT METER	LED Bargraph	Moving Coil	None
5 YEAR WARRANTY	Yes	No	No

What about the preamps then? The MM low power units use a bipolar device while BNOS and Tokyo use **GaAs FETs**. By the time you get to 100 Watts **they** don't bother to fit one at all. And, of course, with the apparent popularity of PIN diodes, if your linear hasn't got BNOS written on it, you probably **can't switch the preamp** out of circuit (marvellous when you've got BIG signals around).

The BNOS 100 Watt Linears use a **"Push-Pull"** final stage. This has a number of technical advantages which result in a much cleaner, more efficient and reliable output signal. The thermal shutdown feature – of which Microwave Modules seem so proud – is **just not necessary!**

With a range of models suiting input drive powers of 1, 3, 10 or 25 Watts and total ATV compatibility you'll see that it pays to . . .

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STAR £10 LETTER

Use of the 10MHz Band

Sir: In view of the forthcoming IARU meeting in April, I am much concerned at the prospect of decisions being taken which deeply affect amateurs who have been given no opportunity to discuss them, and with total disregard for well-established scientific and engineering principles.

Amateur use of the 10MHz band was granted at the last European Amateur Radio Conference on the strength of assurances that no interference would be caused to other services, and the IARU has rightly made this their top priority. To this end, I strongly support the ban on competitive activities, but IARU insistence that "because the band is narrow, only narrowband modes should be used" is nonsensical in view of the link between bandwidth and information rate. A higher rate of transmission means that more contacts can be completed in a given time, in other words what we need to be concerned with is not bandwidth but the *time-bandwidth product,* which is something entirely different. Speech is about 14 times faster than test-pass Morse and, even after making due allowances for use of phonetics in speech and abbreviations in Morse, I find the s.s.b. has an information-rate advantage of about 4 to 1.

More serious, in view of the IARU undertaking, is their failure to take into consideration the uncertainties of h.f. propagation. Most amateurs can vouch for the importance, on finding an apparently clear channel, of asking whether it is in use before they call on it. The commercial receiver operator, unable to reply, can expect to find the entire content of a c.w. signal landing within his passband. In contrast, s.s.b. signals exploit the well-known "spread spectrum" effect; this means that the commercial receiver, being usually narrowband, receives only a small slice of the transmission, which is in any case of relatively low mean power. The suggestion that interference can be prevented or even mitigated by allowing only narrowband modes is therefore a further absurdity.

In March 1985 I submitted to the RSGB for their consideration an engineering report which discussed in detail the information-rate and spread-spectrum aspects and argued the importance of s.s.b. as an aid to propagation and other studies which, at the next EARC, might strengthen the case for amateur use of the band and possibly an additional band. I was told that it had been sent to the IARU, from whom I would be hearing, but this did not happen. I later sent a copy to the IARU Region 1 Secretary, and received a courteous reply with the information that it was being circulated, but have heard nothing further. Not only has there been no rebuttal, but it is clear from the December

LAUGH WITH BARTHES

PW COMMENT

And Then There Were Two!

LIKE MOST OTHER THINGS, magazines must move with the times if they are to prosper, or even to survive. Some changes are welcomed, others are not, but hopefully the ones that are disliked will come to be accepted in time. Back in June 1981, *Practical Wireless* became an all-radio magazine, dropping all the electronic gadgets and gizmos which had filled a proportion of each issue ever since the magazine first appeared in 1932. No, despite what many people think, *PW* **did** feature non-radio gadgets even in its infancy, although the word electronics had not then been invented to describe them.

That change in 1981 upset some of our readers, of course, but we felt it was the right course to take at that time. Since then, there has been a boom in new recruits coming into the amateur radio hobby from CB, but that is now tailing off somewhat. The scope of amateur radio continues to increase, though, with new modes such as packet radio, and increasing popularity of TV, RTTY, etc., largely due to the decreasing costs of computing power. Most young enthusiasts welcome the application of computers to the radio hobby, but some of the older brigade have other views about them! Trying to give a good spread of coverage to all the aspects of amateur radio and of DX broadcast listening and viewing each month has become an almost impossible task and I am well aware that some areas do not get the coverage they deserve.

One solution would be to increase the number of editorial pages in each issue, but to add the necessary space we would have to push up our cover price quite substantially, and inevitably some readers would object to paying more for extra pages that did not cover their particular interests. The other solution would be to split the subject matter in some way and produce two separate magazines, each rather more specialised in its coverage. For some years now, the *PW* editorial team has felt that there was scope in the UK for a publication devoted exclusively to the receiving side of radio and TV DXing on all bands, and the opportunity to launch such a magazine has now occurred.

At the beginning of January 1987, PW Publishing Limited, owners of *Practical Wireless,* acquired *Short Wave Magazine* from its previous publishers. With its April issue, due on the bookstalls on Thursday, March 26, *SWM* will be relaunched as a magazine for the radio and TV DX listener/viewer. Several regular features aimed at the listening and viewing enthusiast will be transferred from *PW* to *SWM* and coverage of such topics in *PW* will be very much reduced from the May issue onwards. Some new features are planned for *PW* and more space will be devoted to constructional articles, to meet the recent very welcome reawakening of interest in that side of the hobby. Further details will appear in the next issues of *Practical Wireless* and *Short Wave Magazine.*

We realise that these changes will not please some present readers of *PW* and *SWM,* and to them we apologise. Existing subscribers to each title are being offered the option to transfer the remainder of their subscriptions to the other magazine if they wish, and it is hoped to offer a very attractive package deal to any reader wishing to subscribe to both titles. Again, more details next month. ***Geoff Arnold***

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1986 issue of *Radio Communication* (p. 865) that there has not been the slightest shift in the IARU position. Meanwhile, those using s.s.b., as their licence allows, have been subjected to abuse in the pages of *RadCom* without being permitted the right of reply.

Later, I was advised by David Evans at RSGB HQ to put my arguments directly to IARU Headquarters. In his reply, the Secretary advised me that they were unable to accept input directly from individual amateurs; he did, however, try to rebutt the "spread spectrum" arguments on the ground that "no degree of harmful interference at all is acceptable". This was in spite of my example which demonstrated, in a particular instance, an advantage of 1200 to 1 in favour of s.s.b. Inevitably, one is reminded of the gnat and the camel!

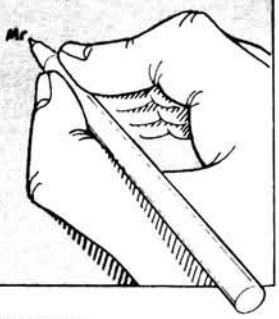
Despite recent steps by the RSGB towards allowing freer discussion of controversial matters, members have so far been kept in ignorance of the technical facts detailed above; neither has there been any discussion of operating practices (c.w. or s.s.b.) with a view to making optimum use of the band whilst minimising the risk of interference to primary users. Measures such as the use of the transmitter radiated power control and beam antennas, or shorter overs with more frequent checks for commercial occupancy, could be of crucial importance. Moreover, concern has been expressed in several quarters at the low level of amateur occupancy, this being mainly confined to a few kHz at the low end of the band, which appear to have been vacated for the most part by the commercial stations. The s.s.b. occupation or the 3 or 4 suitable channels commonly available in the rest of the band would provide the equivalent of 12 to 16 c.w. channels and establish an amateur presence with far less risk to other users. During early morning hours, these are frequently occupied by G–VK "chordal hop" s.s.b. nets, one of which has been in daily operation for several years without complaint. Any s.s.b. operation would of necessity be limited to these channels and I consider priority for long-haul DX to be essential.

I believe it is vitally important for the IARU to maintain its authority which rests solely on the extent to which its decisions have been recognised as fair and reasonable. So far as use of the 10MHz band is concerned, it has forfeited all claim to respect, and I fail to see how this can be regained without proper discussion of the topics listed above, prior to formulation of policy for the years ahead.

L. A. Moxon BSc CEng MIEE G6XN
Hindhead, Surrey

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

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



TVI Filter

Sir: Just a line to say how splendidly the TVI filter of G4YNM works (*PW* December '86). For many years now I have used the G3YOM p.c.b. filter originally described by Pat Hawker in *RadCom*, which worked well until 50MHz came along. This brought back all the old patterning and picture blocking nightmares of amateur radio. With this new filter all problems have been solved. No more TVI!

As a lot of TVI problems are caused by signals creeping down the outside braid of the coaxial cable which feeds the TV set, it is suggested that the G4YNM filter is used in conjunction with a braid breaker.

J. O. Brown G3DVV
Tadworth, Surrey

OUR SERVICES

QUERIES

We will always try to help readers having difficulties with a *Practical Wireless* project, but please observe the following simple rules:

1. We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
2. We cannot deal with technical queries over the telephone.
3. All letters asking for advice **must** be accompanied by a stamped, self-addressed envelope (or envelope plus International Reply Coupons for overseas readers).
4. Write to the **Editor, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP,** giving a clear description of your problem.
5. Only one project per letter, please.

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 most of our more recent projects are available from **CPL Electronics,** 8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE, telephone Middlesbrough (0642) 591157. The **printed circuit boards** are available from our **PCB SERVICE** (see page 1 of this issue).

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.

BACK NUMBERS AND BINDERS

Limited stocks of most issues of *PW* for the past 18 years (plus a few from earlier years) are available at £1.25 each, including post and packing to addresses at home and overseas (by surface mail).

Binders, each taking one volume of *PW,* are available price £5.50 to UK addresses, £5.75 overseas, including post and packing. Please state the year and volume number for which the binder is required. Prices include VAT where appropriate.

CLUB NEWS

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

ORDERING

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

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

SUBSCRIPTIONS

Subscriptions are available at £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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144MHz Contest

The Derby & District ARS are holding a national 144-145MHz contest on Sunday March 15. Briefly the rules are:

1: 15 March 1987
2: 1300-1700GMT
3: All modes, but band plan must be observed. Fixed, /P and /A are all permitted.
4: Exchange callsign, RS(T), serial number (start 001) and administrative county or Scottish region.
5: G3ERD = 10 points, all other = 2 points. Final score is total number of points multiplied by number of counties. Calls on calling frequencies or repeaters are not allowed.
6: Logs must be sent to D&DARS, 119 Green Lane, Derby. They must arrive by April 1.
7: Three sections, (a) full legal limit, (b) low power 25W max. output (c) s.w.l.
8: The decision of D&DARS is final.

For a full list of rules send an s.a.e. to *D&DARS, 119 Green Lane, Derby DE1 1RZ.*

Met on the Move

MET Antennas, formerly based in Dover, are pleased and proud to announce that there has been a change in ownership.

The MET range is now manufactured in Worcestershire under the watchful eye of Alan Kelly. Alan is already a familiar and popular face at most rallies throughout the UK.

He and his staff would like to assure the amateur fraternity that MET's reputation for quality, reliability and friendly service will continue.

MET's ever-popular range of NBS Yagis will still be available from all reputable dealers nationwide or direct from the manufacturers.

For a current catalogue and price list, send an s.a.e. to: *A. Kelly Communications, 3 Stoke Road, Aston Fields, Bromsgrove, Worcs B60 3EQ.*

College Courses

The next Morse code class has just started (Feb 4) for 10 weeks on Wednesday evenings 1830–2030 at Canterbury College of Technology, New Dover Road, Canterbury. An RSGB code test is available at the end of the course for members of suitable standard. The fee for the course is £22. Further details from *Derek Buckley G4OQD on 0227 66081 ext 218.*

Special Event Stations

GB2RCK: The Rotary Club of Kirkwall are holding a Hobbies Exhibition in the Town Hall, Kirkwall, Orkney on 14/15 March. The times will be:
March 14—10am to 4.30pm
March 15—2pm to 5pm
If you want more details then contact *Bill GM3IBU QTHR.*

GB2SDD: The Saint David's Day Specials will again be operating on March 1. They actually start operating at midnight Feb 28 and finish at midnight March 1. Activity will be, conditions permitting, on all h.f. and v.h.f. bands. To qualify for the Saint David's Day Award UK amateurs must work GB2SDD on March 1 and ten Welsh stations during March, April and May. Outside the UK the requirements are GB2SDD and 5 Welsh stations. For more details contact *R.R. Jones, Bryn-Ynys, 13 Strawberry Place, Morriston, Swansea, West Glam SA6 7AG.*

GB4VBP: February 22 is Girl Guide and Brownie Thinking Day. The 4th Verwood Brownie Pack will be running a station for "Thinking Day on the Air" on both February 21 and 22 from the QTH of their Brown Owl and G8VFH. The station will be operated by G4WNC, G4LFM and G4VFH and as many Brownies as possible. They will be running h.f., v.h.f. and probably u.h.f. using the modes RTTY, AMTOR, Packet, s.s.b. and even f.m. Other demos will be the reception of weather FAX pictures.

EDXC Road Shows 1987

The European DX Council is organising two Conferences with Exhibitions devoted to international broadcasting in two UK venues this year.

The EDXC Road Shows aim to promote the DX hobby amongst the public, but each Show will also be of great interest to existing shortwave listeners.

At each Road Show there will be talks about the latest shortwave receivers—the Lowe HF-125, reviewed in this issue of *PW*, for example—and talk about the shortwave hobby by prominent DXers in Great Britain.

There will be the opportunity to try out various receivers with "hands-on" demonstrations at the stands of Lowe electronics and South Midlands Communications at each Road Show. International broadcasters will have displays with the latest schedules available, and the European DX Council will have a stand complete with a micro-computer display. UK DX Clubs will also be taking part.

The first Road Show will be in Birmingham on Saturday February 21 at the New Imperial Hotel, Temple Street, Birmingham starting at 1130 until 1730 and the second will be on Saturday March 7 in Newcastle-upon-Tyne at the Royal Station Hotel, Neville Street, Newcastle, also from 1130 until 1730. With lots to see, hear and do, make a date in your diary now.

Here's a special offer for readers of *PW*: order your tickets in advance and save admission charges! Tickets on the door will be priced at £1.50 for adults and £1 for children, OAPs and UB40s, but you can order direct from EDXC now and the cost will be just £1 for adults and 50p for concessions.

Write today, enclosing your cheque or postal order payable to EDXC, and an s.a.e. to: *EDXC ON The Road Shows, PO Box 36, Wallingford, Oxon OX10 OTG.*

Awards Book

Sue Squibb has been an s.w.l. for the past five years and has made good use of her time. She has produced a booklet detailing over 250 awards that are on offer to the amateur and s.w.l. Each award has details about the requirements, addresses and all the other information you need to apply for the award.

The booklet costs £3 by post, US $8 or 15 IRCs. The address is *Sue Squibb, 36 Frognal Gardens, Teynham, Sittingbourne, Kent ME9 9HU.*

Can You Help?

G4ZVP wants to find the address of Brain Child Electronics Corporation. He has a Type 200W a.m. s.s.b. h.f. solid state linear amplifier and requires a circuit diagram for it. If you can help with either the address of Brain Child or a circuit diagram then contact. *Mr B Rhodes, 13 Amanda Road, Harnorth, Nr Doncaster DN11 8HP.*

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Maxpak at NEC

The Midlands AX.25 Packet Radio Users Group will be working hand-in-hand with the RSGB to provide a live demonstration of Packet Radio at the National Convention on March 27/28 at the NEC.

Working with both RAYNET and BARTG, they will have three stations working within the hall. Located on the RAYNET stand, which will be an island in the centre, will be the two main stations. These will be connected to each other via a station acting as a Digipeater, located on the BARTG stand.

Those interested in AX.25 can meet members of MAXPAK to find out more about Packet Radio.

New Radio Club

A new club has been formed, called the Twickenham & Teddington Wireless Club. At present the club meets monthly in a local hostelry. Details of membership and the current venue can be obtained from John G0AKN on 01-892 2820 (evenings). As the club is in its infancy, officers have still to be elected.

Radio Rallies

February 28
The Rainham Radio Rally will be held at the Parkwood Community Centre, Parkwood Green, Deanwood Drive, Rainham. Admission will be 50p and the doors open at 10am. There is a free car park as well as talk-in on S22. For more details contact *John G0ARB QTHR.*

March 8
The second Wythall Radio Club Rally will take place at Wythall Park, Silver Street, Wythall. Doors open at noon and there are three halls of trade and club stands to look around. RSGB Morse tests available. For more information contact *G0EYO on 021-430 7267*

March 15
The Northern Amateur Radio Societies Association will be holding its 25th annual exhibition at Belle Vue in Manchester. Doors open at 11am and the exhibition is open until 4pm, entry is free. They need a venue for 1988, and finding one comparable to Belle Vue with a floor space of over 10 000 square metres won't be easy. If you can think of an alternative then telephone *Chris Harrison on 061-773 7899* during the evening.

March 22: The Tiverton SWRC are holding the Mid Devon Rally at The Pannier Market, Tiverton. The rally opens at 10am and there will be talk-in on S22. The venue has both easy access and excellent parking. For more details contact *G4TSW, PO Box 3, Tiverton, Devon EX16 6RS.*

July 19
The fifth McMichael rally will be held at the Haymill centre, Burnham, near Slough. Doors open at 10.30am (10.15am for disabled visitors). The usual trade stands will be there as well as a car boot sale area for those with only a few items to sell. There should be other attractions for all the family too. More details from *Bob Hearn G0BTY, 70 Herbert Road, High Wycombe, Bucks.*

July 26: Scarborough ARS Rally, The Spa, Scarborough. The rally opens at 11am and there will be talk-in on S22, SU8 and RB0 (GB3NY). More details can be obtained from *Ian Hunter G4UQP, QTHR or Tel: 0723 376847.*

August 2
The sixth mobile rally for the Rolls Royce ARC will be held at the Rolls Royce S&SC, Baroldswick. Door open at 11am and there should be a wide range of trade stands on show. As usual there will be talk-in, refreshments etc. For more details contact *L.G. Logan, 19 Fenton Avanue, Barnoldswick, Colne, Lancs BB8 6HB.*

September 13: The Lincoln Hamfest will be at the Exhibition Centre, Lincolnshire Show Ground. Admission is by lucky programme.

BT Extensions

To enable people to do their own telephone extension wiring, BT are marketing both kits and individual components.

Customers can now choose whether to install their own plug-in extension points and wiring, employ a private contractor to carry out the work, or continue to use BT services.

All the kits contain easy to use instructions. A starter pack to add one new extension socket is £9.95 and a two-extension kit is £14.95.

If you still have the old style wiring in your house you must get BT to convert the system before you can take advantage of the kits.

Licences Re-Issued

The DTI have announced a change in policy regarding the re-issuing of lapsed amateur radio licences with the original callsigns.

They have now decided to permit any previously held licences to be re-issued to the legitimate holders—even where the original qualifications were not based on the current City & Guilds RAE syllabus. The one exception concerns licences which had callsigns in the G5 + three letters series; that series has already been withdrawn for re-use, so will not be available.

Previously the DTI's policy has been to permit only the re-issue of licences which were obtained on the basis of a pass in the RAE, conducted by the CGLI and awarded after 1958.

In order to reduce the administrative burden on the DTI the onus will be firmly on the applicant to provide evidence that he/she did in fact hold that licence and to satisfactorily provide confirmation of their identity. The applicant would be required to provide:

1: Evidence of having previously held the licence with that callsign.

2: Full details of the lapsed licence.

3: Proof of the applicant's identity.

There will be no change to the requirement that all new first-time licensees hold a pass in the RAE.

Applicants for the re-issue of lapsed licences should be made, in writing, fully supported by the necessary documentary evidence, to: *Department of Trade & Industry, Radiocommunications Division, Amateur Radio Section, Room 613, Waterloo Bridge House, Waterloo Road, London SE1 8UA.*

DXpedition

The Mid Northants Expedition Group has set their sights on an island hopping expedition to Scotland this year. The programme of events is:
Date: May 9 to 16
Callsign: GB0IOS
Location: Harlosh, Isle of Skye (NG24)
Operators: G1AUY, G0AGE, G4TTX, G4VID, G4XAO, G4XBN, G5LP.
Frequency: All h.f. bands with preference to 3·760MHz WAB. Net frequency for all mobile and portable activity. Limited facilities on 144 and 430MHz.
QSL: Special QSL for both GB0IOS and /M, /P activity on individual calls. QSL via RSGB Bureau or direct via G4VID, QTHR. Please include postage or 2IRCs for direct QSLs.

For more information contact ***G5LP QTHR.***

QTI-TNA

QTI Talking Newspaper Association have had a change around. After a successful year, Shirley Evans has completed her "term of office" on QTI-TNA, the radio magazine for blind radio amateurs and s.w.l.s. Her place has been taken by Janine Gillingham. Janine can be contacted at 2 Cartmel Walk, North Anston, Sheffield S31 7TU. You can telephone Dinnington 566301, Monday to Thursday between 9am and 3pm.

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AMRAC User

That's the title of the bi-monthly magazine from AMRAC. It's full of interesting and useful articles for those interested in data communications. Obviously with the "in thing" of the moment being Packet Radio there is lots to read on the subject, repeater news, networking ideas and details of the SWAX 25 meetings. Of course other data modes like AMTOR etc all get their fair share of the space.

AMRAC membership runs from May 1 to April 30 each year, if you join at other times during the year the subs are adjusted for the first year. Current subscription rates are £5 (postal UK members), £8 (postal Europe members), £10 (postal members rest of the world). For those living in the area and who attend the meetings, the subs are £8 or £10 for family membership.

You can send your subs to the treasurer, *Trevor Trigell G1JAF, "Gleness", East Boldre, Brockenhurst, Hants SO42 7WD.*

Radio Telescope

The Swansea Astronomical Society, in conjunction with University College Swansea, will be commissioning the Society's 10m radio telescope—late of Jodrell Bank—some time in 1987.

They would like to extend an invitation to readers living at an appropriate distance to join their Society and avail themselves of a facility whereby they may enlarge the field of their theoretical and practical activities.

They need a couple of "boffins" in their ranks to help out! Annual membership is £4 senior, £3 retired or UB40, £1.50 student.

For more information contact *Colin Jones, Ty Carreg Felin, 42 Penyfai Lane, Llanelli, Dyfed SA15 4EN.*

RSGB AGM '86

At the AGM of the RSGB in 1986, Ian Able recorded the proceedings. If anyone wishes to borrow the tapes, they should send him an s.a.e. The address is *Mr I Able, 52 Hollytree Avenue, Maltby, Rotherham, Yorks.*

Radio Engineering Changes

Angus: The v.h.f. f.m. station at Forfar has been re-equipped. The transmitter, near Carrot Hill, is broadcasting:

Radio 1/2	88·3MHz
Radio 3	90·5MHz
Radio Scotland	92·7MHz

Radio Cleveland: The Bilsdale West Moor v.h.f. f.m. transmitter has changed frequency to 95·0MHz. All the other Radio Cleveland frequencies will stay the same.

Darvel: The new BBC v.h.f. f.m. transmitter should now be in service. It will broadcast:

Radio Scotland	93·9MHz
Radio 1/2	89·5MHz
Radio 3	91·7MHz

The old transmitter on the Carrick Hills will close down.

Radio Norfolk: The Great Massingham v.h.f. f.m. transmitting station has changed its frequency to 104·4MHz (it used to be 96·7MHz). All other Radio Norfolk frequencies will remain the same.

Radio York: The transmitter at the Oliver's Mount, Scarborough has changed frequency from 97·2MHz to 95·5MHz. For best reception, listeners will needs an outside horizontal antenna. All other Radio York frequencies will remain the same.

TV Engineering Changes

Carhampton: A new relay station has been built to the east of Carhampton. The channels to be used are:

Ch. 30 HTV West
Ch. 34 BBC 1 West
Ch. 56 Channel 4
Ch. 67 BBC 2

Viewers will need to use vertical Group W antennas, mounted outside.

Coalbrookdale: Better television reception can be expected for those in the area as a new transmitter has been built about 3km north-west of Ironbridge. The transmitting antennas are actually mounted on the outside of a private residence. The channels are:

Ch. 41 Channel 4
Ch. 44 BBC2
Ch. 47 ITV Central
Ch. 51 BBC 1 Midlands

Viewers will need vertical Group B antennas.

Luccombe: The relay station has been built at Luccombe Riding School and should bring better reception to those living in the area. The channels are:

Ch. 34 IBA Channel 4
Ch. 56 BBC 1
Ch. 59 ITV TSW
Ch. 62 BBC 2

Viewers will need vertical Group W antennas.

New Barnet: For those not receiving good pictures from Crystal Palace in New and East Barnet a new transmitter has been built. The channels being used are:

Ch. 48 Channel 4
Ch. 55 BBC 1
Ch. 59 ITV
Ch. 62 BBC 2

Viewers will need vertical Group C/D antennas.

WAB

Worked All Britain run regular nets to help those chasing rare locations. Details of these are shown here (MHz/clock time):

Monday 144·440 2000 Controlled from Midlands
Wednesday 144·440 2000 Controlled from N. England
144·430 2030 Controlled from S. Coast
Thursday 144·460 2000/2030 Controlled from E. Anglia
144·430 2000/2030 Controlled from S. Wales
Friday 144·440 2000 Controlled from N. England
144·430 2030 Controlled from London area
Saturday 144·260 1100 Controlled from Cheshire
Sunday 144·430 1030 Controlled from London area

For more details you should contact *Brian Morris G4KSQ, 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED.*

QSL Manager

Mario Raul Andraca LU8DPM has contacted us with a list of callsigns he is the QSL manager for. His address is *PO Box 45, (7150) Ayacucho, BS As Argentina, South America.*

The callsigns are:

CE8ABF	CE8EMM	CE5SG	CE4GTA
CE6EDZ	CE6CGU	CE3FIP	CE3DNP
		CE1FGT	3G3C
		C30LCK	ZP0JCY
		ZP5LUY	ZP5LHY
		ZP5JCZ	ZP5JCY
		CX2DC	LU2E
		LU8FEU	LV3XQB
		CE7DQM	CE3FTV
		CE6MBQ	CE2DSA
		CE3BST	CE2HBY

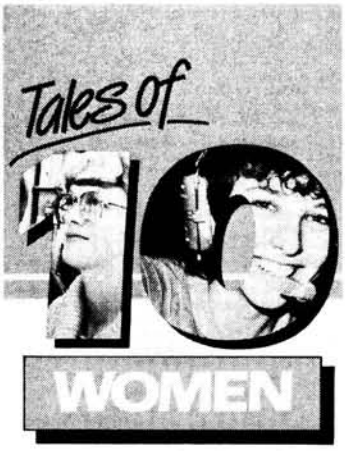
Careers Booklet

A new booklet aimed at encouraging girls to enter the engineering profession has been produced by the IEEIE.

It's called *Tales of Ten Women* it profiles ten winners of finalists of the prestigious Girl Technician of the Year Award. The profiles are written in a style which will appeal to readers in their early teens.

It is hoped that the stories contained in the booklet will encourage other girls to pursue careers as technician engineers.

The booklet is available on request from *The Secretary, IEEIE, Savoy Hill House, Savoy Hill, London WC2R 0BS.*



. . . who are glad they chose ENGINEERING

Apologies . . .

To any reader who has written in to *PW* recently, for the delay in replying to you. We are working our way through the backlog, and an answer should be with you before too long.

Please remember though, that all letters requiring a reply **must** include a stamped self-addressed envelope, or International Reply Coupons if you are an overseas reader.

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PRODUCTS ... compiled by G8VFH

MSF Clock Program from G4IDE Micro Systems

This software was briefly mentioned in the *PW* "Taw" project, (*PW* Nov. 86), causing quite a flurry of interest in the MSF Time Standard. This user-friendly program, when used in conjunction with a Spectrum computer and suitable 60kHz v.l.f. receiver, gives a very accurate off-air time standard, showing date, day and time down to a second. It requires no hardware, the audio signal being fed straight from the receiver's extension speaker socket into the Spectrum's EAR socket.

One of the most remarkable features of the program is the visual on-screen tuning aid allowing easy trimming of the receiver's b.f.o. control. The program is available on cassette tape from ***G4IDE Micro Systems, 79 South Parade, Boston, Lincs PE21 7PN,*** at £4.00 (UK) and £5.00 overseas inc. p&p.

Spike Cleaner

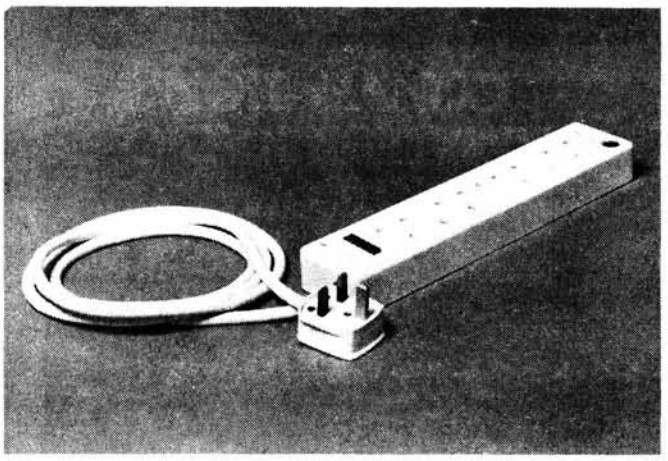
If you are still having problems with mains spikes and surges then Bowthorpe EMP of Brighton have just the thing for you.

Their newly introduced Apollo Clean Power 4-way socket outlet provides a convenient means of supplying clean, spike-free power to four independent pieces of mains powered equipment.

Developed from technology used in their proven Spike Protector Plug, the Apollo will protect sensitive microprocessor-based equipment from the effects of sudden mains voltage spikes generated by lightning or switching surges induced by a wide range of domestic and industrial equipment.

The Apollo will safely clip a spike of up to 10kV to a level well within the safety margins set by most equipment manufacturers within 10 nanoseconds, it uses negligible power and resets automatically after clipping a spike.

At a retail price of £14.49 (inc. VAT) with postage an extra £1.50, the Apollo is made by ***Bowthorpe EMP Ltd, Stevenson Road, Brighton, East Sussex BN2 2DF. Tel: (0273) 692591.***



Antenna Masts

Tennamast is a new company, formed by Norman Brown GM 4VHZ to produce a range of tiltover antenna masts.

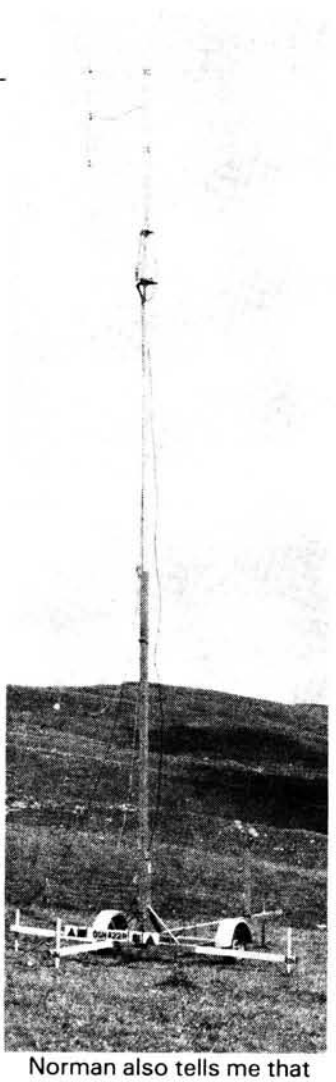
Tennamast are producing several versions of the mast, mobile and fixed and can offer minor variations to suit customers' needs.

According to the brochure "precision engineering and the finest materials ensure maximum reliability and durability", and are capable of handling windspeeds of up to 160km/h with a payload of 50kg and meet the requirements of BS CP3 Ch5 Pt2 1972.

All the inner surfaces of the structure are protected by wax, the upper sliding section is fully galvanised while the rest of the mast is primed.

The mast can be tilted and raised by just one person, even, the company claim, by the disabled. Nylon pulleys and top sleeve cut down friction while several safety features are incorporated to prevent accidents.

Full technical specifications and prices are available from ***Tennamast, Mains Road, Beith, Ayrshire, KA15 2HT. Tel: (05055) 3824.***



Norman also tells me that they manufacture a kit of parts which are suitable for either the VK2ABR tribander antenna featured in the Feb. 87 issue of *PW* or a quad.

Packet Radio Hardware

Siskin Electronics have sent me a copy of their price list together with some technical details of their range of packet radio equipment.

Included in the range are the new TNC-220 terminal node controller, single and dual-port digipeaters and a 5-mode terminal unit by Advanced Electronic Applications Inc.

As far as software for packet is concerned there are several public domain packet terminal programs available for the cost of a disk and return postage and computers catered for include the Atari 520ST, IBM PC, CBM64 and some CP/M formats. Siskin hope to launch their own enhanced Atari 520ST packet terminal software shortly. For the BBC-B they can supply a TNC200/220 enhanced packet terminal ROM at £11.50 inc. VAT.

For further details and prices contact ***Siskin Electronics, PO Box 32, Hythe, Southampton SO4 6WQ. Tel: (0703) 849962.***

CLUB NEWS

If you want news of radio club activities, please send an s.a.e. to our Poole office, stating the area of the country you're interested in. Club Secretaries, please keep the info coming to Elaine Richards G4LFM.

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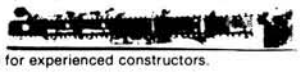
PRICE £22.50 × £1.00 Post and packing (built & tested)
Works excellent in Cybernet, Binatone Lowe TX40G etc. *Check if your radio has the Sanyo chip fitted. We will fit unit for you **£40.00** inclusive. P & P.



* Only suitable for experienced constructors.

KIT OF PARTS AVAILABLE **£17.50 × £1 p&p.**
*Only available from RWC see R&EW March 1985 for full circuit description etc.

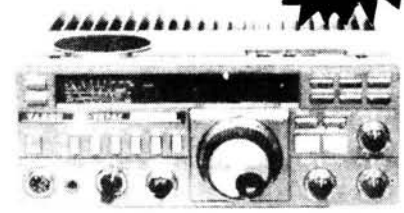
New Storno CQM713/P3 2mtr Modification Kit NEW
This new kit of parts enables conversion of the Storno 55ch Radiophone to the amateur 2mtr band. The end result is a 80ch 25Khz steps 25W transceiver with repeater shift and option of local or remote control BCD or B. ary channels. The unit renders the ideal basis for a cost-effective mobile or Packet Radio transceiver or even Raynet emergency repeater! The kit comprises of two pcbs 2× adder chips, components (excluding external switches and pots) and 2× 7th overtone crystals and instructions and should present the average amateur with some constructional experience the minimum of difficulty. Why not have a go! Many parts available. Storno Mod Kit. **£29.50** Inc post.

FRG9600 SCANNING RECEIVER

The FRG9600 Scanning receiver was first modified by RWC and now has coverage up to 950Mhz and improved receiver performance and S meter. We fit an additional BNC socket for frequencies above 460Mhz and are able to supply optional antennas to cover this range. This has been our most successful mod to date with many delighted customers, to our competition who copy the mod we say "Immitation is the best form of flattery!"

Again we improve a fine HF transceiver by fitting our FAST TUNE FACILITY. The mod is "free of charge" at normal retail price, or send your rig, carriage paid and payment of £34.50 and we'll fit it for you. Can be fitted by experienced constructors. Built and tested kit at £20 Inc p&p.

INSIST THAT YOUR NEW 757 HAS OUR "FAST TUNE" MOD.....



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15 FM/CW	V15F	£39.50

All units use Mitsubishi or Toshiba power modules.

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		6A 8 A MAX	
1305	13.8V 5 Amp Max	£28.50	post £3.00
1303	13.8V 3 Amp Max	£19.25	post £2.50

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AZ31	2.75	EM81	2.50	PL519	6.00	6AK5	5.99
CL33	4.00	EM87	2.50	PL802	6.00	6AL5	1.50
DY86/7	1.50	EN91	6.50	PY33	2.50	6AM6	6.02
DY802	1.50	EY51	2.75	PY81	1.50	6AN5	4.75
E88CC	10.33	EY86	1.75	PY82	1.50	6AN8A	3.50
E180F	12.05	EY88	1.75	PY83	1.25	6AQ5	3.25
E810F	35.48	EY500A	3.00	PY88	2.00	6AR5	25.00
EABC80	1.25	EZ80	1.50	PY500A	4.00	6AS6	8.66
EB91	1.50	EZ81	1.50	PY800	1.50	6AS7G	8.75
EBF80	1.50	GY501	3.00	PY801	1.50	6AT6	1.25
EBF89	1.50	GZ32	4.00	QQV02-6	38.00	6AU5GT	5.00
EC91	8.00	GZ33	4.75	QQV03-10	26.25	6AU6	2.50
ECC33	4.50	GZ34	4.00	QQV03-20A	48.38	6AW8A	3.75
ECC35	4.50	GZ37	4.75	QQV06-40A	46.00	6B7	3.25
ECC81	1.75	KT61	5.00	QV03-12	6.80	6B8	3.25
ECC82	1.75	KT66	15.00	R18	3.00	6BA6	1.50
ECC83	1.75	KT77 GOLD	12.00	R19	9.24	6BA7	5.00
ECC85	1.75	KT88 LION	20.00	SP41	6.00	6BE6	1.50
ECC88	3.50	N78	15.00	SP61	4.00	6BH6	2.50
ECC91	8.93	OA2	3.25	U19	13.75	6BJ6	2.25
ECF80	1.50	OB2	4.35	U25	2.50	6BN6	2.00
ECH35	3.00	OC3	2.50	U26	2.50	6BQ7A	3.50
ECH42	3.50	OD3	2.50	U37	12.00	6BR7	6.00
ECH81	3.00	PC86	2.50	UABC80	1.25	6BR8A	3.50
ECL80	1.50	PC88	2.50	UBF89	1.50	6BS7	6.00
ECL82	1.50	PC92	1.75	UCH42	2.50	6BW6	6.00
ECL83	3.00	PC97	1.75	UCH81	2.50	6BW7	1.50
ECL86	1.75	PC900	1.75	UCL82	1.75	6BZ6	2.75
EF37A	5.00	PCF80	2.00	UCL83	2.75	6C4	1.25
EF39	2.75	PCF82	1.50	UF89	2.00	6C6	3.50
EF41	3.50	PCF86	2.50	UL41	5.00	6CB6A	2.50
EF42	4.50	PCF801	2.50	UL84	1.75	6CD6GA	5.00
EF50	2.50	PCF802	2.50	UY41	2.25	6CL6	3.75
EF54	5.00	PCF805	1.70	UY85	2.25	6CH6	13.00
EF55	3.50	PCF808	1.70	VR105/30	2.50	6CW4	8.00
EF80	1.75	PCH200	3.00	VR150/30	2.50	6D6	3.50
EF86	3.50	PCL82	2.00	Z759	25.00	6DQ5	7.50
EF91	2.95	PCL83	3.00	Z803U	25.00	6DQ6B	4.75
EF92	6.37	PCL84	2.00	2D21	3.25	6EA8	3.00
EF183	2.00	PCL85	2.50	3B28	50.00	6EH5	1.85
EF184	2.00	PCL86	2.50	4CX250B	58.00	6F6	3.00
EH90	1.75	PCL805	2.50	512A	47.50	6GK6	2.75
EL32	2.50	PD500	6.00	5R4GY	5.50	6H6	3.00
EL33	4.00	PFL200	2.50	5U4G	3.00	6HS6	3.77
EL34	4.00	PL36	2.50	5V4G	2.50	6J5	4.50
EL36	2.50	PL81	1.75	5Y3GT	2.50	6J6	8.93
ELL80	25.00	PL82	1.50	5Z3	4.00	6J7	4.75
EL81	5.25	PL83	2.50	5Z4GT	2.50	6JB6A	6.50
EL84	2.25	PL84	2.00	6/30L2	1.75	6JE6C	7.50
EL86	2.75	PL504	2.50	6AB7	3.00	6JS6C	7.50
EL91	7.39	PL508	5.50	6AH6	5.00	6K6GT	2.75
EL95	2.00	PL509	6.00			6K7	3.00
EL360	18.50					6K8	3.00

6KD6	8.00	7027A	8.00
6L6G	5.00	7360	10.00
6L6GC	5.75	7586	15.00
6L7	2.50	7587	23.00
6LQ6	7.50		
6Q7	3.75		
6RHH8/6KN8	10.00		
6SA7	3.00		
6SC7	2.75		
6SJ7	3.25		
6SK7	3.50		
6SL7GT	3.00		
6SN7GT	3.00		
6SS7	2.75		
6SG7M	2.50		
6U8A	2.25		
6V6GT	4.25		
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6X5GT	1.75		
12AX7	1.75		
12BA6	2.50		
12BE6	2.50		
12BY7A	3.00		
12E1	20.00		
12HG7	4.50		
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30P4	2.50		
30P19	2.50		
30PL13	1.80		
30PL14	1.80		
572B	55.00		
805	45.00		
807	3.75		
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812A	47.50		
813	65.00		
866A	35.00		
872A	20.00		
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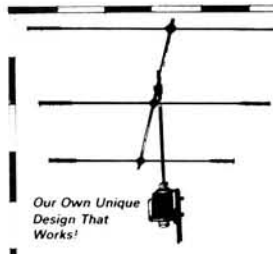

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ANTENNA MODEL	AQ6-20/2E	AQ6-20/3E	AQ40/2E
Forward Gain Dbd.	3.8 to 4.8	5.5 to 7.5	3.8
Front to Back Db	13 to 15	16 to 18	12
Side Null Db	25	25	20
VSWR (Typical)	1·1:1	1·1:1	1·1:1
Weight	7·5 lb	12 lb	12 lb
Wind Load	2ft²/0·18M²	3ft²/0·27M²	3ft²/0·27M²
Turning Radius	76"/1930mm	96"/2438mm	114"/2895mm

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PW "Woodstock" Short Wave Converter

The v.h.f. scanning receiver must rank as one of the most important pieces of equipment to a keen s.w.l. This short wave converter designed by Bryan Robertson G4POL will without doubt make the scanner quite the most versatile and useful piece of equipment you ever purchased.

There are now a wide range of v.h.f. and u.h.f. scanning receivers available on the market. Each has differing features but those that are common to almost all are as follows: they receive a.m. and tune in 5kHz steps; they have digital readout; they are stable, and have memory facilities.

The following article describes a simple up-converter which when placed ahead of a scanner tuning 50 to 80MHz will provide the listener with the added frequency coverage of 10kHz to 30MHz. Those fortunate enough to own a scanner with the provision of a b.f.o. and fine tune will also be able to resolve s.s.b. and c.w. stations. The range of stations to be heard will be limited only by the antenna and type of scanner used.

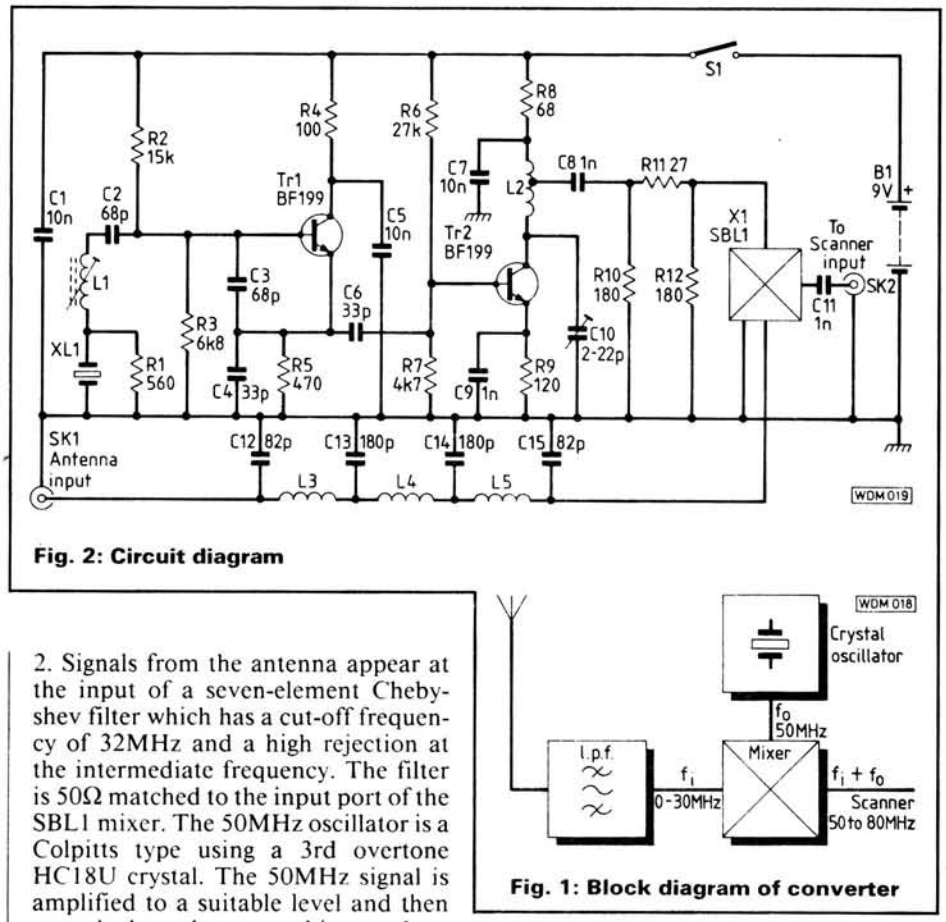

Fig. 2: Circuit diagram

Fig. 1: Block diagram of converter

Choice of I.F.

Early scanners didn't cover all of the v.h.f. spectrum the portion from 88 to 108MHz usually being omitted as it required a wide band f.m. demodulator for listening to f.m. broadcast stations.

The later versions now have continuous coverage. The obvious choice for frequency conversion would be to use a 100MHz oscillator which would make keypad entry simple, e.g. 15·325MHz being entered on the scanner as 115·325MHz. This is fine if you have a later type scanner covering 100 to 130MHz, but not a practical solution for owners of earlier models. A compromise was therefore sought. A 50MHz oscillator was used to mix with the incoming signals in the range 0 to 30MHz, providing an output between 50 and 80MHz, this range being available on most scanners.

Circuit Description

The block diagram shown in Fig. 1 represents a simple but effective converter based on a 50MHz crystal oscillator and an SBL1 double balanced mixer. The frequency required at the output of the converter is the input frequency f_i, plus the oscillator frequency f_O, e.g., (f_i) = 10MHz = ($f_i + f_O$) = 60MHz.

The circuit diagram is shown in Fig. 2. Signals from the antenna appear at the input of a seven-element Chebyshev filter which has a cut-off frequency of 32MHz and a high rejection at the intermediate frequency. The filter is 50Ω matched to the input port of the SBL1 mixer. The 50MHz oscillator is a Colpitts type using a 3rd overtone HC18U crystal. The 50MHz signal is amplified to a suitable level and then passed through a matching pad to present a 50Ω impedance to the mixer port. The resultant output of the mixer is sufficient to feed directly into a scanner. The mixer has a conversion loss of 6dB which is equivalent to about 1 S-point, but the strength of broadcast signals is such that all but the weakest signals will be heard provided a reasonable antenna is used.

Construction

The layout and track patterns of the double-sided p.c.b. are shown in Fig. 3. The board should be made from double-sided, copper clad, glass fibre material. The upper side acts as a ground plane. Where leads of components are to pass through the board, the areas around holes in the ground plane should be cleared to prevent short circuits, this can be done using a drill bit.

When the board is prepared, solder in the resistors first followed by the capacitors. Note, all connections (except those of X1 and XL1) to earth are made on the upper surface of the p.c.b. rather than by passing the lead through a hole in the board. Care should be taken to bend the "earthy" leads of ceramic plate capacitors outwards using fine-nosed pliers, to avoid damaging the fragile body of the component. Next install the crystal and coils, L1 should be wound after its former is glued into the p.c.b.

Once the board is fully populated it can be mounted in a screened enclosure that is fitted with suitable coaxial terminations. If required, a switch for the supply may be included, particularly if the unit is to be run from an internal battery, the converter draws approximately 20mA.

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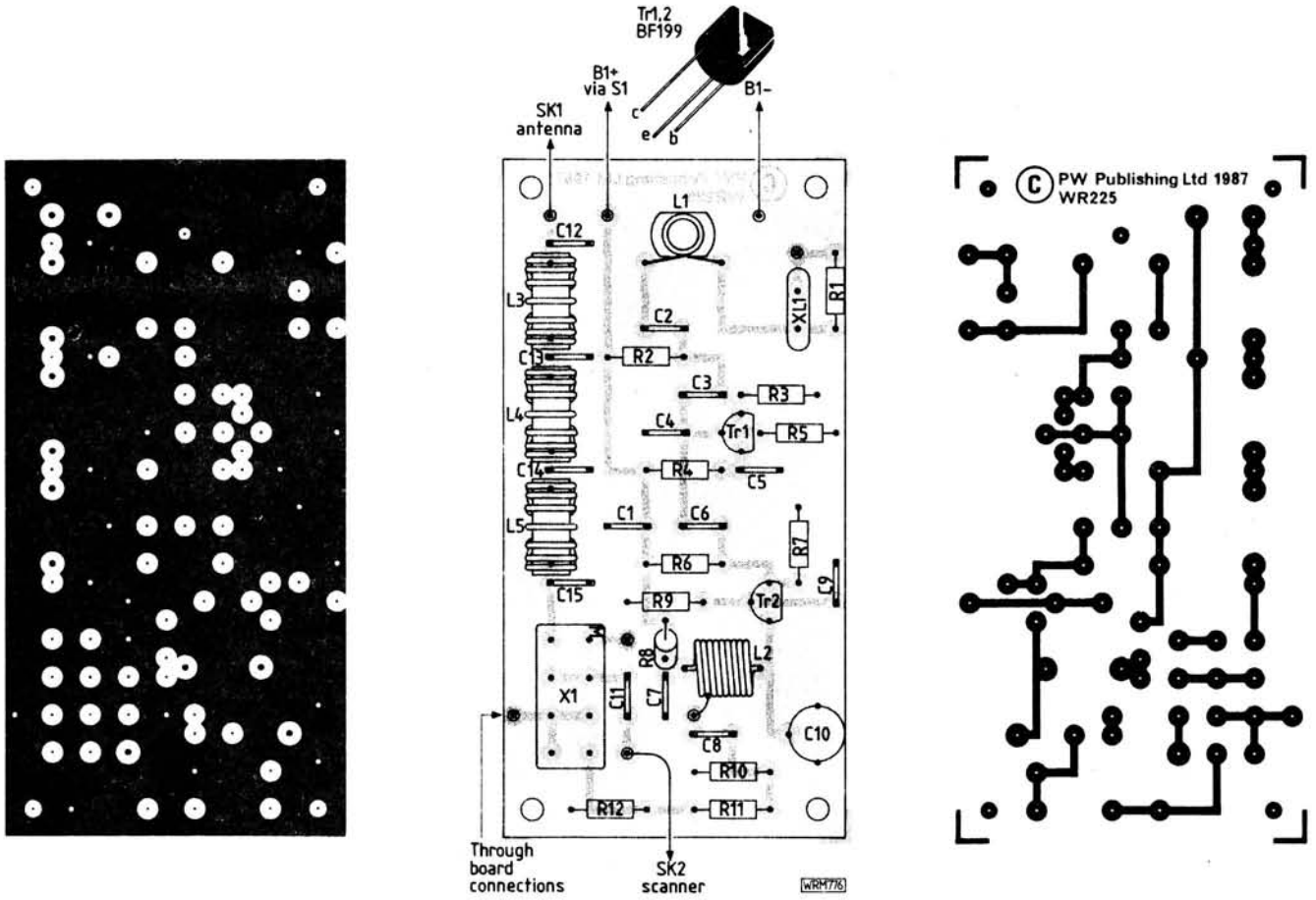

Fig. 3: Full-size p.c.b. track pattern and component location diagram of converter.

Alignment

The following sequence is for those without access to test equipment for alignment. First check all connections and the polarity of the supply. Connect the converter to the scanner, attach an antenna to the input of the converter and switch on. Dial in 50MHz on the scanner, you should hear the carrier of the crystal oscillator. Next adjust C10 until its plates are one third meshed, and set L1 core just level with the top of the former. If all is well, dial 65·070MHz, this corresponds with the BBC overseas service on 15·070MHz, it can usually be heard from dawn to dusk. Using the signal, if heard, adjust L1 and C10 until you get an audible or if your scanner has an S-meter, a visual increase in signal strength. Once this operation has been completed the converter is aligned.

For those possessing a frequency counter, the crystal frequency can be measured at the junction of L2/C10 and L1 adjusted for 50MHz. If an oscilloscope is available the same point may be monitored and C10 then peaked for maximum signal. For ease of frequency entry one could use the second harmonic of the 50MHz signal i.e., 15·070MHz would become 115·070MHz. This will only be possible if your scanner covers the frequencies between 100 and 130MHz, the first alignment procedure can still be used.

The alignment frequency of 15·070MHz was chosen because it is clear of adjacent stations and should be easily identified.

All that now remains to be done is to put the lid on the box and the world is your oyster!

In Use

The author listened to Radio Australia the day the prototype was built, the antenna consisted of a piece of wire,

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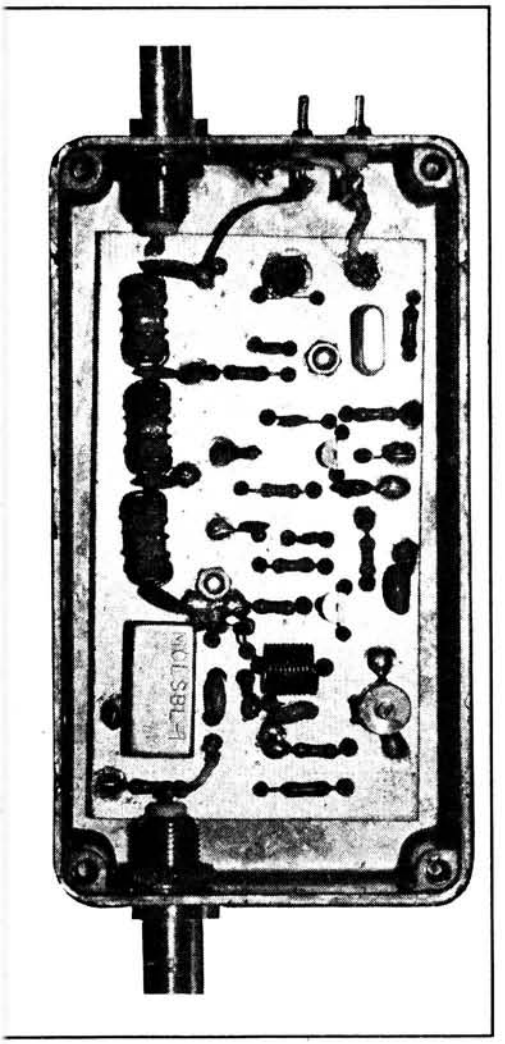

some 5 metres long, draped across the garage. The author's prototype was also tested at the *PW* office in Poole, in conjunction with an AR 2001 scanner, and it was felt that a simple antenna tuning unit or preselector would give a worthwhile improvement to the overall sparkling performance of the converter, particularly when used with a large antenna system. ***PW***

Special Thanks

Special thanks to Mervyn Staton G4BGT for his technical assistance on this project.

SHOPPING LIST

Resistors

0·25W 5% Carbon Film

27Ω	1	R11
68Ω	1	R8
100Ω	1	R4
120Ω	1	R9
180Ω	2	R10,12
470Ω	1	R5
560Ω	1	R1
4·7kΩ	1	R7
6·8kΩ	1	R3
15kΩ	1	R2
27kΩ	1	R6

Capacitors

Ceramic Plate

33pF	2	C4,6
68pF	2	C2,3
82pF	2	C12,15
180pF	2	C13,14
1nF	3	C8,9,11
10nF	3	C1,5,7

Miniature Foil Trimmer

2-22pF	1	C10

Semiconductors

BF199	2	Tr1,2[5]

Miscellaneous

XL1 50MHz (HC18/U 3rd overtone xtal) (1)[1]; X1 SBL1 double balanced mixer(1)[2]; 5·23mm dia Neosid (52-002-60) type formers(1)[3]; Core dia to suit, F29 material(1)[3]; T50/6 toroids(3)[2]; 34s.w.g. enamelled copper wire; 24s.w.g. enamelled copper wire; S1 s.p.s.t. Miniature toggle switch (1); Battery connector(1); Battery type 6-F22 (PP3)(1); Aluminium project box AB9 102 × 70 × 38mm(1)[4]; 50Ω BNC chassis sockets(2); p.c.b.(1); Veropins; 6BA nuts(12); 6BA × 12mm screws(4); 6BA washers(4); Adhesive feet(4).

(1) P.R. Golledge Electronics. G3EDW, Merriott, Somerset TA16 5NS. Tel: 0460 73718

(2) Cirkit Holdings PLC. Park Lane, Broxbourne, Hertfordshire EN10 7NQ. Tel: 0992 444111

(3) C.P.L. Electronics. 8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE. Tel: 0642 591157

(4) Maplin Electronic Supplies Ltd. P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel: 0702 554161

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Table 1: COIL WINDING DATA

Coil No	Turns	Wire s.w.g.	Coil Form Dia (mm)	Remarks
L1	5	34	5·23	F29 core material
L2	10	24	6mm	self supporting tapped at 1½ turns
L3/5	8	24	—	wound on T50/6 toroid
L4	9	24	—	wound on T50/6 toroid

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PW WESTBURY BASIC WOBBULATOR	Jan '87	£16.50
HIGH IMPEDANCE MOSFET VOLTMETER	Dec '86	£23.90
P.W. TAW-VLF CONVERTER	Nov '86	£13.20
ACTIVE ANTENNA	Nov '86	£17.80
AUTOMATIC NICAD CHARGER	Oct '86	£15.00
SIMPLE 50MHz CONVERTER	Sept '86	£21.50
P.W. ARUN-PARAMETRIC FILTER – inc. case	May '86	£48.00+£2 p&p
P.W. ARUN-PARAMETRIC FILTER – exc. case	May '86	£34.00+£1 p&p
MEON 2 – 50MHz TRANSVERTER – 144 MHz I.F.	April '86	£42.50+£1.50 p&p
R.F. SPEECH PROCESSOR	March '86	£47.20+£1.50 p&p
RTTY/MORSE MODEM – no case	Jan '86	£31.85
CRYSTAL CALIBRATOR	Jan '86	£17.95
TWO TONE OSCILLATOR	Dec '85	£20.30
MEON – 50MHz TRANSVERTER – 28MHz I.F.	Oct '85	£42.50+£1.50 p&p
DIP OSCILLATOR	Oct '85	£19.90
CAPACITANCE METER	Oct '85	£21.30
U.H.F. PRESCALER	Sept '85	£21.90
ADD ON B.F.O. – inc. C8D4+optional comps.	Aug '85	£12.95
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BATTERY CHARGER CONTROLLER	June '85	£9.50
TRIAMBIC KEYER	Feb '85	£16.45
BUG KEY WITH 528 BIT MEMORY	Oct '84	£46.50
MORSE SENDING TRAINER	July '84	£12.00
AUTO NOTCH FILTER	July '84	£23.80
MORSE PRACTICE OSCILLATOR	Jan '82	£9.20
COIL FORMERS+ CORES. (Simple 50MHz Converter)	Sept. '86	£2.70 per set

COMPONENTS

BC214L	12
BF224	.35
BF244	.35
BF256	.44
BF256L	.48
BF961	.75
BFY90	.88
J309	.72
J310	.72
VN10LM	.75
2N3702	.14
2N3704	.14
2N3819	.42
2N3866	£1.05
2N3904	.14
2N3906	.14
555	.22
741	.20
LF351	.46
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AR2001 Computer Interface

Way back in Mods 36, July 1986 PW, *I briefly mentioned a computer interface that had just become available for the AOR AR2001/2 and at that time I promised to pass on more information as it became available. I have now had a chance to learn more about the unit and I am even more impressed with its potential says Roger Hall G4TNT.*

The remote control pack has an anonymous looking box that simply plugs into the socket on the back of an AR2002 (an adaptor is needed for the 2001) and also into the RS232 socket of a home computer such as the BBC—the settings are 8-bit, no parity, 1 stop bit and 2400, 4800 or 9600 (switch selectable). There is no power lead as the unit taps into the scanner's supply.

Inside, the RC pack is far from anonymous. There is an 8-bit c.p.u. with its own ROM and RAM and the internal software is so comprehensive that it can be used with a "dumb" terminal instead of a computer. In this mode the built-in software gives the scanner 50 memory channels which can be set to scan/priority or locked out, 10 search bands, 20 lockout channels, adjustable delay times and so on. There is even a feature that allows you to assign descriptions to each of the memory channels so that you can remember what that frequency is and the memories can also be listed along with the appropriate descriptions. This program certainly extends the scanner's facilities and if this were all that it did, it would be worth having. Fortunately, it does much more. When it is used in conjunction with a computer, the user can ignore the built-in software and write a program to suit his own needs. This means that you can have as many memory channels as you want (or your computer can handle), log interesting frequencies, pre-set the levels at which the squelch opens and closes and at which the scan stops and so on. The possibilities are almost endless—if you can program a computer. Unfortunately I cannot and my idea of using a computer is to run the software and do whatever the screen tells me to. I am a computer illiterate but I am obviously not alone because Lowe Electronics have now made available two pre-written programs for the BBC that let you plug it in and go.

The first one is supplied on an EPROM that simply fits into one of the ROM sockets inside the computer. It is activated by typing in

*RC-PACK HH MM SS

where HH, MM and SS is the correct time which is used to set the on-screen clock (see the illustrations for a typical screen display).

Most of the control operations can be carried out with a single keystroke and there is a function key overlay to show which keys to use. Where more than one key has to be used, it is usually just a matter of following the on-screen prompts.

The AR 2002 and matching RC Pack

The Keys

The **ESCAPE** key is used to escape from any of the functions such as scanning, searching or entering memories.

The up/down arrow keys (↑ ↓) are for increasing or decreasing the frequency by the pre-selected step size.

The left/right arrow keys (← →) are for stepping backwards and forwards through the memories.

The **SHIFT f0** gives you a prompt which asks for a new step size in kHz which can be from 0·1 to 999·9kHz.

f0 asks you for a new frequency in MHz and it will accept 25 to 550MHz (and 800 to 1300MHz on the 2002).

f1 is used to add to or alter the scan memories. The memory that you want to change can be found with the up/down arrows or the appropriate channel number (1–50) can be entered. Prompts will then ask if you want to LOCK Y/N ?, ENTER FREQ. ?, MODE ? and DESCRIPTION ? This last facility allows you to write a 13-character description of that frequency (see photograph) and is probably one of the most useful features of this program. It means that whenever the set stops scanning, there is a little note there to remind you of the service that is using the frequency.

f2 is used for setting the upper and lower limits of the search bands.

f3 is the priority toggle switch. Channel 1 is the priority channel and it will work even if it is locked out. When the priority is on, it will interrupt you regardless of what you are doing in the program—even if you are entering memories.

f4 is used to enter the scan mode. If you want to temporarily hold on a frequency while in this mode, pressing the space bar will cause the scan to stop until it is pressed again.

f5 enters the search mode and the space bar works in the same way as before.

f6 toggles the delay. This has a default time of three seconds but is "user programmable".

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SHIFT f6 will save to disk all 50 memories, the search frequencies, the display frequency, the mode and step size.

f7, f8 and **f9** set the mode to wide f.m., narrow f.m. and a.m. respectively.

As you can see, this program allows you to make far more use of your scanner and yet again, if this were all that the RC Pack could do, it would be well worth having, but there's more.

As an example of the capabilities of this interface, Keith G8YQX (Lowe's programmer), has devised a fairly simple program that allows you to start and stop the scan at certain times, hold and/or ignore frequencies, create a noise level table so that the scan or search will only stop if the signal strength is greater than the base level, save the signal to cassette, print out the times that certain frequencies were in use, create a chart of frequency usage or noise levels, alter the delay time or set different delays on certain memories and have a pause facility for memories and/or search frequencies.

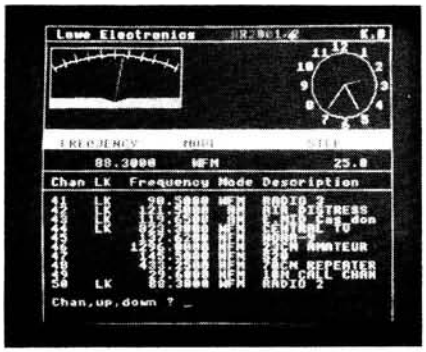
When I saw this program working, it has been set to listen across a specific frequency band and the scanner had been left running for several hours. At the end of that time, Keith pressed a few buttons and the computer's printer

Rear view of an AR 2002 and an RC pack showing the connecting lead and socket for connection to a computer

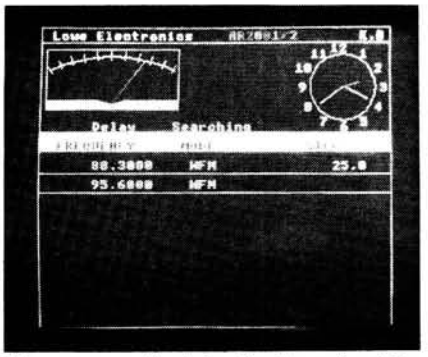
printed out a list of each of the specific frequencies that have been active during that time, along with the start and stop times of each transmission. Not only that, the cassette recorder that was plugged into the back of the computer had recorded the content of all of those transmissions!

This program is available as a listing or disk and if I knew just a little more about computers, I am sure that I could modify it to make it do even more. Those who know about these things have assured me that it is very simple.

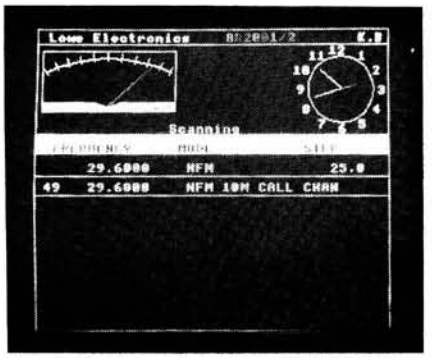
The RC Pack computer interface for the AR2001/2 is available from ***Lowe Electronics, Chesterfield Road, Matlock, Derbyshire*** for £255.63 inclusive with £2 carriage. I would suggest that anyone who uses a scanner for anything other than casual listening around should try it for themselves. ***PW***



A typical screen display provided by the RC Pack interface. Note the on-screen S-meter and real-time clock. Also shown are examples of the type of descriptions that can be used to label spot frequencies



The screen that is displayed while the unit is searching between preset frequency limits



A screen showing the display in the scan mode

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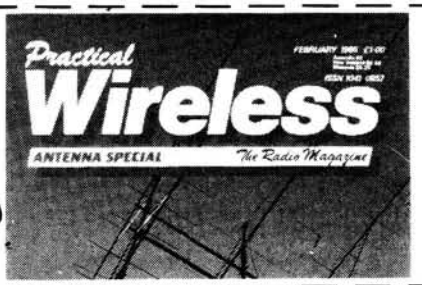

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Georg Simon Ohm

NAMES from the PAST

by Tony Smith G4FAI

Ohm's Law is learned by all students of electricity today, and prospective radio amateurs are sure to find a question on it in the RAE. However, they will probably have given little thought to how this important theory first came into existence. Behind every great discovery there is a story, usually of triumph in the field of adversity. In Ohm's case it wasn't quite like that.

His father, a self-sacrificing locksmith in Erlangen, Bavaria, was determined that his two sons should receive a good scientific education. Attending university in their home town, their mathematical ability was highly praised, and a brilliant future forecast for them.

Disappointment

Despite this auspicious beginning, Ohm's story is more of disappointment and frustration than success. He wanted desperately to obtain a university appointment, and to devote himself to study and research in an academic environment. In the event, he spent most of his life as a teacher, in poor circumstances, overwhelmed by the demands of his students, incurring the disapproval of his employers, and of many contemporary German scientists.

In 1806, after only eighteen months at university, he invoked his father's displeasure by allegedly over-indulging in billiards, dancing and ice-skating. He left Erlangen to teach mathematics in Switzerland, returning in 1811 to obtain his Ph.D. He stayed at the university teaching mathematics in an unpaid capacity, hoping to obtain a permanent appointment, but finally, in 1813, lack of funds forced him to seek employment elsewhere. He became a teacher of mathematics and physics at a low grade school, staying there, unhappily, until 1816.

Recognition

In 1817, he went to a new post in Cologne, where a well-equipped laboratory, coupled with a happier academic atmosphere, led him to take more interest in physics than hitherto. He studied the works of other scientists and, after Oersted's discovery of electromagnetism in 1820, turned his attention specifically to magnetism and electricity.

Courtesy The Science Museum

In 1825, he realised he was still making no progress toward attaining academic distinction. He then made a conscious decision to undertake original research, and publish the results, in the hope that this would be the means of improving his fortunes.

Following this, he published various papers on electric circuits, each dealing with some aspect of his eventual famous work. In 1826, he took a year's leave of absence to undertake research in Berlin where, the next year, he published a pamphlet, *The Galvanic Circuit Investigated Mathematically*, which propounded Ohm's Law as it is known today.

Unhappily for Ohm, his theory was poorly received by other scientists who, not realising the extent of his experimental work, assumed that he had merely published the results of theoretical calculations.

Hurt by this reaction, he resigned his post at Cologne and worked for the next six years, in Berlin, as a private tutor. He was appointed professor of physics at Nuremberg Polytechnic in 1833, but a university appointment still eluded him.

His work began to be accepted by younger German physicists, but it was not until it was recognised by scientists in England and France that it became well known and generally accepted in his own country. Belatedly, he began to receive the recognition due to him. He was invited to join various scientific societies, both at home and abroad. His work was published in translation, in England, in 1841, and that year he received the Coley Medal, the Royal Society's highest award. The importance of his theory became widely recognised in the English speaking world after Wheatstone referred to it in his famous lecture to the Royal Institution in 1843*.

Ohm's Greatest Memorial

Finally, in 1849, Ohm was appointed professor of physics at the University of Munich, a post he held for only a few years until he died in 1854.

His work greatly influenced the development of both the theoretical and practical approach to electricity, and its significance lay in his discovery of the relationship between electromotive force, resistance and current in a circuit. He discovered, also, that resistance depended not only on the material used as a conductor, but that it was proportional to the length of the wire, and inversely proportional to the cross-sectional area.

He carried out experimental work in acoustics, optics and the electrical conductivity of liquids, but his mathematical analysis of an electric circuit was his greatest work, and remains his memorial.

The "Ohm"

In 1881, the International Electrical Congress, in Paris, officially designated the unit of electrical resistance as the "ohm" in his honour. Additionally, the unit of conductance, i.e. the reciprocal of resistance, was at one time called the "mho" although this was later re-named the "siemens".

The significance of Ohm's work is now universally recognised. It seems very sad that, unlike many of his famous contemporaries, he remained unrecognised, and received so few of the rewards which were his due, until almost the end of his life.

*October 1984, Practical Wireless

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HF Band Antennas for Difficult Locations Part 2

In Part 2 of this series, F. C. Judd G2BCX continues to look at the practical aspects of h.f. antennas in restrictive areas

The easiest was to energise a single wire antenna is to bring one end into the shack and connect it to a tuned circuit at a point where the "impedance" matches that of the antenna. The tuned circuit should preferably be link-coupled through a short length of coaxial cable to the transmitter via a v.s.w.r. meter. This is illustrated in Fig. 2.1, in which (a) provides a high impedance (voltage) feed to the antenna; (b) shows how the impedance increases, as the voltage increases and the current diminishes as we go from the bottom to the top of the tuned circuit; in (c) the antenna is taken to a lower tapping point (impedance a little lower) but if this were near the bottom, then the feed impedance would be low with high current to the antenna.

So, if the antenna was in the region of a quarter wavelength long at 1·8MHz, it would be current-fed and its impedance at the feed point fairly low. Operated harmonically, on 3·5MHz (or higher) it would be voltage-fed (current low). For this condition in particular, care must be taken with regard to insulation where the antenna lead-in enters the shack from outside and of course at the far end of which will also be at high r.f. voltage. However, a simple tuned circuit of this nature would only be suitable for one band, or perhaps two, with suitable tapping points but might be used for experimental purposes. Otherwise it will be assumed that the station is equipped with a wide-range a.t.u. if a number of bands are to be used.

Earthing System

A good "earthing" arrangement is essential with open wire antennas, especially when operating at 1·8MHz as a quarter-wave, and should preferably be an outdoor one using a copper tube of substantial length, or a sizeable piece of sheet copper, or zinc buried as deeply as possible in the ground. A metal main water pipe is an alternative but NEVER use the electricity supply earth which could prove dangerous and introduce noise during reception and/or carry r.f. to nearby radio and TV receivers.

Low Frequency Antennas and Harmonic Operation

The reason for emphasis on open wire antennas that will operate on the lowest frequency band (1·8MHz) as well as harmonically on the higher frequency bands, is because they lend themselves more favourably to being adapted for "difficult" situations. One of the most simple antennas, often referred to by older radio amateurs, as a "Marconi", was originally intended as a vertical antenna tuned against ground and frequently used with a "capacity" top. It was popular because it would function very well when bent into an "L" shape. At 1·8MHz, its total length would be in the region of 40m, although this could be varied considerably and with a good a.t.u. be brought to resonance at fundamental (1·8MHz) and operated harmonically at higher frequencies. It will no doubt be realised that the length (40m) is in fact a half-wavelength on 3·5MHz.

Harmonic Operation

A term derived from the fact that many of the h.f. bands are closely related to each other harmonically in terms of frequency. Starting at 1·8MHz

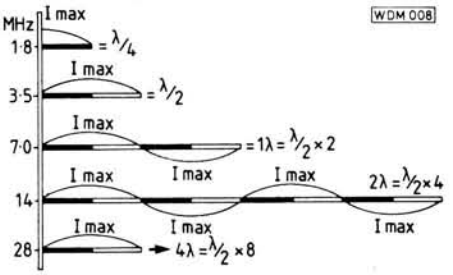

Fig. 2.2: Antenna length 40m resonant at 1·8MHz and harmonic relationship to higher frequencies

the second harmonic of that frequency is approximately 3·6MHz and the second of that 7·2MHz (now 7·0 to 7·1MHz) hence reference to these bands in wavelength of 160, 80 and 40m and so on. These harmonic relationships are sufficiently close for an antenna one quarter-wavelength long at 1·8MHz, to be virtually a half-wavelength at 3·5MHz, one complete wavelength at 7·1MHz, two wavelengths at 14MHz and four wavelengths at 28MHz as illustrated in Fig. 2.

The newer bands, 10, 18, 21 and 24MHz (nearly 25) are not directly harmonically related. However, an open wire antenna can be made to function on these odd frequencies with a flexible a.t.u., with some added inductance and/or capacitance in series with the antenna. Inductance in series with an antenna will make it "electrically" longer whilst capacitance in series will electrically shorten it.

Getting an Antenna into a Small Space

So far we have taken around 40m of wire as a basis on which to work but nevertheless a good one if it can be accommodated. But where? Outdoors or indoors? Can you find space for this amount of wire with a top section of around 30·5m, or must it somehow be

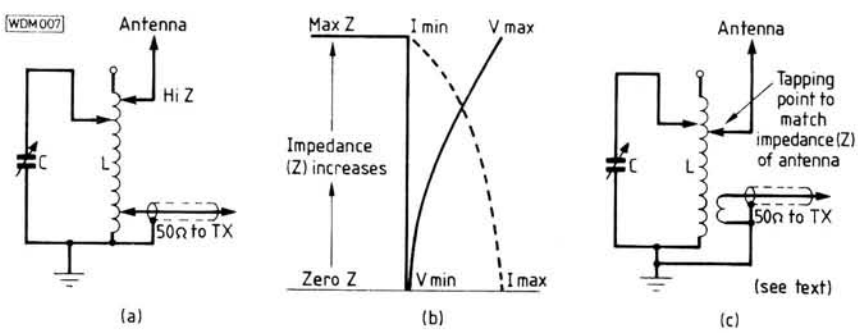

Fig. 2.1: A basic antenna tuning circuit. (a) high impedance (voltage) feed; how impedance increases from zero to maximum—from bottom to top of tuned circuit; (c) antenna tapping point adjusted to meet feed impedance requirements

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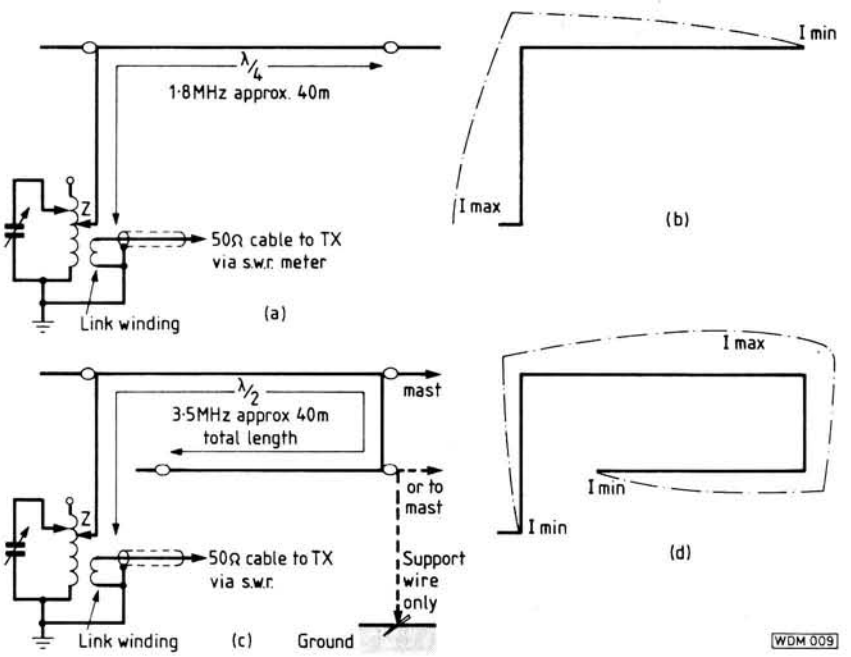

Fig. 2.3: Antenna with "L" shaped format, 40m operating at 1·8MHz; (b) same length but folded back on itself and operating at 3·5MHz, with suitable a.t.u. either will function harmonically

fitted into a smaller space? You might not have a garden at all but could wrap a length of wire around the walls of the house as a loop, or somehow get it all into a loft space. Well there are lots of possibilities which radio amateurs all over the world have had to resort to, with I might add, reasonably satisfactory results.

Limited Space

For the time being we will forget unidirectional or bi-directional antennas such as parasitic or driven arrays, multi-band or otherwise, but assume that whilst space is limited, there are no planning authority restrictions for an outdoor antenna. With very limited space one might consider a multi-band vertical, preferably at some height above ground and employing a counterpoise (radial) system. Most of these antennas have a nominal feed impedance of 50Ω so an a.t.u. may not be necessary.

Now we come to what is often wrongly called "a long wire" and is really the "harmonic" type antenna already mentioned. Two posibilities are illustrated in Fig. 2.3, with (a) the most common arrangement, "L" shaped in this case, having a total length of 40m: (b) shows the current distribution expected when the antenna is operated at 1·8MHz hence the feed point is near the bottom of the antenna tuning circuit where impedance is low.

With a height of about 10m the top section would be in the region of 30m. An a.t.u. will be needed to tune the antenna (low impedance at 1·8MHz) and provide a high impedance output (voltage-feed) for the higher frequency bands. This will be apparent from Fig. 2.3 (c) and (d) which shows operation on 3·5MHz, but here it has been assumed that there is insufficient space for a long top section so the antenna has been "folded back" under itself.

Folding an Antenna

Although the total length is still about 40m, the folding could reduce the top section length to about half that previously mentioned, i.e. from about 30m to 15m or less depending on the height of the uppermost section and the distance down to the lower folded back section. If we assume a top height of around 10m, then the drop to the lower part of the fold could be in the region of 4·5m. With a metre or so for the lead-in to the shack, about 10m up to the higher horizontal section and a 4·5m drop to where the fold begins, the top section would be about 12·5m and the lower about 12m.

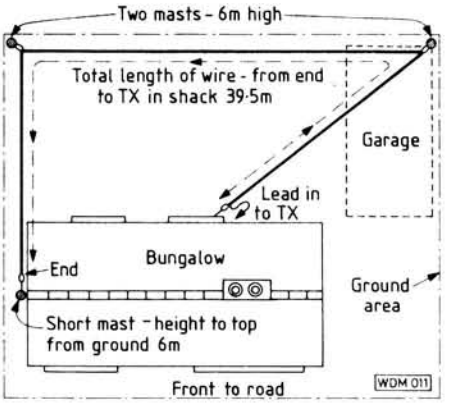

Fig. 2.5: Arrangement used where garden space is small. Antenna used on all h.f. bands by G4UWY. Similar arrangements could be employed to accommodate length of approximately 40m

Folds can also be put into an antenna as shown in Fig. 2.4, in fact this arrangement was used for many years by G4GA (now a silent key) who worked considerable DX with it on 1·8, 3·5 and 14MHz. His problem was a very short garden.

We now come to the problem where the garden is small but more or less square, in fact a situation faced by a neighbouring radio amateur G4UWY. My suggestion for accommodating approximately 40m of wire for operation on the h.f. bands and with the aid of an a.t.u. was adopted and is illustrated in Fig. 2.5. Good DX has been worked with this arrangement, running the rig "barefoot" on 3·5, 7 and 14MHz. Still on the assumption that there are no restrictions, other than limited space for an outdoor antenna, there is of course the popular inverted "V" (G5RV). This angled arrangement requires less ground lengthwise, can be operated on a number of bands and is supported at the centre on a single mast which also takes the weight of the feed cable connected to the centre point of the antenna.

Part 3 will continue with the possibilities of looping the antenna around the house, antennas in a loft space, a discreet outdoor antenna for temporary use, but all for the h.f. bands

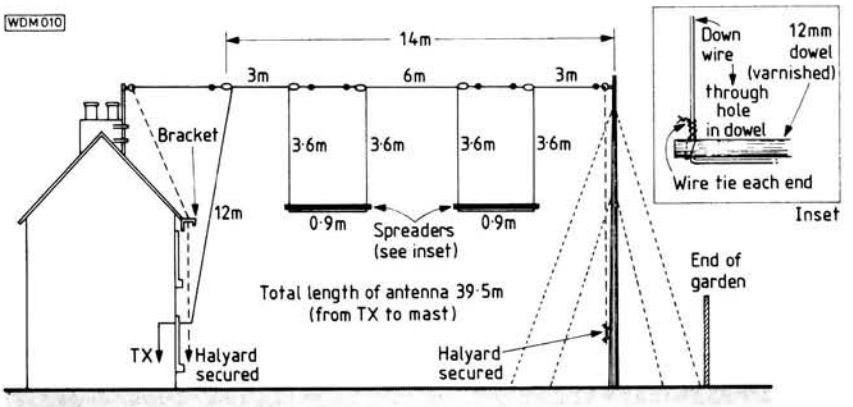

Fig. 2.4: Another "folded" arrangement for a 40m wire for use where space (lengthwise) is limited. The inset shows a method of securing the wire to the dowel spreaders

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QSL 100% OM

". . . and many thanks for the QSO, old man, and hundred per cent QSL via the Bureau." Saying which, our (sometimes) newly licensed amateur fills in the QSL card for onward despatch. At this point, says Peter Chadwick G3RZP, STOP.

As the junior assistant to a QSL sub-manager, I've seen the results of far too little thought being given to the business at the point of filling in the card—let alone more than a few other places as well. For instance, when you filled in the card for that QSO, did you make sure that the callsign was in LARGE letters on the back? Or does your QSL card have information on the back?

Little is more annoying than the card that has to be searched for the callsign of the addressee. A card, for example, from the "Worcestershire Lions" came through the Bureau. Obviously a CB card, stating that it is "QSL from International DX Station" it refers to a 3740MHz l.s.b. QSO and there are two callsigns on it—a G0 and a G4. Neither call is printed, and there is no indication to whom it should be sent, or where it came from! As an example of the futility of wasting the efforts of the QSL Bureau, it takes some beating.

Lousy Writing

Another area which sees us often in some argument is about the callsign of the addressee—just because of the lousy writing. U and V are obvious characters where confusion can occur, but H, M and W can also appear to be very much alike. Small writing, as in computer produced contest QSL cards, is at least clear, but also means searching through the information to find the address.

Not mentioned so far is the size of the QSL card. Normal postcard size is easy to handle, but those monstrosities that are folded are a distinct pain, as are the ones on airmail paper or, alternatively, thick cardboard.

Some of the worst offenders in the "lousy writing" stakes are *Jamboree on the Air* cards. Scouts or Guides are left to fill them in and though they often do a creditable job, the standard of writing leaves much to be desired. In fact GB stations often suffer from the bad writing syndrome, probably because of this desire to "QSL 100 per cent via Bureau". This leads to cards being filled-in in a rush at the time of the contact, or, perhaps some poor soul is given the job afterwards and gets pretty fed-up by the time he, or she, has deciphered the log book and written hundreds of cards for contacts they didn't make!

So, having got a pile of cards ready for sending to the Bureau, what then? It is assumed that our intrepid operator is an RSGB Member—if he isn't then he should be, and he can't use the outgoing Bureau service anyway—and he will be sending his cards to the Bureau address. That isn't the address of the QSL sub-manager responsible for the operator's incoming cards. Interesting as it may be to see the DX or otherwise that has been worked by the customers, the QSL Bureau sub-manager doesn't want to have to handle the cards. This explains the cards that are returned to the sender!

The pile of cards have also been sorted into country order. This means that AA1, K1, N1, WA1, W1 are all together—hopefully in alpha-numeric order to make things easier for the Bureau at the far end. A mixed block of cards is quite likely to result in cards for Europe going to Australia first.

If you are a major contester, and are going to send cards for the contacts, stop and think. Granted that at v.h.f. there may well be people who want your square confirmed, how many people don't?

In a big h.f. contest, where a well placed station may easily work up to two thousand contacts in 24 hours, is there really any point in sending cards to each of a string of Americans, Germans or Russians?

New countries, zones, states, DOKs or Oblasts are different, but some degree of selection may well be worthwhile, and lighten the load on the QSL Bureaux around the world.

So, you've sent your cards—all of them with the addressee's call clearly marked. Reasonable size cards sorted into alpha-numeric order. And you are going to get some back—you hope.

You will, of course, have sent a number of envelopes to the sub-manager for your callsign series. You can do this even if you are not an RSGB member, although this doesn't apply in all countries, where membership of the national society is required before any use of the QSL Bureau can be made.

Did you make sure that the envelopes were big enough? The small letter envelopes do not hold very many cards, even of postcard size. The long brown business envelopes are not much better, while going to the other extreme and sending envelopes that take an unfolded sheet of A4 paper is a bit ridiculous.

Telepathy

Even worse is the very small envelope with so much postage that it would need lead QSL cards to get up to weight! You did make sure that you had written your address on the envelope, didn't you? And what about putting your callsign on it? No? How do you expect the QSL manager to know your callsign—telepathy?

The best size of envelope is probably about 200 × 150mm while 150 × 100mm is really the minimum size and First Class letter post will bring about 15 to 20 cards. If you are going to operate on bands that will bring you a lot of cards then it might be worth putting some more postage on the envelope. If you provide an A4 envelope with about 250 grams of postage and don't operate very much you may have to wait an awfully long time for your cards.

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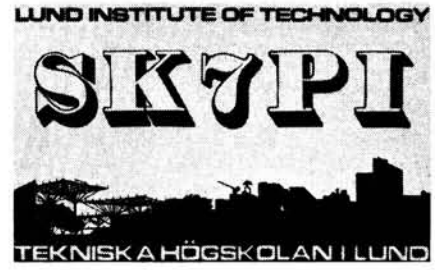

Wait 6

If you want cards fairly often you can write "Wait 6" or whatever on the envelope. You may find that even then you get ten or so in the envelope. This isn't because the QSL manager is playing silly whatsits, but because you had five cards waiting and a parcel came from the Bureau with five or six in it for you.

Similarly you don't need to leave a lot of envelopes with the Bureau. Half a dozen is adequate for most people and although it is suggested that you write "LAST" on one of them, you should remember that it is quite easy to make a mistake and seal up the one marked "LAST"—it isn't asking too much of the manager for him to write "LAST" on the envelope.

Clients

The sub-manager will probably have around 550 to 600 clients for a G series (as opposed to GM, GW, etc). Most managers do more than one sub-group, as this allows for a major saving in postal costs of getting the cards to them. Somewhere between ten and fifty per cent of clients keep envelopes with their sub-manager—older callsign series on the lower side. So, if ten per cent of the total are fairly active this means storing about 300 to 500 envelopes with a fairly quick turn round.

What about those that aren't among the 10 to 50 per cent? Very often these include club and/or contest stations. Several of the v.h.f. groups that regularly enter contests never collect their cards! Once in a while a new manager tries to stir up interest by getting cards to them by hook or by crook, but it rarely seems to work. So, if you don't get a reply via the Bureau, try direct, although it is probably unlikely that you'll get any luck that way either.

Unclaimed Cards

What happens to the unclaimed cards? Some foreign bureaux return them, but the general practice is to destroy unclaimed cards after three months. It's heartbreaking at the time to burn some of the really choice DX cards—there's a certain G4 who worked Heard Island, no less, and had the card consigned to the dustbin because he didn't keep envelopes at the Bureau!

If you don't expect many cards, put the First Class postage rate on your envelopes so that when the rates go up second class will still apply.

Queries

Now that you've had your callsign for about three months and you've sent envelopes, and haven't had any cards, what do you do? Write to the QSL sub-manager? If you do, don't expect an immediate answer. Sub-managers, strange to relate, do have other things to do than just sort cards! They have families, commitments and some of them even like to go on the air occasionally! The QSL Bureau will get dealt with when the occasion arises, such as when a parcel arrives, or at the end of a month or whatever. If you sent an envelope with 250 grams of postage on it you'll need to have done a lot of operating, and sent a lot of cards, before it will be full. If you've put "Wait 10" on it it may well have to wait for the next box from the main Bureau which, with new callsigns, works out at about every six weeks. The sending of an A4 envelope with 100 grams of second class postage and "Wait 2" on it is going rather far in the other direction.

Of course, if you really want to get up your manager's nose you can telephone to see if you've got any cards, or if your envelope has arrived. In this case do choose a good, convenient time, such as around 18.30 hrs when he is in the middle of his meal. Alternatively how about Sunday lunch time or even midnight!

If you have a query, it's easier to provide a card with pre-written instructions *(There are/are not envelopes at the Bureau for G3RZP)* which, being stamped and addressed, is much easier for the manager to deal with. Even then don't expect an immediate response. If there's a pile of cards waiting, and an enquiring postcard arrives, enough interest is being shown that managers won't destroy cards until enough time has elapsed for you to get envelopes to them.

The number of man hours involved in sorting a box of cards is fairly considerable. A typical box for two callsign series would be 380 × 305 × 305mm, weigh over 5kgm and appear every six weeks or so. Sorting into alpha-numeric order prior to stuffing the envelopes will take about 8 to 10 man hours and another 5 man hours for actually stuffing the envelopes, weighing, sealing and picking the great heap off the floor and into the carrier bags ready for taking to the post office.

Some managers will, if they know that their clients will be at an event such as the HF Convention, NEC or a mobile rally, take along the cards. This saves trouble for the client, but don't expect it—and if you see someone in your callsign series getting cards at an event, it's because it was known beforehand that they would be there.

Duff Ones

You may think that some of the things mentioned are apochryphal; surely, no one would leave their callsign off of the envelopes? Unfortunately tain't so! There is, of course, "Nowt so strange as folk", and this applies to radio amateurs just as much, if not more so, than most. I haven't even mentioned the people who send boxes of outgoing cards to G3DRN when it has been widely publicised that the Bureau is closed for two or three weeks because of holidays. Then there's the man who works something rare, but doesn't get the full callsign and sends a card to the bureau with half the call on it—not to mention the non-existent prefixes. Or the real "duff" ones: ZD8CW/ST0, QSL via G4BAC. There is only one G4BAC: no one seems to know anything about him, and only one conclusion can be reached. If you operate "out of area", do send some envelopes to the GM, GW or whatever sub-manager, or make sure that it is "QSL via G . . ." as appropriate.

QSL cards are a fascinating part of amateur radio: they are needed for a number of awards, bring back memories of contacts perhaps years later, and keep the QSL Bureaux busy! Sent automatically, because "the last courtesy of a QSO is a QSL", they can provide large quantities of scrap paper, work and trouble, especially for those people who don't (or won't) collect them. One of these I met on the air. "You've no envelopes," I said. "Do you want your cards?"

"Oh, yes," he replied. "Don't throw them away. I'll send some envelopes immediately. Whatever you do, don't throw them away, although I'm not interested in QSLing." That was six months ago . . . Anyone for scrap paper? ***PW***

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PW REVIEW

In these days when the land of the rising sun seems to have cornered the enthusiast market in radio transmitters and receivers, it is a very special occasion indeed when a UK company comes up with a totally home-grown design. When an invitation came to visit the Lowe Electronics headquarters at Matlock in Derbyshire to see the prototypes and talk to the designer of the HF-125 communications receiver, it was an opportunity not to be missed. This month, Geoff Arnold G3GSR reports on what he saw and heard there, to be followed next month by a report of how one of the pre-production samples performed on the air and the PW *test lab.*

The idea of producing an in-house design for an h.f. communications receiver has been in the mind of John Wilson, Technical Director of Lowe Electronics, for many years. There have been receivers carrying the Lowe label—the SRX-30 Wadley-Loop design and its digital-readout counterpart the SRX-30D are well-known to radio enthusiasts—but these were actually Japanese products, and were sold in other parts of the world under different brand names. A couple of years ago, John Thorpe joined Lowe as Head of Development, and began work, amongst other things, on a concept for a high-performance, no-compromise h.f. receiver. That receiver is **not** the HF-125, but it has formed a very useful test-bed for various design ideas which have been included in it.

HF-125 Design Brief

The concept of the receiver which is the HF-125 originated in January 1986. The design brief was for a replacement for discontinued low-price general coverage receivers, but with special attention being given to strong signal performance to cope with the enormous number of high-power radio stations operating in Europe.

To give the purchaser value for money, a number of ground rules were laid down, with the aim of spending a larger proportion of the cost on better components where these would improve performance, and less on "gimmicks" which most users were unlikely to require. These were: 1. Essential features only to be included, but less essential ones could be added if the final selling price was not compromised as a result. 2. The design selection process should minimise component count, to cut assembly costs and reduce the overall p.c.b. size, allowing the use of a smaller, cheaper, off-the-shelf case. Capital outlay on special tooling for the case would be minimised, so that the production run length would have little effect on the price. 3. The equipment design should aim for minimum alignment adjustments in manufacture.

The result is a dual-conversion, synthesised receiver built on one main p.c.b., with a second smaller board carrying the front panel controls. The main board is designed in a logical signal-flow layout, to minimise the need for any interstage screening. The various oscillators are grouped in islands on the p.c.b., well removed from the amplifiers, and fed into the mixers via transmission line-like connections. The synthesiser is based on a single-chip microprocessor, designed to minimise logic noise problems by shutting down the m.p.u. into a "static idle" state when retuning to a new frequency has been completed.

Signal Processing

Signals from the antenna pass first through a 30MHz low-pass filter, then to a duplexer comprising 1·6MHz low-pass and high-pass filters. For frequencies above 1·6MHz, the signal passes through one of four band-pass filters. The appropriate filter is selected by diode switching, and the output passes via the switchable 20dB attenuator to a Plessey SL6440 high-level mixer, which converts the signal to the first i.f. of 45MHz. The mixer stage is designed for best dynamic range and intermodulation performance, having sufficient gain to remove the requirement for a separate r.f. amplifier stage, and offering more than 90dB of i.m.d.-free dynamic range. A 4-pole crystal filter with a 15kHz bandwidth provides selectivity where it most matters, at the first i.f., a somewhat costly but very effective component.

The second i.f. section is a cascade of three filters, interspersed with two amplifier stages. The i.f. at 455kHz is produced by a second SL6440 mixer, run at a much reduced current compared with the first mixer. The mixer output is applied directly to the first group of filters, one of three (2·5kHz, 7kHz, or a 500kHz l.p.f.) being selected by diode switching, see Table 1. Both of the amplifier stages are contained within the Plessey SL6700 detector i.c. A 4kHz filter or a direct connection can be placed between the two amplifiers. Finally, a 10kHz filter is placed between the second amplifier and the a.m. and s.s.b. detectors. A 12kHz filter is used in place of this when f.m. or synchronous a.m. modes are selected with the optional detector

TABLE 1

Selected i.f. bandwidth	1st i.f. filter	2nd i.f.		
		Filter 1	Filter 2	Filter 3
2·5kHz	15kHz	2·5kHz	4kHz	10kHz
4kHz	15kHz	7kHz	4kHz	10kHz
7kHz	15kHz	7kHz	Thru	10kHz
10kHz	15kHz	500kHz	Thru	10kHz

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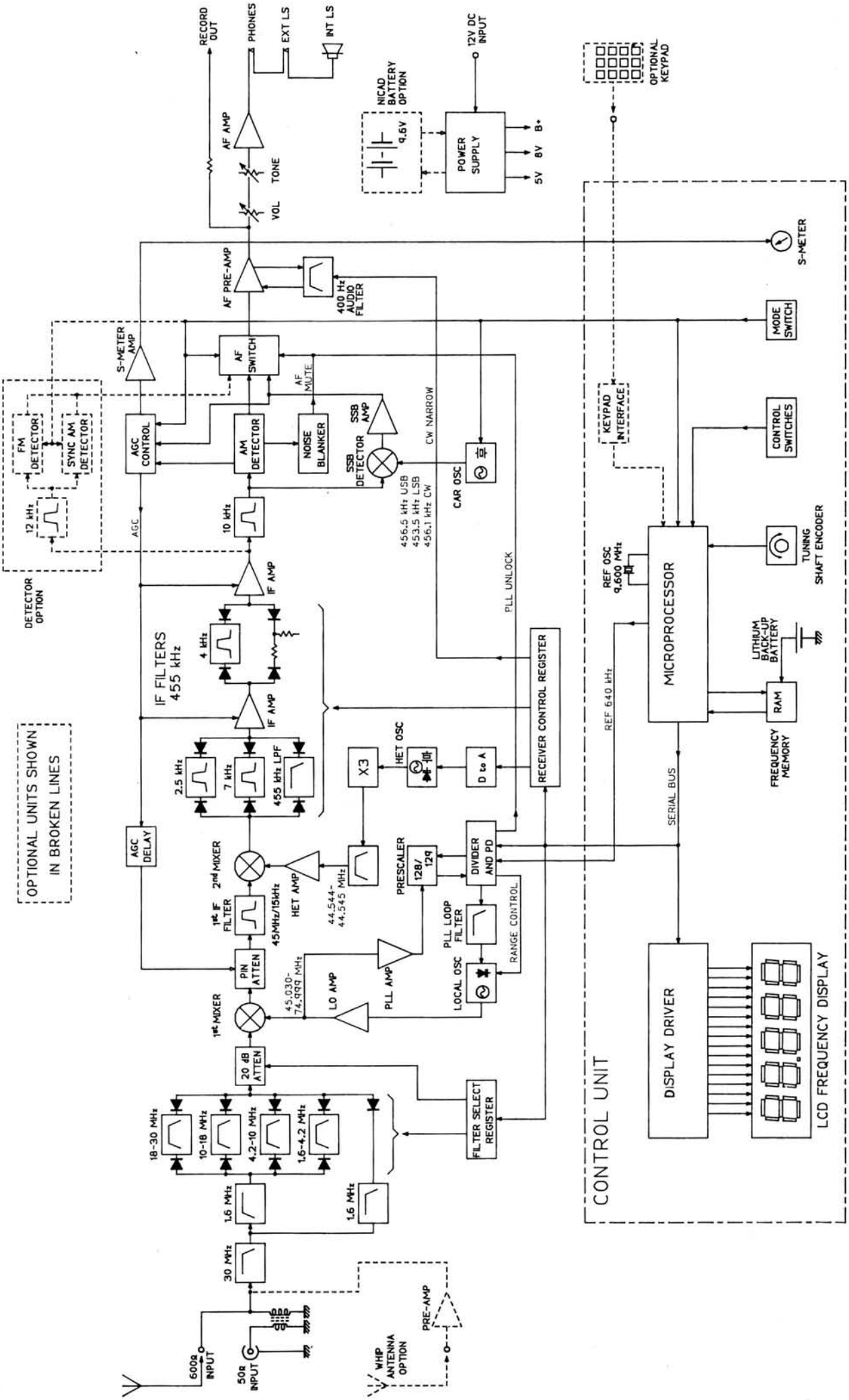
LOWE HF-125 BLOCK DIAGRAM



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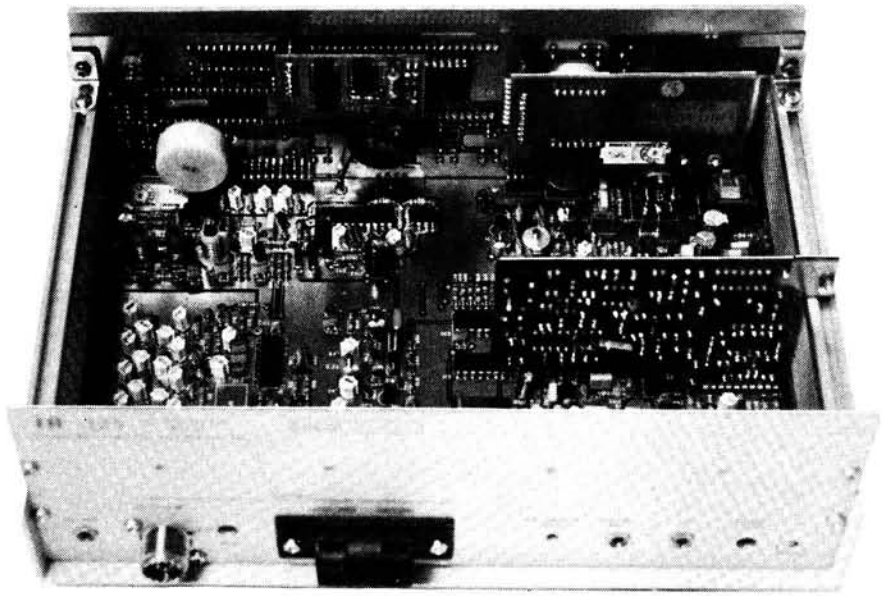
unit fitted. The MODE switch automatically selects the appropriate combination of filters to give a suitable bandwidth for the mode selected, but a different bandwidth can be selected by the operator if desired.

The SL6700 contains the a.m. and s.s.b. detectors, the a.g.c. system and the impulse noise blanker, which has a blanking period of about 0·3 milliseconds and is permanently in circuit. The a.g.c. attack and decay time-constants are lengthened when a.m. is selected, and a fast attack circuit is switched in for s.s.b. The a.g.c. is applied to a *pin*-diode attenuator following the first mixer, and to the two 455kHz i.f. amplifiers.

Audio from the detectors is passed via a muting stage to a pre-amplifier and a 400Hz bandwidth audio filter centred on 800Hz, which can be selected by means of the filter switching circuit when using c.w. The pre-amplifier output is fed to the RECORD OUT jack at constant level, and via the VOLUME and TONE controls to the a.f. amplifier. The TONE control provides either bass or treble cut.

Three power supply rails are used in the receiver: 5V for the logic and control system, i.f. amplifiers and signal switching; 8V for some i.f. stages, the p.l.l. system and oscillators, and the audio pre-amp; 9–15V (B+) unregulated for the first mixer and the a.f. amplifier. A large part of the receiver's consumption is on the +5V supply, and the display and S-meter illumination l.e.d.s are connected between B+ and 5V to take advantage of the voltage drop across the regulator.



Internal view showing two p.c.b.s

Frequency Control

The phase-locked loop system and two other oscillators are controlled together by the m.p.u. in order to tune the receiver. The p.l.l.-controlled first oscillator (l.o.) is a wide-range v.c.o., tuning in 1kHz steps from 45 to 75MHz in four ranges. The second oscillator (het. osc.) signal at about 44·545MHz is derived by tripling the output of a 14·848MHz crystal oscillator. The oscillator is varicap-tuned via a 6-bit control system and a current-to-voltage converter in 64 nominal 15·625Hz steps across a 1kHz range, giving interpolation between the 1kHz steps of the first oscillator. The tuning rate produced by movement of the tuning knob varies according to the receiver mode, being slower for c.w. and s.s.b. than for the other modes. The rate also increases for faster rotation of the knob. The tuned frequency is displayed on a 5-digit liquid crystal readout.

★ MAKER'S SPECIFICATIONS

Frequency coverage:	30kHz–30MHz
Detection modes:	c.w., l.s.b., u.s.b., a.m. n.b.f.m. and synchronous a.m. (Optional with D-125 unit)
Tuning:	By spin-wheel in 15·6Hz steps. Step size increases with faster tuning knob rotation. MHz quick selection by push button. Keypad frequency entry (Optional with K-125 keypad unit and interface)
Memories:	30 frequency memories in two banks of 15, with lithium battery backup
I.F. Filter bandwidths:	2·5, 4, 7 and 10kHz 400Hz audio filter (c.w. only)
Sensitivity:	c.w./s.s.b.: <0·3µV for 10dB S/N a.m.: <0·7µV for 10dB S/N @ 70% mod. (For received frequencies >500kHz)
R.F. Attenuator:	20dB switchable
Dynamic range:	>90dB at 50kHz from tuned frequency >80dB at 20kHz from tuned frequency (Measured in s.s.b. mode with 2·5kHz filter, covering both 3rd order i.m.d. and reciprocal mixing effects)
Image/spurious responses:	>75dB rejection
Audio output:	0·75W into internal loudspeaker 1·25W into external 4Ω loudspeaker
Connections:	Antenna: 50Ω via SO-239 socket. 600Ω plus Gnd terminals. Active whip antenna (Optional P-125 unit) External loudspeaker output—3·5mm jack Headphone output—6mm mono/stero jack Record output (100mV)—3·5mm jack 12V d.c. power input—2·1mm power jack
Power supply:	External 12V d.c. supply at 250mA approx. (a.c. mains adaptor supplied as standard) Internal NiCad batteries and charger to give typically 8 hrs operation (Optional P-125 unit)
Dimensions:	255 x 100 x 200mm (WxHxD) approx.
Weight:	1·8kg approx. 2·5kg approx. with P-125 option fitted

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The carrier insertion oscillator (car. osc.) uses a ceramic resonator to maintain good frequency stability. Its frequency is adjusted by modifying the load capacitance seen by the resonator, in order to maintain the correct relationship to the i.f. passband for the mode in use.

As an alternative to v.f.o. control, two banks of 15 memory channels are available. These frequencies, together with the v.f.o. frequency, are stored in a c.m.o.s. r.a.m., with its supply maintained by a lithium battery. It is possible to preview memory contents whilst still listening to the frequency tuned by the v.f.o. The l.c.d. frequency display is used to briefly display the memory channel number selected, followed automatically by the frequency stored in that memory.

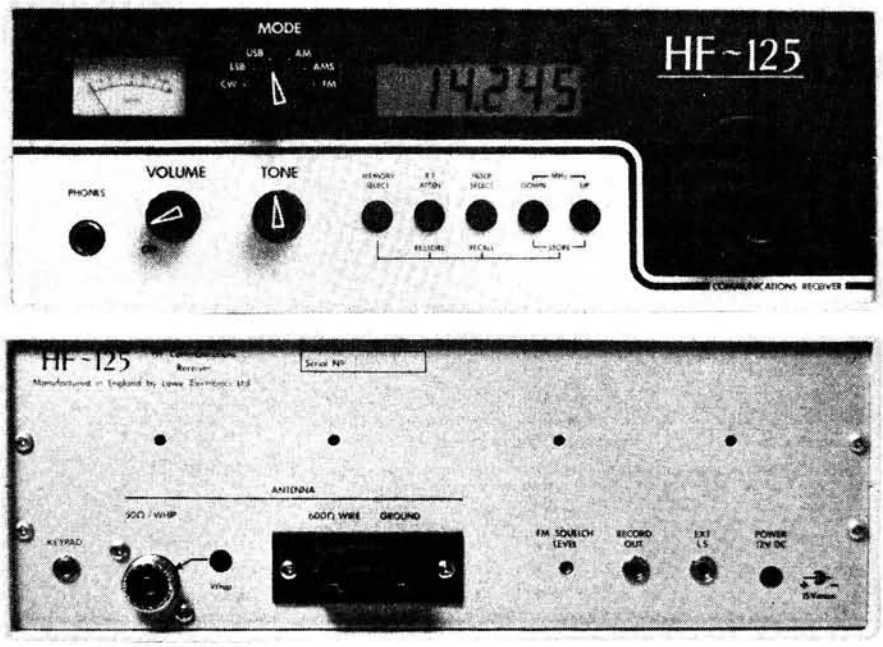
Options

Three option packs are available for the HF-125. In the design process, the aim so far as practicable was to put all components required for the options into the "add-on", so that the price of the basic receiver was not significantly increased for the purchasers not wanting the option.

Portable Option: This comprises an internally fitted NiCad battery pack and a charger operating from the external 12V supply, plus a whip antenna and pre-amplifier board.

Keypad Option: This comprises a keypad which connects via a 2-wire serial link to an internally fitted interface, giving direct entry of tuned frequency.

Detector Option: An internally fitted p.c.b. which adds narrow-band f.m. and synchronous a.m. (e.c.s.s.) modes. The MODE switch is already wired up for this option. The synchronous a.m. mode gives easy, precise tuning plus improved performance with carrier fades of up to about 10dB. The performance is similar to a conventional a.m. detector for deeper fades. Squelch is provided on n.b.f.m., with on/off switching available from the front panel, and a preset level control on the back panel.



Front and rear panel layouts

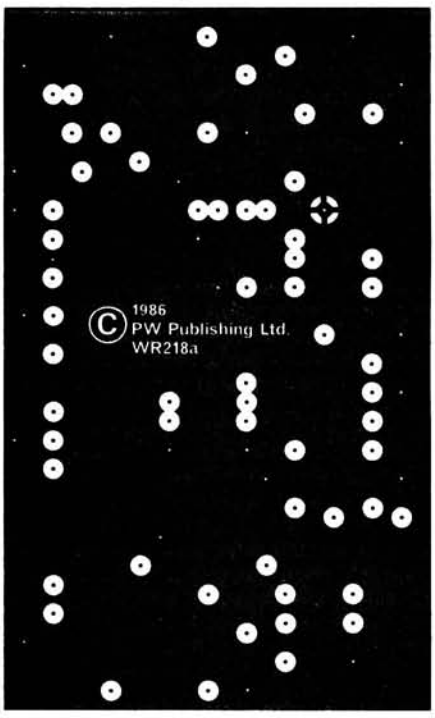
Next Month

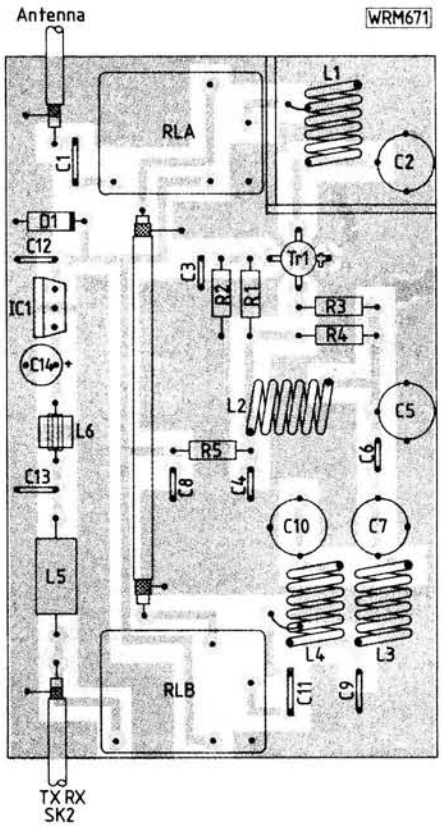
Further details of the operation of the front panel controls, plus other features such as self-diagnostic test routines, will be given in Part 2 next month, along with the results of our on-air and laboratory tests.

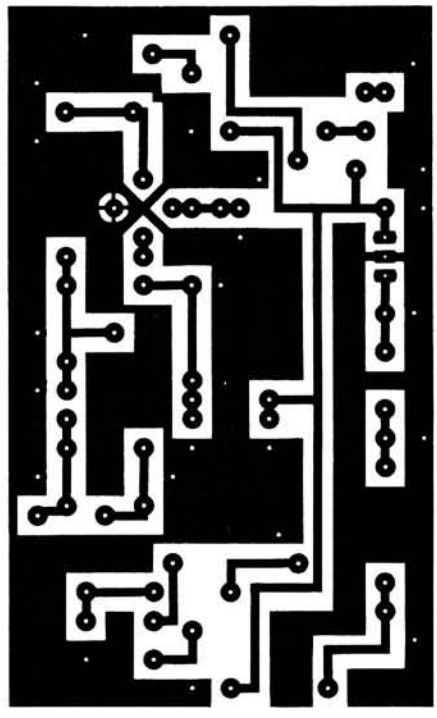
ERRORS & UPDATES

The p.c.b. for this project is double-sided, but appeared in the magazine as a single-sided board. The correct board is shown here.

Mast-head Pre-amp for 144MHz
February 1987







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RADIO

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R. A. Penfold
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R. Bunney
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F. C. Judd G2BCX
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PASSPORT TO AMATEUR RADIO
Reprinted from *PW* 1981-1982
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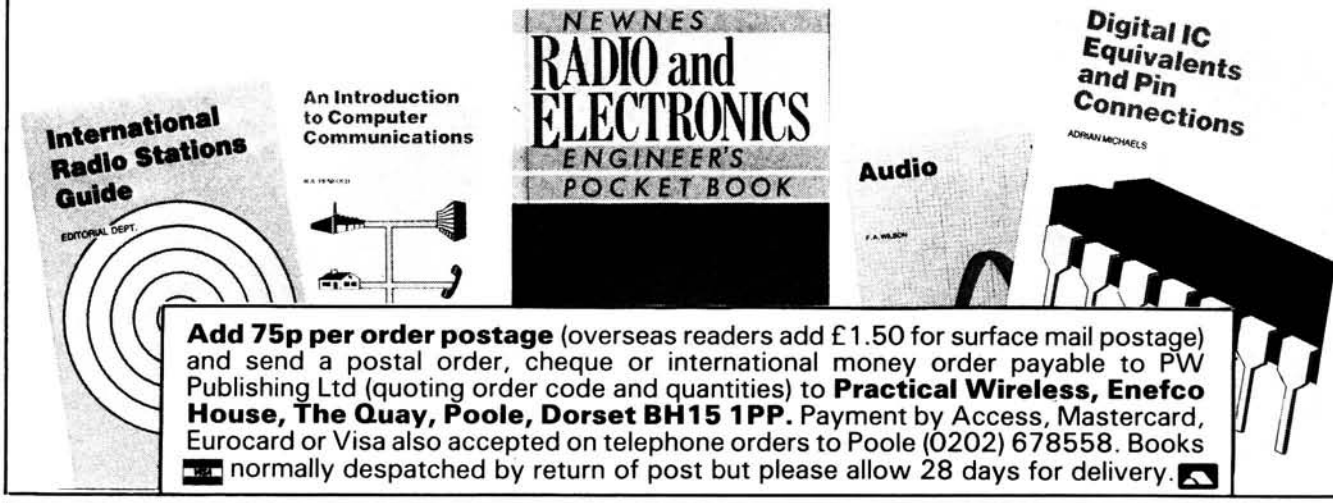

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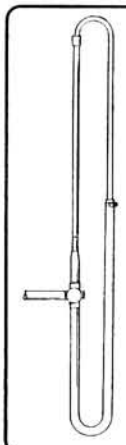

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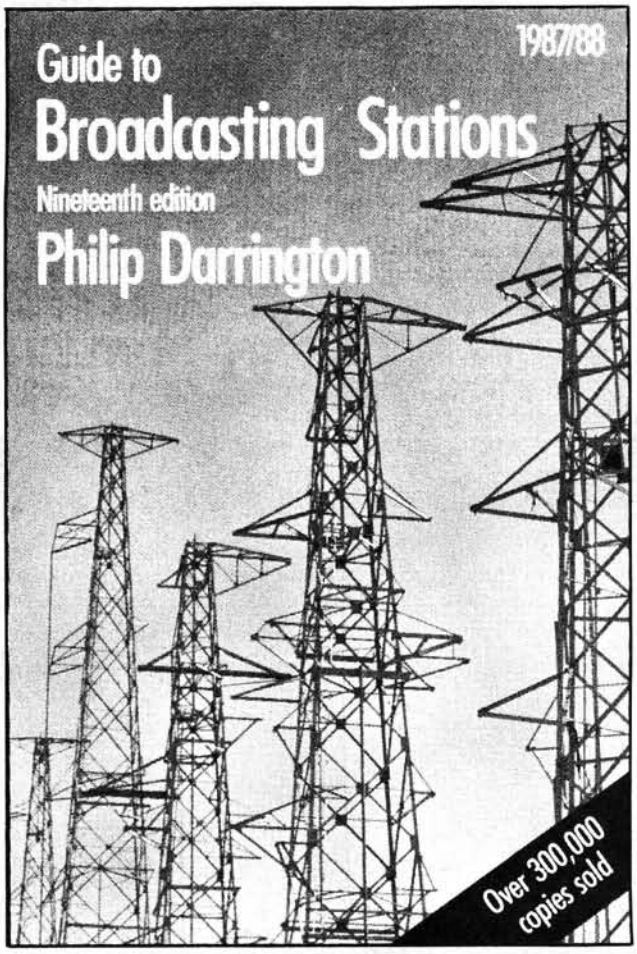

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Antenna Radiation Patterns Computerised–2

by Dr. L. W. Brown G0FFD and F. C. Judd G2BCX.

The radiation patterns shown in Part 1 were concerned with the horizontal dipole for both horizontal and vertical planes and for given heights above ground. In this part we take a look at the vertical dipole, grounded vertical and ground-plane antennas and a simple two-element array consisting of a driven element (dipole) and a reflector.

It will be appreciated that we can only illustrate a few of the many different radiation patterns which a computer can rapidly produce with simple programming. For instance, with the appropriate short program containing INPUT commands, enabling different values to be entered, the computer can be made to display the vertical radiation pattern for different heights of an antenna above ground, the radiation patterns of long-wire antennas of various lengths and the numerous patterns provided by multiple element arrays for different element spacing as well as the effect of phase difference in the currents flowing in the elements.

The Vertical Dipole at a Given Height Above Ground

Many h.f. band operators use vertical dipoles at some convenient height above the ground, particularly for the higher frequency bands such as 14, 21 and 28MHz, and while these antennas are omni-directional in the horizontal plane, the radiation pattern in the vertical plane is of great importance. For instance, as is well known, maximum radiation at a low angle of elevation is desirable for DX work.

The computer print-out, Fig. 2.2, shows the vertical radiation pattern from a vertical dipole whose centre is 0·125λ above ground. Although maximum radiation occurs at the required low angle, this would not really be a good height above ground at 21 and 28MHz because of the shielding and attenuation due to surrounding buildings and/or trees, etc. The height could be increased to 0·75λ for example, in which case the vertical radiation pattern would be that shown in Fig. 2.3. Although this shows appreciable radiation at this height the radiation at the lower angles is less likely to suffer shielding or attenuation as mentioned above.

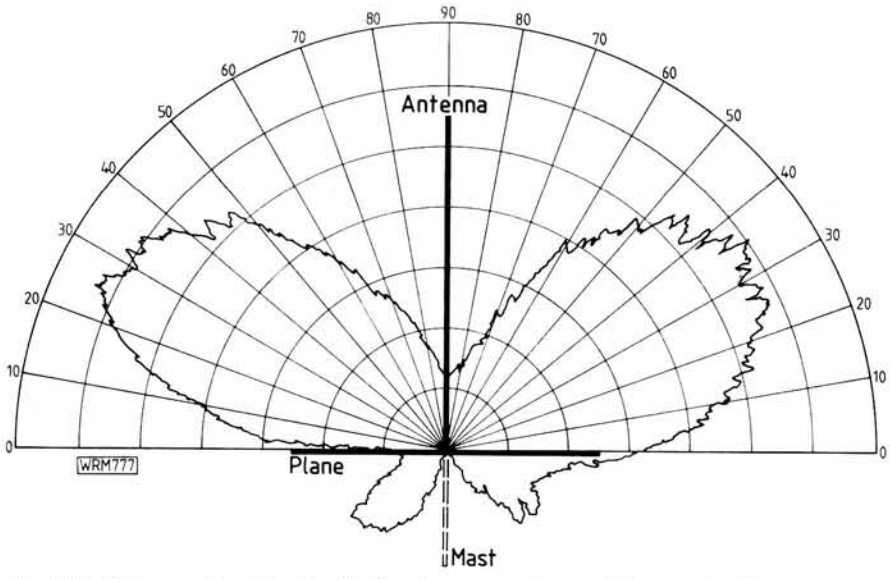

Fig. 2.1: Measured vertical radiation from a scale model ground-plane antenna operated at u.h.f. Even with a large number of radials, each a half-wave long, maximum vertical radiation is far too high at 30 to 35 degrees

The Ground-plane Antenna

At v.h.f. a single omni-directional antenna such as a vertical dipole, the Slim Jim, or a vertical colinear, will usually be sufficiently high above the ground to become in effect a "free-space" antenna virtually unaffected by the ground in its vicinity. The vertical radiation will be maximum in the horizontal direction, i.e. perpendicular to the vertical antenna. In contrast, and whilst the ground-plane antenna has been a popular and convenient omni-directional system for v.h.f. use, the vertical angle of maximum radiation is excessively high as illustrated by the computer print-out, Fig. 2.4, and which also corresponds to tests on physical antennas of this nature.

Even with a relatively large number of ground-planes, each of half a wavelength, the vertical angle of maximum radiation is still in the region of 30 degrees as the results of tests with a real ground-plane antenna show, Fig. 2.1. As may be seen, radiation at low elevation is very limited. Incidently, the above also applies to ground-plane antennas for lower frequencies, e.g. 70 and 28MHz.

Grounded Vertical Antennas

Unlike the radial type ground-plane (as above) the earth itself becomes the "ground-plane" for vertical antennas with the base at ground level, hence the term "grounded vertical antenna". Such antennas are used by many radio amateurs for h.f. bands operation although there is some controversy as to whether they are as good as horizontal (long-wire) antennas, particularly for multi-band work. The computer can readily show how vertical antennas of various lengths behave regarding their vertical radiation patterns. It is general practice, of course, to assume that the

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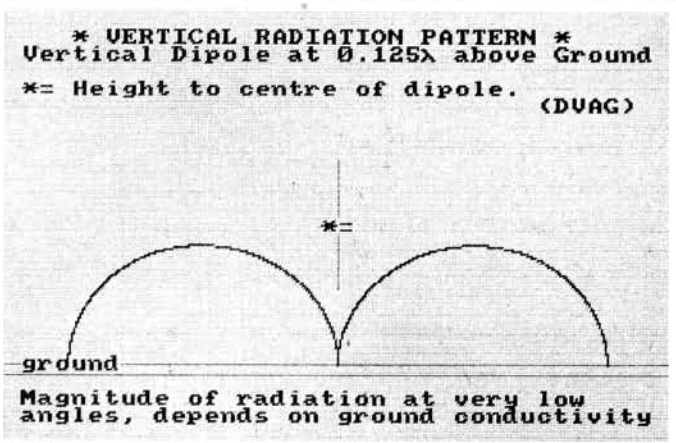

Fig. 2.2: Vertical radiation pattern from a vertical dipole at a height of 0·125λ above ground (see text)

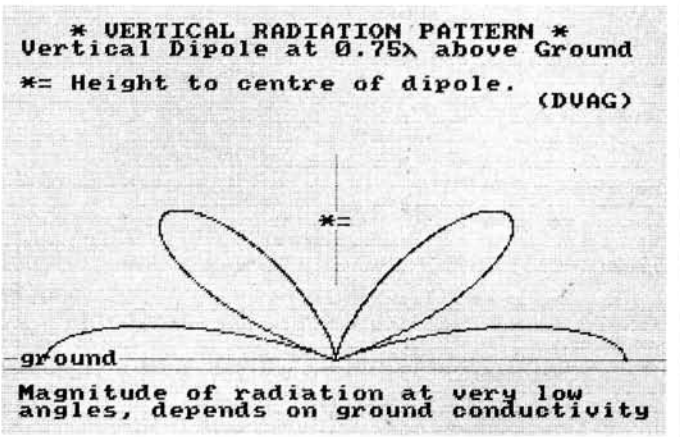

Fig. 2.3: Vertical radiation pattern from a vertical dipole at a height of 0·75λ above ground

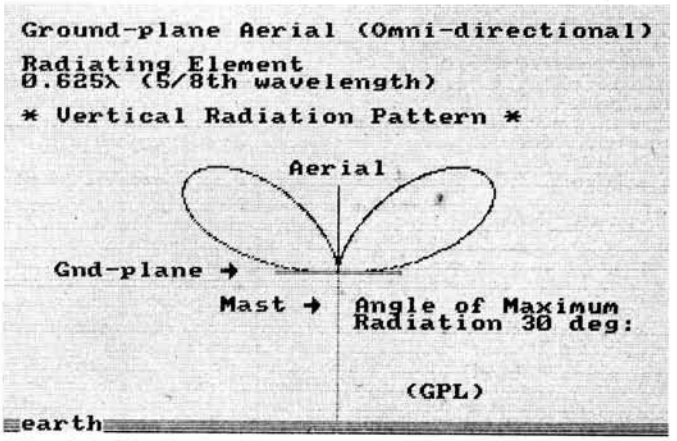

Fig. 2.4: Vertical radiation pattern from a typical v.h.f. ground-plane antenna. Radiation, otherwise omni-directional, is maximum at a vertical angle of about 30 degrees. See also Fig. 2.1

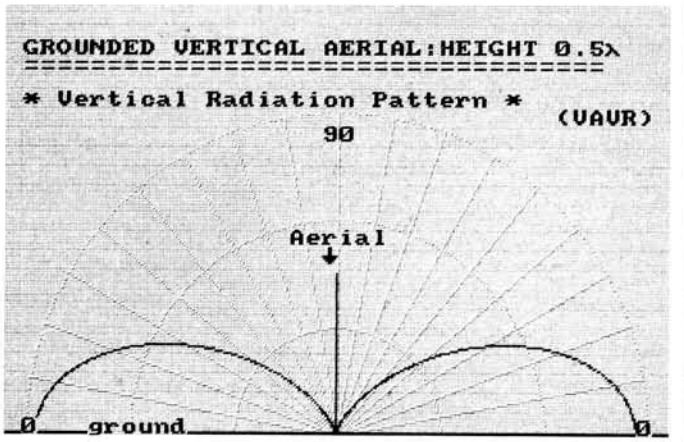

Fig. 2.5: Vertical radiation pattern from a grounded vertical antenna with a height/length of 0·5λ. See text regarding practical operation

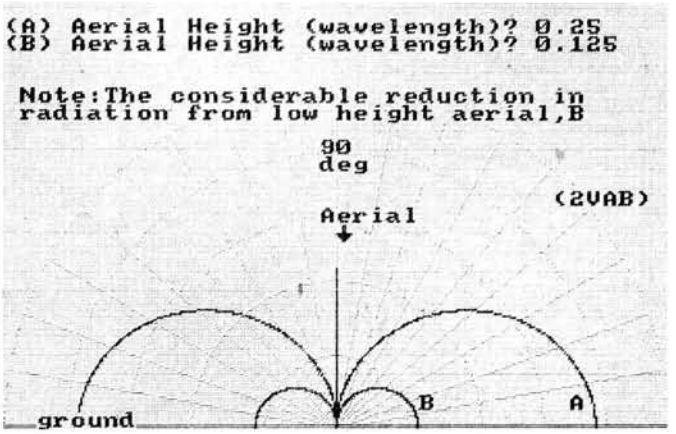

Fig. 2.6: Here the computer has been programmed to produce two vertical radiation patterns. (A) is for a grounded vertical antenna 0·25λ in height and (B) is for a similar antenna at a height of 0·125λ. See text regarding practical operation

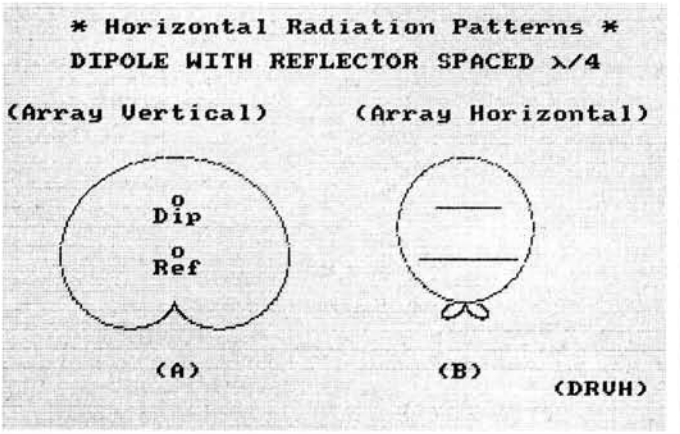

Fig. 2.7: Another double print-out showing the radiation patterns for an array consisting of a driven dipole and passive reflector with the array vertical (A) and horizontal (B). See text for further comments

ground beneath the antenna is a good electrical conductor. For maximum radiation at low elevation the optimum height (length) of grounded vertical antennas is 0·5 and 0·625λ. Such heights, particularly the latter, are commonly used by medium-wave broadcast stations to obtain the greatest coverage at ground level. (Ref. 2.1).

A height of 0·625λ is not very practical for amateur bands except at v.h.f. when operated with a radial ground-plane, or as a mobile antenna with the vehicle body as a ground-plane. But then, as already illustrated the vertical radiation becomes excessively high.

The computer print-out, Fig. 2.5, shows the vertical radiation pattern for a grounded vertical antenna with a height of 0·5λ. If the fundamental frequency were 7MHz, then the pattern would be as shown in Fig. 2.5. But at 3·5MHz the antenna would be 0·25λ, although the physical height in either case would be about 20m. This might be a more practical proposition for some and such an antenna could be voltage fed for 7MHz and current fed for 3·5MHz. However, since the antenna would become 0·25λ in height at

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3·5MHz, the vertical radiation pattern would be changed to that in Fig. 2.6(A).

A Grounded Vertical

A similar possibility would be a grounded vertical, 0·25λ in height for a fundamental frequency of 3·5MHz, physical height still about 20m, and current fed with a vertical radiation pattern as shown in Fig. 2.6(A). However, the same antenna could also be operated as a 0·125λ vertical for 1·8MHz for which the vertical radiation would be as shown in Fig. 2.6(B). It will be appreciated that a vertical antenna of so short a wavelength would need to be inductively loaded to obtain resonance as well as a low impedance at the base to obtain a current feed.

A Simple Two-Element Array

The driven dipole and reflector form a simple yet effective uni-directional antenna. There are other applications for this, one being its use as a driving system for parasitic arrays. Here, however, the computer has been programmed to show the radiation patterns with the array vertical, Fig. 2.7(A), and horizontal, Fig. 2.7(B). The patterns are very similar to those obtained with the HB9CV, or a two-element ZL Special, except that these two antennas have close-spaced elements, both driven, there being a phase difference of 135 degrees between the currents in the respective elements. It may be noticed that there is a marked difference between the two patterns in Fig. 2.7. Pattern (B) is narrower than the "cardiod" pattern (A) due to combining the cosine p.d. of a dipole with the p.d. of the combination. Note also the two minor rear lobes in pattern (B). The program listing and further information regarding these patterns will be presented in Part 3 of this series. This will also include some examples of simple computer programs which can be readily adapted to suit popular home computers.

Linear radiators (long-wire antennas) and some broadside/endfire arrays will be the subject of the final (fourth) part of the series.

References

1. *Long and Medium-wave Propagation.* H. E. Farrow. (BBC). Iliffe 1957.

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Have Trio 430S general coverage receiver, 100W TX narrow s.s.b. and f.m. Would exchange for handheld only rig with, or without, a.t.u./p.s.u. and cash adjustment. Garry. Tel: 0625 530200. *C131*

Have Avo Model 8 Mk III. Would exchange for Standard C58 mobile mount and linear, plus cash adjustment. Garry. Tel: 0625 530200. *C131a*

Have 27MHz f.m. base station, also have camera, 135mm lens, 35mm enlarger. Would exchange for general coverage receiver. N. Beadsworth, 111 Canterbury Park, Waterside, Londonderry, N. Ireland. *C111*

Have Icom 144MHz full coverage f.m. mobile, 28MHz multimode, dual beam oscilloscope Hartley type 13A, 40 channel f.m. CB, plus many other items. Would exchange for 144MHz multimode, Icom or any other make. John. Tel: 061-273 8829. *C140*

Have Sinclair ZX81 16K with Morse Tutor. Would exchange for 144MHz f.m. receiver or w.h.y.? G0FUW (was G1KVY). Tel: Gosport 527694. *C141*

Have National Panasonic RF8000 broadcast receiver 1979. Would exchange for good communications receiver of recent make. H. M. J. Carroll, 4/135 Newbridge Road, Bath BA1 3HG. *C145*

Have SR9 144MHz receiver. Would exchange for antenna tuning unit, must be in good condition. J. S. Wood. Tel: Clochan 378. *C152*

Have Gould dual beam 15MHz 'scope. Would exchange for v.h.f./u.h.f. scanning receiver—SX200, AOR2001, w.h.y.? Also have Spectrum+ and Interface One with microdrive. Would exchange for anything to do with radio, i.e. ATV TX w.h.y.? G1FTV, 39 Cleverton Court, Penhill, Swindon. *C155*

Have Tasco 9F telescope D=60mm, F=800mm with moon filter, zoom lens, Barlow lens and Nite-writer pen. Would exchange for 430MHz TX/RX or multimode w.h.y.? G1FTV, 39 Cleverton Court, Penhill, Swindon. *C155a*

Have Sharp FV1700 intercontinental 6-band 17-transistor large portable radio. Mains/battery/12V, l.w. and full coverage from 550kHz to 26·5MHz, b.f.o., outstanding sensitivity, good tone and volume. Would exchange for stereo radio cassette. Dennis. Tel: Milton Keynes 77139. *C167*

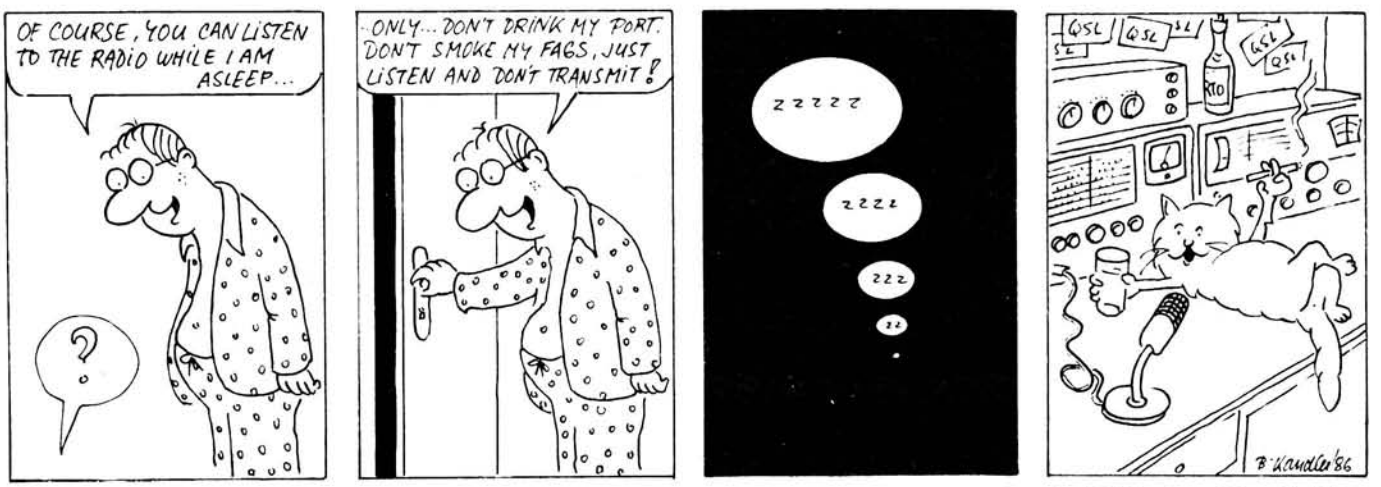
Have new boxed Yaesu 9600 with all accessories, including power pack. Has all the latest extended frequency coverage mode. Would exchange for AR2002 in similar condition. Tel: Walsall 642509. *C168*

Have Cobra 148 GTL-DX 28MHz multimode (28–29·7MHz). Would exchange for Kenwood TX T-599S. Peter G1TXI, 2 Mayes Close, Norwich NR5 9AR. *C178*

Have PFM200 frequency meter (new), ZX81 (new) with 16K RAM but no p.s.u. and ZL1LH SSTV boards complete with i.c.s Would exchange for 144MHz transceiver or old shortwave receiver. Tom Byrne, 68 Shelbourne Road, Ballsbridge, Dublin 4. *C200*

Have FT-290R that is too bulky for requirements. Would exchange for FT-208 with speaker/mic (plus cash adjustment) to make a set with 708. John G1OQV. Tel: Hungerford 83562. *C223*

BENNY



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The PW "Blandford" Receive Converter PART 1

In the true spirit of amateur radio, Ray Howgego BSc G4DTC has produced a design that could be the basis of a unique approach to receiver construction, while still leaving plenty of room for those who have a taste for experimentation.

The converter to be described allows the entire radio spectrum from 5kHz to beyond 400MHz to be swept in a single band, while suitable switching may be incorporated to extend coverage to almost 900MHz. It delivers an output at around 29·5MHz for connection to either a multimode h.f. receiver or a dedicated i.f. strip operating at this frequency. Right across the band, sensitivity is adequate for all but the most demanding applications, and it has an acceptably low noise figure. The concept of tuning 400MHz in one band may seem a little daunting at first, and certainly creates a new perspective for the listener. Each half degree of dial rotation covers more than 1MHz, say for example the entire medium wave broadcast band. However, if a 1MHz crystal calibrator is used in conjunction with the unit, calibration points may be established and the main station receiver can be used as a tunable i.f. providing accurate resetability. If, however, tuning is to be accomplished on the converter itself, a reduction drive of at least 400:1 will be essential, and this is not too difficult to arrange.

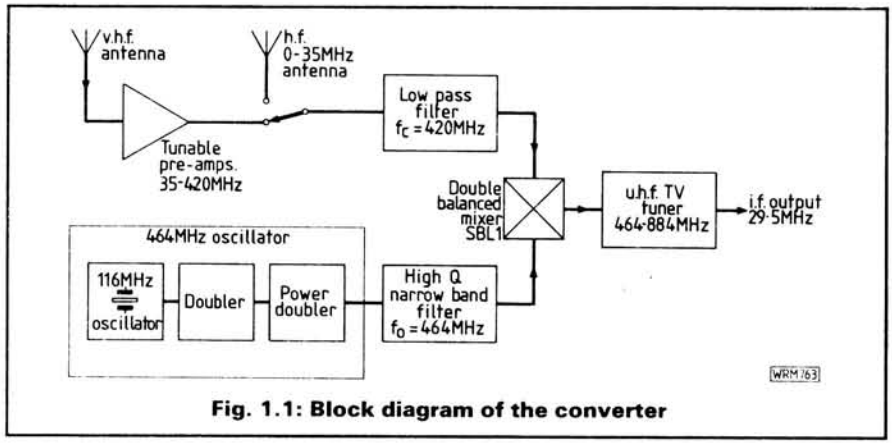
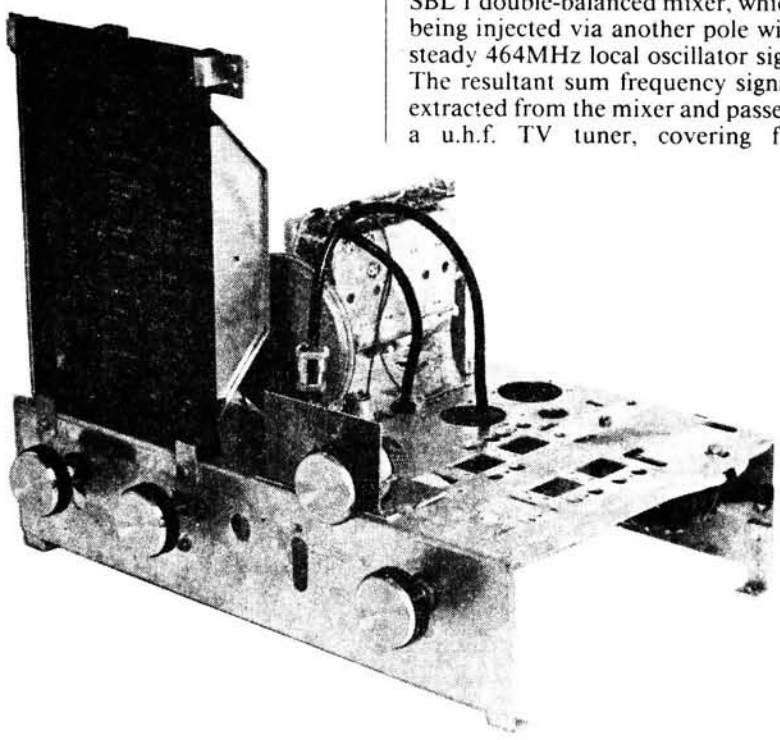


Fig. 1.1: Block diagram of the converter

System Description

A block diagram of the receive converter is shown in Fig. 1.1. All received signals lying between 5kHz and 400MHz are first fed through a low-pass filter. This filter is designed to cut off at approximately 420MHz, to stop break-through of local TV signals. From the low-pass filter the receive signal is then fed into one pole of an SBL 1 double-balanced mixer, which is being injected via another pole with a steady 464MHz local oscillator signal. The resultant sum frequency signal is extracted from the mixer and passed to a u.h.f. TV tuner, covering from 464MHz to beyond 860MHz. The TV tuner thus performs the function of a tunable i.f. amplifier and, in a single rotation of its tuning capacitor, takes in all received signals up to 400MHz. A 464MHz injection frequency was chosen because it coincides with the bottom end of the range of most u.h.f. TV tuners and may also be generated, by multiplication, from a 116MHz stock crystal.



PW "Blandford" test-bed, showing utilisation of old cord drive for slow-motion tuning

Design Criteria

The ultimate frequency stability of the converter will depend entirely on the stability of the local oscillator within the TV tuner. However, the author has used such tuners for many years and has been surprised by their exceptional stability. This is particularly true of the mechanically tuned units, in which use is made of a variable capacitor to tune a quarter-wave trough-line. All tuners of this type are virtually identical in construction and show essentially the same operational characteristics. At switch-on, there is a rapid fall in frequency, but this soon settles down to a steady drift of 300Hz/minute after 10 minutes, falling to 30Hz/minute after about an hour. This was considered to be quite acceptable for general band-searching, an f.m. or a.m. signal requiring only occasional retuning. A clean T9 note is produced by the oscillator, giving clear copy of s.s.b. signals.

Changes in external temperature produce the more pronounced drift: about −10kHz/°C. This corresponds

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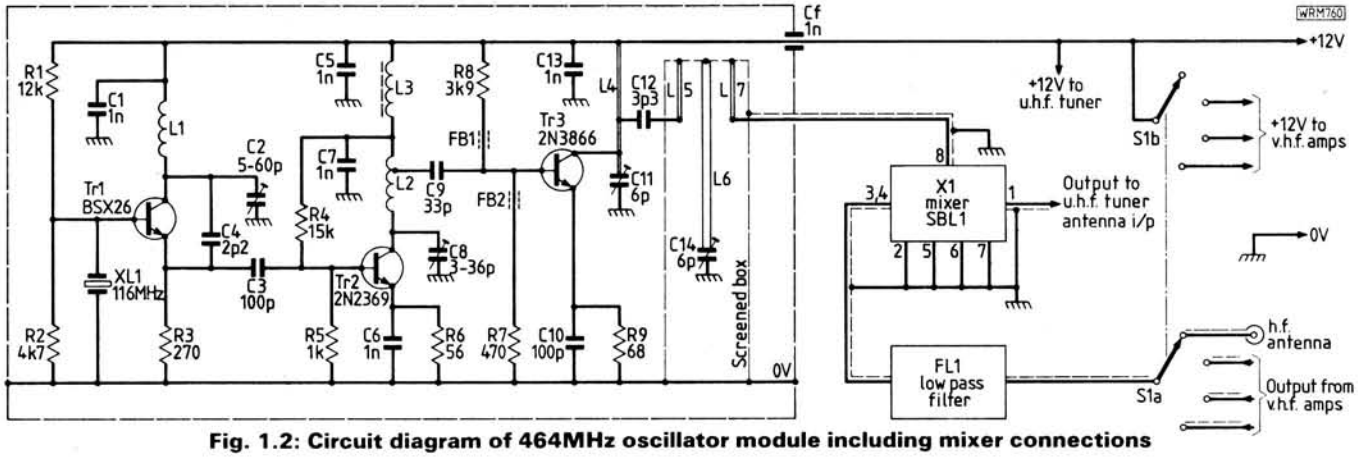

Fig. 1.2: Circuit diagram of 464MHz oscillator module including mixer connections

closely with the calculated drift inherent in a quarter wave line due to thermal expansion. Fortunately, the thermal inertia of the tuner and its enclosure is high and the response to external temperature changes is slow. A sudden reduction in room temperature will appear as a slow upward drift in frequency.

By far the most annoying cause of instability is mechanical. The TV tuner must be rigidly mounted and, preferably, enclosed in a diecast box. On no account must the tuning spindle make mechanical contact with the front panel of the finished unit otherwise the slightest vibration of the panel will be propagated through to the oscillator. However, the converter is intended as a fixed installation and, unless it is likely that the finished unit is to be subjected to continual mechanical shock, this form of instability will be rarely apparent.

Certain types of Varicap tuner might be suitable but, if such were to be considered for this project, they would require thorough evaluation before construction proceeds.

The SBL1 mixer is specified for operation only in the range 1 to 500MHz. However, when connected as suggested it will handle a signal frequency to below 10kHz and deliver an output to 1GHz without any obvious increase in insertion loss. There is no advantage in using the more highly specified, and excessively priced, SBL1-X.

The u.h.f. TV tuner must be thoroughly protected against r.f. breakthrough from TV signals. This is accomplished by means of a three-section filter, FL1, which gives a sharp cut-off above 420MHz. All internal signal lines after the filter must be well screened, using good quality coaxial cable. With the finished unit enclosed in a metal case, the local Crystal Palace emissions, line of sight from the author's QTH, were barely detectable. More distant signals had been totally eradicated.

At frequencies below 30MHz, the system noise level is sufficiently low to allow the mixer to be fed directly from the antenna. At frequencies above 30MHz, however, it is essential to introduce a large measure of pre-amplification. As a compromise, the author decided on narrow-band tunable pre-amplifiers having the highest possible gain. Three identical amplifiers are required to cover 35 to 420MHz, the narrow bandwidth giving good rejection of spurii and out-of-band signals which would otherwise introduce cross-modulation. Below 30MHz a similarly large measure of attenuation is necessary to prevent the most horrific degree of cross-modulation. All u.h.f. TV tuners provide access to the base of the r.f. amplifier transistor, this being used to provide a.g.c. in the TV receiver. By suitable reduction of the base voltage, cross-modulation is virtually eliminated without degradation of the signal-to-noise ratio. It is recommended some form of additional pre-selection is provided for operation below 30MHz. For example a simple pi-network antenna tuner could be useful when using a highly receptive long wire antenna. The author has no facilities for measuring noise figure but the sensitivity of the finished unit will speak for itself. Total system noise figures, calculated from manufacturers specification are 4·3dB at 400MHz, 2·9dB at 40MHz, 9dB below 30MHz. Omission of the v.h.f. amplifiers will push the noise level to approximately 11dB in the v.h.f. band, although many signals would still be heard.

Oscillator

The output of the 464MHz carrier oscillator must have a high degree of spectral purity. A single tuned circuit (L4/C11) at the collector of the second multiplier transistor was found to give insufficient discrimination between multiplier products; those at 696 and 928MHz having sufficient power to operate the mixer. To prevent the production of a host of spurious signals it was essential to insert a high *Q* bandpass filter, tuned to 464MHz, between the oscillator and mixer. Considering filter losses, and the high carrier level (about 500mV) required to give low noise conversion, the final oscillator doubler must operate at a reasonably high input power, approximately 100mW, necessitating the use of a 2N3866 device. The entire oscillator must be well screened; not a simple matter at u.h.f. where, quite often, the enclosure will resonate at the frequencies involved. A diecast box will be essential, or one of heavy gauge tinplate, soldered along all seams. It is impossible to remove all traces of the 116MHz harmonics but they can be reduced to a level well below that of most received signals and will, in fact, form useful markers in the final calibration. When the completed unit is tuned across the spectrum, with no antenna connected, the constructor might be concerned by the apparently large number of weak spurious carriers, the origins of which are difficult to compute. There are, however, no more than about twenty of these, which in a tuning range of over 400MHz is acceptable by any standards.

A block diagram of the final design is

SHOPPING LIST

Resistors

0·25W 5% Carbon Film

56Ω	1	R6
68Ω	1	R9
270Ω	1	R3
470Ω	1	R7
1kΩ	4	R5,15†
3·9kΩ	1	R8
4·7kΩ	2	R2,11
6·8kΩ	1	R12
10kΩ	1	R10
12kΩ	1	R1
15kΩ	4	R4,14†
56kΩ	3	R16†

† 1 of 3 pre-amplifier components, see text

Potentiometers

2·2kΩ log.	1	R13

Capacitors

Miniature ceramic plate

2·2pF	1	C4
3·3pF	1	C12
6·8pF	2	C15,18
10pF	1	C28*
15pF	4	C16,17,26*, 28*

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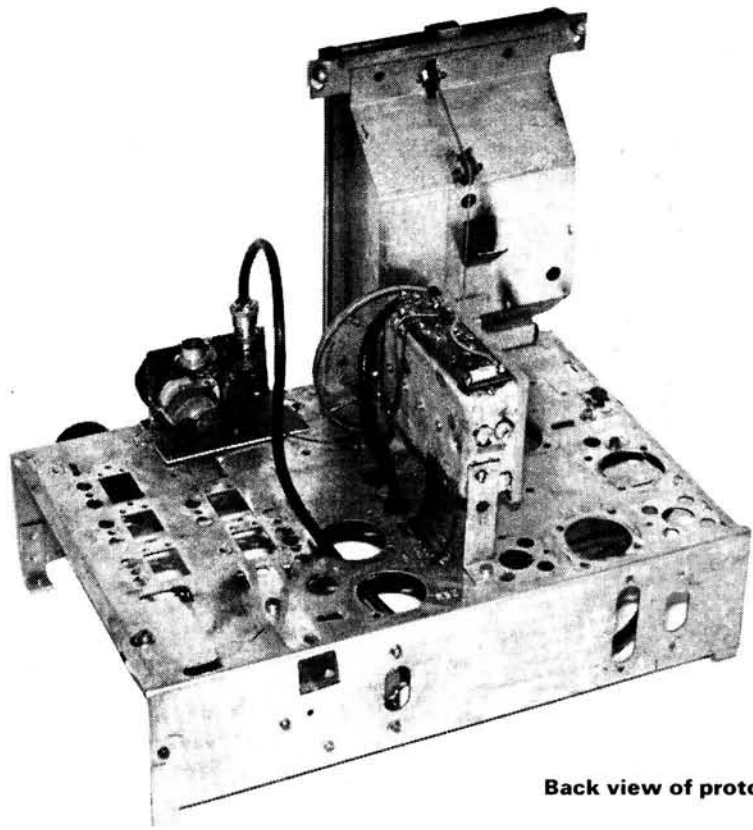
TABLE 1: PRE-AMPLIFIER DETAILS

	FREQUENCY BAND (MHz)		
Item	35–100	80–220	220–420
C26	39pF	33pF	15pF
C27	50pF	50pF	22pF
C28	22pF	15pF	10pF
	L12	L12	L12
Turns	12	3½	3
s.w.g.	24	24	24
Dia (mm)	6	6	3
Length (mm)	20	8	5
Tapped at	2½	½	½



Back view of prototype

given in Fig. 1.1. A circuit diagram of the 464MHz local oscillator module is shown in Fig. 1.2. Transistor Tr1 functions as a 116MHz fifth overtone crystal oscillator, Tr2 as a doubler to 232MHz, and Tr3 as a second doubler to the final frequency. Fifth overtone oscillators tend to be temperamental creatures and it was not an easy matter to find a reliable circuit. Some of the classic circuits depart onto some obscure crystal resonance while others simply fail to operate. What is important is that the tuned circuit is sufficiently selective to produce a high degree of feedback at the fifth overtone frequency only. Any attempt to draw power from L1 or the collector of Tr1 will damp the circuit to such an extent that the crystal tends to choose its own mode of vibration.

However, drawing the output from the transistor does not effect the *Q* of the tuned circuit and allows reliable operation. Almost any transistor with an f_T of over 250MHz should work here with suitable selection of C3 and R1. It should be emphasised that C3 and R5 are common to both oscillator and doubler stages and that the oscillator should be tested only with these components in circuit.

Transistor Tr2 functions as a doubler, L2 being tuned to 232MHz. There are few common substitutes for the 2N2369 and the bias components shown have been optimised for high efficiency. Transistor Tr3 doubles to the final frequency, L4/C11 being resonant at 464MHz. As discussed earlier, this stage must operate in excess of

22pF	1	C28*
33pF	2	C9,26*
39pF	1	C26*
100pF	2	C3,10
1nF	13	C1,5,6,7,13, 19,23,24†, 25†
Ceramic feed-through		
1nF	1	CF
Polyester		
0·22µF	1	C20
0·47µF	1	C21
Variable Air-spaced capacitors		
20pF	1	C27†(2)
50pF	2	C27†(2)
see text for alternative		
Foil trimmers		
3–36pF	1	C8(2)
5–60pF	1	C2(2)
5mm ceramic trimmers		
1·8–6pF	2	C11,14(2)
Electrolytic		
4700µF 25V	1	C22

† 1 of 3 pre-amplifier components, see text

* 1 of several frequency related components with the same component number, see Table 1

Semiconductors

Transistors		
AF239	3	Tr4†(1)
BSX26	1	Tr1(1)
2N2369	1	Tr2(1)
2N3866	1	Tr3(1)
Diodes		
OA91	1	D1
W005	1	D2
Integrated circuits		
7812	1	IC1

Miscellaneous

XL1 116MHz Crystal (1)(2); X1 SBL1 mixer (1)(2); TV tuner AT6382/15 or AT6382/02 (1)(4); L11 6·8µH inductor (3†)(2); S1 rotary switch 2p.4w. (1); S2 mains toggle switch s.p.s.t. (1); FX1115 Ferrite beads (2)(2); Mains transformer 12V,1A (1); FS1 500mA 20mm (1); p.c.b. fuse clips 20mm (2); chassis mounting coaxial sockets (5); p.c.b.s; double-sided p.c.b. material; tinned copper wire, enamelled copper wire, see Table 2; 50Ω coaxial cable; 10:1 reduction drive (1)(3) (see text); tinplate (see text); M1 (option) 200µA f.s.d.; diecast alloy project box (optional, see text); connecting wire; nuts, bolts and washers; knobs (2).

(1) Cricklewood Electronics Ltd., 40 Cricklewood Broadway, London NW2 3ET. Tel: 01-450 0995
(2) Cirkit Holdings Plc, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: 0992 444111
(3) Maplin Electronic Supplies Ltd., P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel: 0702 554161
(4) Manor Supplies, 172 West End Lane, London NW6 1SD. Tel: 01-794 8751
Some of these components appear in circuit diagrams in Part 2.

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100mW input and a medium power transistor like the 2N3866 is essential. Inductors L5 and L7 are untuned loops, loosely coupled to the trough-line inductance L6. Inductor L5 induces a current in L6 which is large only at the discrete frequency determined by L6/C14, which is resonant at 464MHz, currents in L6 are large, as are the induced currents in the output loop L7, and all other frequencies should have been eliminated. In reality, nothing is perfect and some signal at 696MHz and 928MHz does get through, although at too low a level to produce mixing. Purists might wish to try a two or three section filter but there is little to spare in terms of permissible losses.

Pre-amplifiers

The three v.h.f. amplifiers, the general circuit of which is given in Fig. 1.3, each cover a little more than one octave and may be adjusted to span 35 to 420MHz. It was decided that this was more sensible than trying to arrange some sort of band-switching within a single amplifier, any form of switch mechanism invariably increases the minimum capacitance achievable and would restrict the tuning range. The constructor will, no doubt, have personal preferences for particular transistors here but *pnp* types do possess the convenience of allowing the inductance to be returned directly to the ground-plane. Today, m.o.s.f.e.t. devices tend to be used almost exclusively, but require two tuned circuits or wideband matching networks, unnecessary complications in an intentionally simple circuit. The suggested AF239, although a little dated, still gives a highly competitive account of itself, with good stability. Even so, unconditional stability, with neither input nor output loaded, cannot be guaranteed, so switch S1b was incorporated to remove the supply from the unused amplifiers while S1a switches the mixer to the amplifier required.

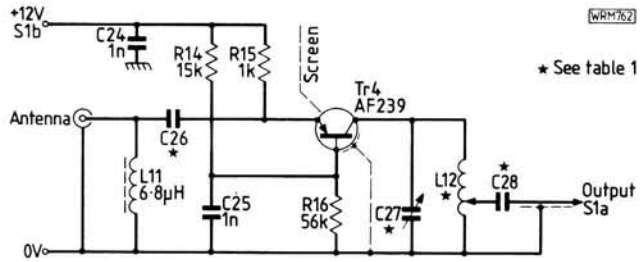

Fig. 1.3: Common circuit diagram of all three v.h.f. pre-amplifiers

NEXT MONTH:

In Part 2, construction and testing the PW "Blandford"

The SHORT WAVE Magazine

SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM SWM

FEB 87 ISSUE

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George Dobbs G3RJV Updates the SCD Into A 3W 80m Band Transmitter

Part 7 of "Simple Sideband"

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ON THE AIR

AMATEUR BANDS

Reports to: John Fell G0API, 14 Rectory Avenue, Corfe Mullen, Wimborne, Dorset BH21 3EZ

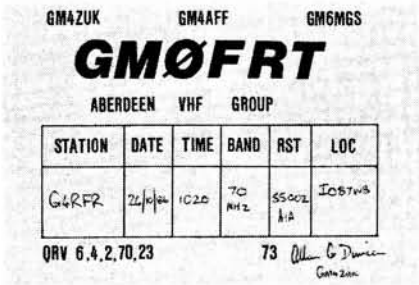
by John Fell G0API

Allan G. Duncan GM4ZUK of the Aberdeen v.h.f. Group (GM4ZUK, GM4AFF, GM4CAN, GM6MGS and GM8FFX) has written and says that he agrees with me about the DX potential of 70MHz, but bemoans the fact that in the October 1986 70HMz fixed contest not a single GM station was worked! They could not even claim a county multiplier and the nearest station worked was G3VIP on Humberside —over 400km away. However, to compensate a very good 144MHz aurora occured on 24/25 November extending as far south as Southern Germany. Best DX worked by members of the group, using their group callsign GM0FRT was OH, UR1, UQ2 and RQ2—all c.w., but overheard on s.s.b. was a contact between F and OH which can't be bad.

GM0FRT was also active during the December 144MHz fixed contest, experiencing poor conditions with gale force winds causing some excitement whilst on the roof fixing sheared antenna rotator U bolts in 125km/h winds! Best DX for this event was G4RFR, the Flight Refuelling ARS Club station—some 699km with both stations running full legal power. The GM group will be QRV on all contests between 70 and 1296MHz this year so look out for activity from IO87—it does exist, folks.

John Fitzgerald G8XTJ is the v.h.f. publicity officer of the Worked All Britain Awards Scheme and he has written to provide details of recent WAB "firsts" on v.h.f. and u.h.f. The first diamond award, which involves working 1500 areas has been issued to Laurie Segall G6XLL of Cricklewood, N. London. Close behind was Hayden Barker G6XVV, Rotherham with Jack G4WXX and Roy G1NUS all now holders of a specially engraved trophy.

None of this would have been possible without the sterling efforts of the many WAB enthusiasts who go mobile and portable to activate many of the non-populated places in UK. One such station is run by Bob Waters G1SMI who has been awarded the WAB Expedition and Mobile Platinum award for activating more than 750 areas on 144MHz. Not all activity is on 144MHz as proved by G6CSY for he has now received the first certicate for 100 areas on 1296MHz. Helen Rose, a s.w.l. in Harlow, completes the "firsts" by obtaining the first Heard All Britain 144MHz Decade Award. For more details of the WAB Awards see the News pages.


GM4ZUK GM4AFF GM6MGS

GMØFRT

ABERDEEN VHF GROUP

STATION	DATE	TIME	BAND	RST	LOC
G4RFR	24/10/86	1020	70 MHz	55002 MA	IO87WB

QRV 6,4,2,70,23 73 Allan G Duncan GM4ZUK

Belgian s.w.l. **Lambert J. Derenette ONL 5735/DIG 3202** has produced the Belgian Awards Directory, which is an 80-page booklet (in English) detailing all national and regional awards operating in ON. Lists of callsigns valid for each award are shown together with check log spacings. The booklet costs 3US dollars, 8 DM or 15 IRCs and is available form Lamber at: Strandlaan 47, B-8460 Koksijde, Belgium. Included are details of the ONLCC Awards (ONL Century Club) designed to encourage licensed amateurs to answer all s.w.l. reports they receive and to thank them for their contribution made to the education of the new generation of radio amateurs —what a nice idea.

Band Reports

With the Christmas holidays intervening, this month's reports show some reduction in the h.f. area, but are compensated by increasing v.h.f. happenings. **Robert Watters** of St. Austell has not deserted the bottom end of h.f. and once again provides a comprehensive log of stations heard on his FRG-7700 + a.t.u. and 20m long inverted L antenna. On 3·5MHz, HH7PV provided a 58 signal from Haiti on November 29 at 2151 with JY9RL at 2345 on December 9. The interesting callsign NL/LA3HY was logged at 2247 on the 9th and the 11th found an early evening stateside signal from KB1BE at 2051. Robert heard his first Icelandic station, TF1PF on 8 December putting in a 59 signal at 2356 on 3·791MHz.

Angie Sitton BRS 88639 monitored 7MHz and noted Y09AYN in s.s.b. QSO with SP, JA and Y70 on November 28. December 12 had KP4WI working 4X4/6 stations—at 55 in Stevenage via an HR10B and vertical whip antenna. The 14th revealed ZS6G at 55 working IK0, OE and EA stations. As usual 14MHz band signals were not in short supply, Robert Watters heard the special event callsign celebrating the Pope's visit to Australia, on November 29 at 1050. December 1 found TI2LC, Costa Rica 57 at 1403. Following earlier loggings of KV4FZ and J88BK from St Vincent. 5N8ALH was 58 at 1904 on 3 December with SV3YY on the 7th. An Austrian member of the UN forces based on the Golan Heights, OE8HFL/Port. YK also came up on December 1 preceded by 9YART at 58 from Trinidad. Signals from well south of the Equator were the main feature of December 17. At 0922, LU2DX was 58, VK2UT 59 at 0928 (28°C at his QTH!) and ZL2AJV 59 at 0930.

GM0FRT QSL card confirming possibly best DX during the RSGB 70MHz fixed contest, Oct '87. G4RFR in Wimborne at IO90AS

Angie Sitton found 15/16 November useful with A82EN working 1/2/4/0 US call areas—all very strong. The 16th had V44KI just above noise working OH7AA. Very strong but raspy tone A type signals were heard from K7RI at 1627 the previous day.

21MHz opened up for slightly longer around this time with T12CP heard in QSO with SU0AH—both 55, W2RP was very strong plus VE3FXE/P, ZS6 and 5B4SA. December 15 had ZS6RX at 55 working N5GDT/ZS1TP in Florida who was 5/3.

The 28MHz band continues to offer a taste of DX to come with both meteor shower and wintertime Sporadic-E propagations noted during December and early January. A shower peak during the ARRL contest weekend of 13/14 December produced a very quick exchange between **Roger Ward GW5NF** in Newport and F6IFR/P. Angie Sitton heard HA9RG attempting to work VK at 1128 on the 14th, followed by IU0UWS who was also 59+. During that period Band I TV signals were present for approximately two hours during the morning.

A check on 28MHz at 0200 on December 8 showed no activity but 27MHz was heavily populated by signals from Turkey, USSR and Yugoslavia, lasting for nearly an hour—most probably from the steady, clear signals and rapid fade due to Sporadic-E which was definitely operating on New Year's Day with UK amateurs working as far afield as Israel.

Amongst many others I have been watching the 50MHz band for signs of Sporadic-E openings, but up until early January have heard nothing via this mode, which normally peaks for the winter season during December/January. Many meteor "pings" and bursts have been received from both operational UK beacons, GB3SIX—50·020MHz and GB3NHQ—50·050MHz. It is believed that the GM beacon GB3RMK will return soon with a higher sited antenna following QRM problems with its local repeater. This unit, operating on 50·060MHz has put many good m/s signal bursts into my part of Southern England. A brief period of tropo enhanced conditions occurred on 3 January resulting in G0API (Dorset) working well up into the country with best DX at a very strong 59 peak from Basil G2AMV on the Wirral Peninsula.

G2AMV was running 10W to a recently developed Jaybeam 4-element dual band Yagi. Eric GU2FRO on the Island of Sark tailended this QSO with an equally strong signal, off the back of the 5-element Yagi at my QTH. Several new GW stations have been worked on 50MHz including John Davies GW4IOI who had to erect a dipole half way up his multi-storey tower block QTH in order to comply with the current band regulations! His main h.f. antenna, a TH3, on top of the building at 35m a.g.l. was relegated to receive-only function for the QSO. QRP is also very possible with Ken GW4LWL, Cardiff running a barefoot 0·5W transverter and indoor antenna providing a 52 signal for me on December 27 (driven element of recent PW beam design).

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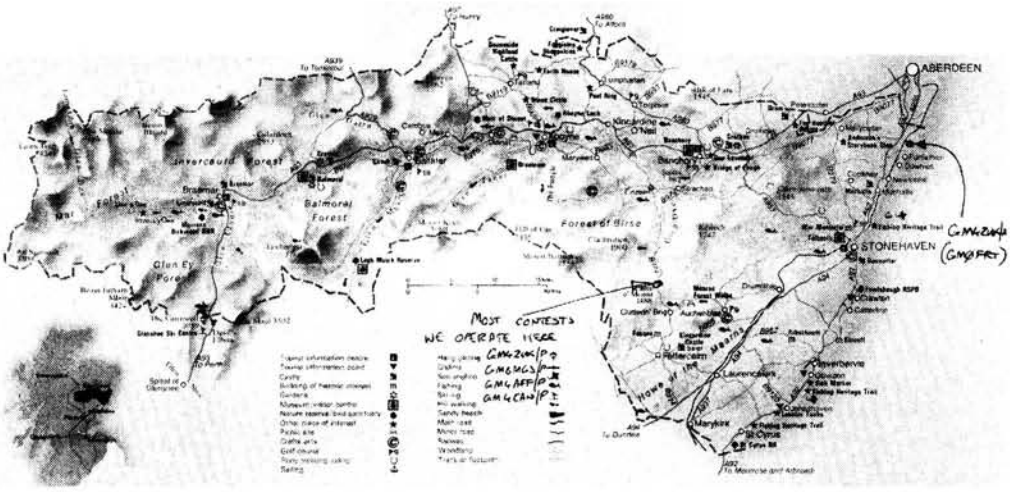
Last month I mentioned the beginning of a useful looking tropo opening on the 144MHz band and this certainly proved to be the case. During November 29 I worked over 10 PA/PE stations with some on the Northern Dutch Coast. On the 30th, DG8BAH in JO33RC at 700km was a 5/8 signals with other DF, On and French stations also worked.

Ian Galpin G1SMD, Poole, was also active at this time, working his first GU station on 144MHz f.m. in the form of GU1WDT. Ian reports hearing a visitor to his area, Tim G1RKF/M (who is normally DA4TP), working amateurs at his home QTH at München Gladbach via their "local" repeater on 145·800MHz—not bad DX for 2·5W f.m. to a 5λ/8 vertical!

On November 29, G1SMD worked the well-known call EA1TA, Joe near Santiago City IN53, for the first time amongst a very large pile-up of Midlands stations. The following day, further F stations were worked plus PA and DL with OZ3PZ heard via the Mendip repeater GB3WR (RO) at 0250. Many other UK and continental v.h.f. repeaters were heard at workable strengths at Ian's sea level QTH.

As a final this month, I have received a summary of activity on 432MHz during the 1986 RSGB Cumulative Contest series. These were run at 16 day intervals between October 7 and December 10. **Paul Phillips G4KZY** and **Ashley Hulme G0CDY** teamed up for this event operating at G4KZY/P from a well elevated site, 10km south-west of Newbury (IO91GI).



Map showing locations of GM4ZUK/P etc. It is in the centre of the Kincardine & Deeside Follow the Royal Road leaflet

This series of mini contests are an ideal introduction to contest operation, lasting 2½ hours each but with all the fun (and hard work). Using a TS-700 144MHz transceiver driving a Microwave Modules transverter and K2KIW 200W p.a. plus 2 x 21-element Tonna Yagis, our intrepid pair operated during 4 of the 5 sessions. The first was a near disaster with "site locating" problems causing a 1¼ hour late start. A bad joint in the home-brew front-end caused low i.f. sensitivity, but when located and fixed conditions were good and allowed the best DX of the series FC1DV1 in AF38d at 738km to be worked. A further 51 QSOs in the remaining time left them enthusiastic but fed-up about their initial problems.

The third, fourth and fifth sessions were also entered from the same site resulting in 76, 88 and 72 QSOs respectively with best DX in each all PA/PE stations at nearly 450km. All in all a commendable effort, proving that 432MHz is alive and well and that it gets very cold and windy on hill tops in November and December. They both say they'll be back this year—will you?

ALL REPORTS MUST BE WITH JOHN BY FEBRUARY 20

RTTY

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

by Ron Ham BRS15744

"It must be remembered that BARTG caters for all modes of data transmission, from 50-year-old teleprinters using simple limiter discriminator terminal units to tomorrow's packet radio networks using state of the art microprocessor chips," said Alan Hobbs G8GOJ, Chairman of the British Amateur Radio Teleprinter Group, in the Winter 1986 issue of the group's journal, *DATACOM*.

As usual, the latest issue of *DATACOM* is full of interest for the data enthusiast and for those of us who know little about the techniques of the AMTOR and PACKET modes of communication, I can recommend the articles on these subjects by G6CCA and G3VPF respectively.

The first entry in my log for this session was ZL2AMD, working a DJ, at 0829 GMT on November 26 and although this RTTY signal, from North Island, was weak and watery with me and at his end he was suffering QRN from a local thunder storm, it was good to copy data from New Zealand once more on 14MHz.

Fig. 1: The RTTY chart

Country (Prefix)	Frequency (MHz) 3·5	7	14	21
Australia (VK)			X	
Austria (OE)			X	
Belgium (ON)			X	
Brazil (PY)			X	X
Bulgaria (LZ)			X	
Canada (VE)			X	
Canary Is (EA8)			X	X
Cape Verde Is (D4)			X	
Cayman Is (ZF)			X	
Chile (CE)				X
Corsica (TK5)			X	
Cyprus (ZC)			X	
Czechoslovakia (OK)			X	
Dominican Rep (HI)			X	
East Germany (Y2)	X	X	X	
Egypt (SU)			X	
Eire (EI)			X	
England (G)	X	X	X	
Finland (OH)			X	
France (F, FE)			X	
Gozo & Comino (9H4)		X	X	
Greece (SV)			X	
Greenland (OX)			X	
Guatemala (TG)			X	
Hawaii (AH)			X	
Hungary (HA)			X	
Indonesia (YB)			X	
Israel (4X)			X	
Italy (I, IK, IT)		X	X	
Japan (JA)			X	
Kuwait (9K)			X	
Lebanon (OD)			X	
Liberia (A8)			X	
Martinique (FM)			X	
Mexico (XF)			X	
Netherlands (PA)	X		X	
New Zealand (ZL)			X	
Nigeria (5N)			X	
Norway (LA)			X	
Poland (SP)			X	
Portugal (CT)			X	
Reunion Is (FR)			X	
Rumania (YO)			X	
San Marino (T7)			X	
Sardinia (IS)			X	
Scotland (GM)			X	
Sicily (IT9)			X	X
South Africa (ZS)			X	
Spain (EA)		X	X	
Sri Lanka (4S)			X	
Suriname (PZ)			X	
Svalbard (JW)			X	
Sweden (SM)	X		X	
Switzerland (HB)		X	X	
Turkey (TA)			X	
Ukraine (UT)			X	
USA (W)			X	X
USSR (UA, UB)			X	
Venezuela (YV)			X	
West Germany (DF, DJ, DL)	X	X	X	
Yugoslavia (YU)		X	X	

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SCR-2	Receive Sound De-Modulator	24.95	—
VD/P1	Pre-Emp/De-Emp Module	10.50	—

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Country (Prefix)	Frequency (MHz) 3·5	14
Austria (OE)		X
Canada (VE)		X
Canary Is (EA8)		X
England (G)	X	X
Finland (OH)	X	X
Guatemala (TG)		X
Hungary (HA)		X
Italy (I, IK, IT)		X
Northern Ireland (GI)		X
Poland (SP)		X
Sicily (IT9)		X
Sudan (ST)		X
Sweden (SM)	X	X
Switzerland (HB)	X	X
USA (W)		X
Venezuela		X
Wales (GW)		X
West Germany (DF, DJ, DL)	X	X

Fig. 2: The AMTOR chart

Early on the 28th, I logged RTTY signals from Brazil and Japan and copied ZL2AMD again around 0830 on December 1, in QSO with a PA0.

"AMTOR traffic seems much less in evidence the last few months and since this mode is much more computer orientated, I wonder whether many operators have now succumbed to the temptations of packet!," asked **Len Fennelow G4ODH**, Wisbech. You may well be right Len, judging by the bursts of packet signal noise that I often hear passing through the Hampshire repeater GB3HP.

However, between November 20 and December 19, Len logged AMTOR signals from 5 countries on the 3·5MHz and 18 on the 14MHz bands as listed in Fig. 2. "14MHz is the band for all seasons," said Len, having logged RTTY signals, during this period, from 55 of the countries listed under the 14MHz heading in Fig. 1. Among the new ones that he found this time were Cape Verde D44, Hawaii AH6, Reunion Is. FR4 and Svalbard JW5, thus increasing his datawatch total to 137 countries. The signals from Cape Verde and Hawaii were received on November 22 and December 14, respectively. During a QSO between stations in Finland and Lebanon, around 0850 on Christmas morning, I read the statement, "One of my first QSOs in RTTY," from the OH and let us hope that this is the beginning of a multitude of contacts in the data mode.

PLEASE MAKE SURE YOUR REPORTS ARRIVE WITH RON BEFORE FEBRUARY 20

SPACE & SATELLITES

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

by Pat Gowen G3IOR

JAS-1/FO-12

Our latest satellite is spending quite a lot of what would otherwise be operating time resting, and in fact was off the air for six consecutive whole days from 22 November to 28 November to permit the depleted batteries to recover. This is not surprising, as for all but a few favourable modes and orbital positions relative to the sun-angle, FO-12 is working from a negative power budget, that is to say the on-board systems are consuming more average power than can be developed by the solar cells. This condition will become more impaired with time, as the battery storage capacity will drop, and partial cataract can reduce the efficiency of the solar panels.

Operation of the digital transponder gives a very heavy battery loading, even more than that caused by excessively powered stations on the analogue mode, so we cannot expect the new spacecraft to be on full time. At the end of 1986 the Japanese command station found that it was dangerous to run the mode "JD" digital transponder on a continual basis for more than six or seven orbits, as the battery showed signs of serious charge depletion following this. As many packet operators may choose to load and down dump automatically, this recharging period was not thought to be a serious impediment to social operating hours, as the satellite would overfly all world areas in the twelve to fourteen hours allotted, nothing being lost in the way of global communications possibly due to the limited power up duration.

Unfortunately, as far as is known, the Japanese command stations do not run h.f. nets, so there is no way yet of knowing before-hand as to any change of operational schedule in the short term. We can only suggest that users tune in to the numerous AMSAT nets, in the hope that one of the participants will have obtained any change of operational schedule details, to try to keep abreast of the ever changing situation.

The current plan, calculated from a combination of user interest and technical feasibility, is to share the operations on a regular basis and yet to allow a sufficiency of off-time to permit adequate battery recharging. Thus, an intermittent high power "JD" mode is now programmed in, to give the best of all possible worlds.

In early January, hopefully to continue, the daily schedule plan is as follows:

Sundays .....Mode "JA" analogue all day. (c.w., s.s.b., etc.)
Mondays .....Recharge day—all systems off.
Tuesdays .....Mode "JA" analogue all day (As Sundays).
Wednesdays .Mode "JD" digital (Packet only) but with transponder on for 116 minutes, then off for 116 minutes, alternating to permit adequate battery charge maintenance.
Thursdays .....Mode "JA" all day, as on Sundays and Tuesdays.
Fridays .....Recharge day—all systems off as Mondays.
Saturdays .....Mode "JD" on/off at 116 minute intervals, as for Wednesdays.

Remember that user demand, power use, and the eclipse to insolation ratio determines the efficacy of this schedule for the early part of the year, and that changes may have to be made from time to time to allow for uncalculable variables.

UoSAT's

The image taken by the c.c.d. camera aboard OSCAR-11 that appeared as Fig. 7 on page 62 of our December column is thought to be that from a camera severely dazzled by the sun at horizon, the result of incorrect pointing due to the loss of gravity gradient stability. To quote the University of Surrey spacecraft command centre from the UoSAT OSCAR-11 Bulletin-065, sent on 27 November '86 . . . "The UO-11 c.c.d. camera is very sensitive, and over exposes very easily . . . until we have arrived at the correct exposure, combined with good satellite pointing and good ground weather (to give clear land/sea/cloud boundaries) we will not be sure how well the camera and the DSR memory system are working . . . listen on 435MHz for test transmissions . . ." The diary has been programmed to take images when the satellite is over the terminator (twilight line) and some very encouraging results were returned from the pictures taken on Monday 23 November '86.

Also in late November a series of tests were performed with WOD surveys to assess the battery loading presented by having both the 435 and 145MHz beacons on simultaneously for a 12 hour period. Channel 52, which indicates the battery voltage, clearly showed a discharging trend superimposed on the normal eclipse effects, but was found not to be dangerous to the long term capacity of the cells. The power budget is markedly affected by the attitude of the spacecraft, as was very noticeable when the gravity gradient was out of lock.

Steve Holder of UoS has been very busy working on the final details of getting the Digitalker to give meaningful messages with interesting content, and if all goes according to plan you will be receiving lengthy bulletins in the spoken word from OSCAR-11 by the time you receive your magazine.

Undoubtedly many of you monitoring this satellite over the festive period will have heard the Christmas greetings message from the University of Surrey team encoded onto the Digitalker.

It is always worth looking at the Uo-SATs around the Yuletide Festival, as in previous years the bulletin has carried pictures of candled Christmas trees and decorated satellite drawings with the seasonal greeting printed out.

If you have yet to hear the Digitalker in operation, then look for orbits on Wednesdays, either by calculating or computing pass times from our Keplerian element sets for OSCAR-11 (UoSAT-2) or by leaving your receiver on slight squelch cut-off set to 145·825MHz, when you will hear the passes in the morning, and a further set in the middle evening.

The University of Surrey team would like to hear from any schools, colleges, other universities etc. who are using UoSAT in their studies. Last year a prize went to the Sir William Turner's Sixth Form College in the UK, for work performed by the first and second year students in tracking, receiving and decoding telemetry, WOD surveys and the regular bulletins. Please send in

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UOSAT 2 ON 18/2/87

UTC	AZ	EL	LAT	LONG	ORBIT NO
1027	14	0	75	334	15835
1028	15	5	72	340	15835
1029	15	10	68	345	15835
1030	16	16	65	349	15836
1031	17	25	61	352	15836
1032	19	39	58	354	15836
1033	25	64	54	356	15836
1034	171	77	51	358	15836
1035	139	43	47	359	15836
1036	192	30	44	1	15836
1037	193	19	40	2	15836
1038	194	12	36	3	15836
1039	194	6	33	4	15836
1040	195	2	29	5	15836
1041	195	-2	26	6	15836

Fig. 1

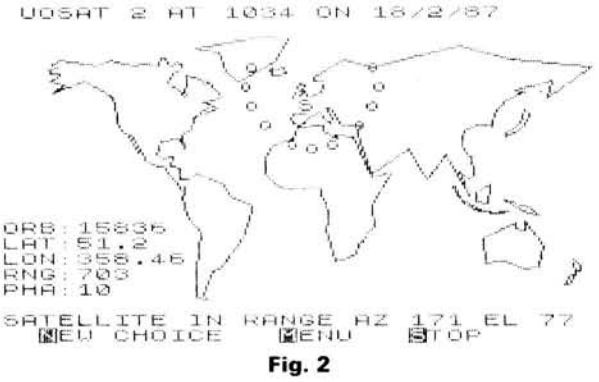


Fig. 2

UOSAT 2 ON 18/2/87

UTC	AZ	EL	LAT	LONG	ORBIT NO
2000	128	1	35	335	15841
2001	124	5	38	337	15841
2002	116	10	42	338	15841
2003	110	15	45	339	15841
2004	98	20	49	340	15841
2005	80	25	52	342	15841
2006	58	27	56	344	15841
2007	37	25	60	346	15841
2008	21	19	63	348	15841
2009	10	14	66	352	15841
2010	2	9	70	356	15841
2011	357	5	73	1	15841
2012	353	1	76	10	15841

Fig. 3

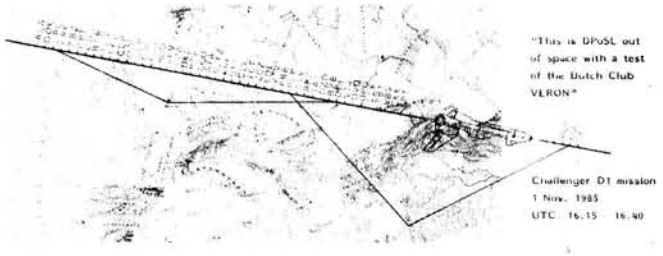


Fig. 4: DP0SL/PE1LFO QSL card

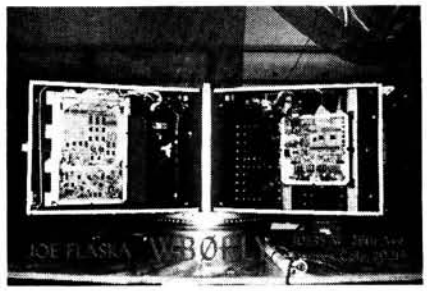
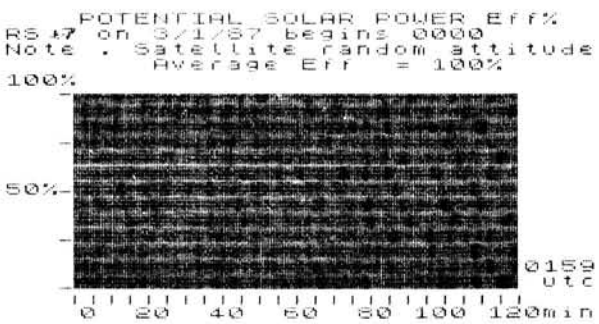
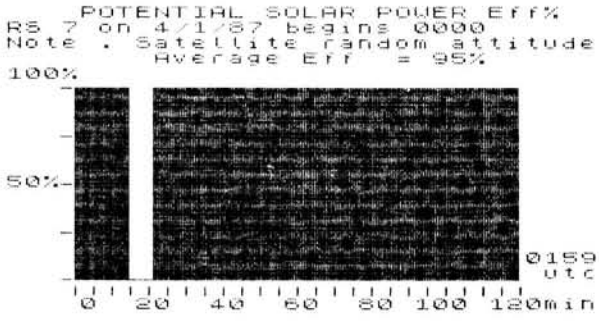


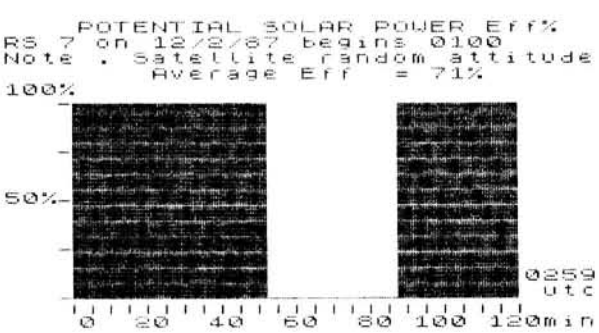
Fig. 5: OSCAR QSL card from WB0RLY



◀ **Fig. 6(a)**



◀ **Fig. 6(b)**



◀ **Fig. 6(c)**

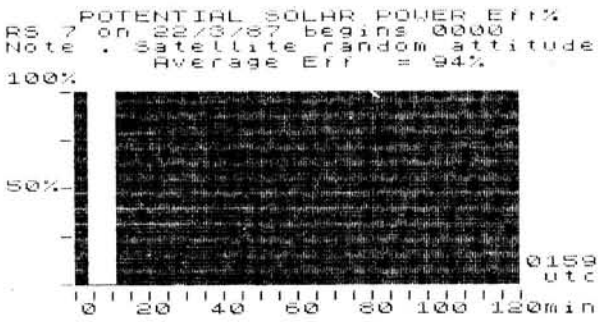


Fig. 6(d) ▶

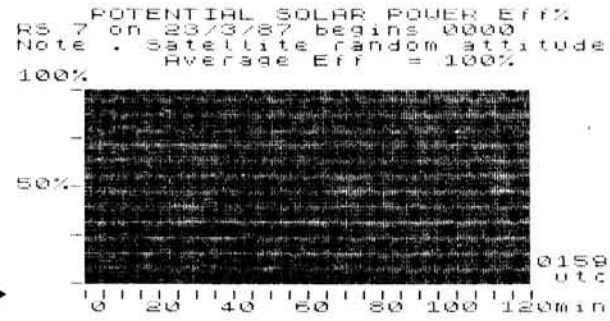


Fig. 6(e) ▶

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your activity, station details, and a photograph, and ask for the basic information pack to get started if needed.

To help any newcomers, three printouts from the John Branegan/Berger Lindholm "UoSAT" Spectrum program is given, as Fig. 1 which gives a pass suitable for schools use on the morning of 18 February. From left to right each column reads UTC, the satellite azimuth in degrees from true North, the satellite elevation above a flat horizon, then the latitude and longitude of the sub satellite point of the world that the spacecraft is overflying at that time, and lastly the orbit number.

The Mercator map print-out Fig. 2, shows the satellite marked as "S" over the UK at 1034UTC, and the footprint as a circle around it. At this time, UoSAT-2 will be very strong for high angle receptors, so hand-held and mobile stations should incline their antennas horizontally to obtain maximum quieting.

For those who are QRL by day, Fig. 3 gives an ascending evening pass table for the same day.

Mount Olympus?

Serge Raus ON1KRC writes from the University of Liege Telecommunications Institute to tell us of an interesting concept with the coming ESA Olympus satellite, which is to be launched from FY7 in 1988. There are to be four payloads, viz:

1. A 12, 20 and 30GHz propagation package to complement and verify propagation statistics in the higher frequency range.
2. A 12/14GHz specialised services payload for advanced communications experiments between small earth terminals.
3. A direct broadcasting payload with two channels, one intended for pre-operational Italian use, and the second for general European use.
4. A 20/30GHz communications payload for point to point and multipoint teleconference and other experimental applications.

The most fascinating opportunity presents itself when we learn of the results of discussions between ESA and EUTELSAT (a re-grouping of all CEPT members) which recommends that open access to Olympus is available to everyone, on the single proviso that no-one will attempt to take advantage of the system whilst it is actually broadcasting. If national licensing authorities give special permission for radio-amateurs to use the frequencies (currently not part of the amateur bands), Olympus will provide the basis for new and advanced telecommunications experiments by progressive radio amateurs, which will permit the extension of occupancy and use of the 10 and 24GHz bands by the developments made on the nearby satellite frequency bands.

Interested participants should write to their licensing authorities via the Telecommunications Liaison Officer of their national radio society, requesting special licenses for a temporary period, listing the experimental project, the system envisaged, the power and dish gains, to give a comprehensive proposal and plan that might receive favourable consideration. Send your proposal also to Serge Raes ON1KRC, Universite de Leige, Telecommunications, Institut Montefiore B.28, Sart Tilman, B-400 LIEGE, Belgium. Telephone: 32 (0) 41 562626 o4 562621. TELEX: 41797 saunlg b.

More technical information on Olympus will soon be available from AMSAT and other national radio amateur organisations revues, and will be published in this column when received.

DP0SL/PE1LFO

True to our last month's column, the promise ". . . A QSL card will come . . ." given to Peter Cardwell of Sheffield by Bob Caron, PE0BCC, the VERON Space Experiment Project Manager, a QSL **did** come, and is shown in Fig. 4. Those who followed the propagation experiment might wish to compare their logs of the code groups recorded against those transmitted by PE1LFO for accuracy. Furthermore, it would be interesting to calculate if any sub-horizon anomalous propagation permitted copy of any groups transmitted whilst the Challenger Space Shuttle was below their particular QTH radio horizon.

As far as can be determined, no remarkable re-angulation of the signal was evidenced over Western Europe during the time of the experiment, although it may have been a very different case when the track was further to the South East. Many observers may note that they heard signals first marginally sub-horizon, a severe attenuation at the horizon itself as the signal propagated through the maximum path of ionisation, followed by an escalating S-meter reading as the elevation of the source increased and the observer to shuttle distance decreased, as this is the expected norm at v.h.f.

It would require an enormous solar flux to produce a sufficient F2 re-angulation of 145MHz signals to return them to earth, but the effect of the "E" layer is often pronounced. It will be interesting to read of the results of the experiment when eventually published, as it may lead to further advanced understanding of the propagation of signals from within the F2 layer of our ionosphere at low sunspot levels.

Weathersats

As a replacement for NOAA-6, NOAA-10 was launched successfully from Vandenberg California on 17 September, and was handed over just three days later for operations to commence. It contains an advanced high resolution radiometer, a microwave sounding unit, an ARGOS data collection and location system, earth radiation and budget experiment, and high resolution infra-red sounder. Only six days after launch, and within a day of having its search and rescue package activated, it picked up a distress signal from four Canadians whose aircraft had crashed in a remote area of Ontario, who were promptly rescued.

GOES-2 at 112·88W, inclination 4·6 degrees, has WEFAX on 1691·0MHz.

GOES-3 at 135·67W, inclination 3·5 degrees, has WEFAX on 1691·0MHz.

GOES-5 at 75·63W, inclination 0·08 degrees, has WEFAX on 1691·0MHz, and VISSR data from GOES-6 on 1687·1MHz.

GOES-6 is an imaging satellite, located at 97·5W, inclination 0·06 degrees.

RS-5 and 7

Billy Kelly sent his log of the signals heard from the Russian satellites taken before they went back to full time transponder operation, but heard the orbital data given on the ROBOT frequencies of both RS-5 and RS-7, as well as DL9BU, DJ3UH, RS3A, IV3LCZ, G2BUY, PA3DS, UA9FHX, UR2JL, G3BGM, SM3RLJ, OH7UK, R5SG, SM5DXR, ON4KG, DF2OK, I5YT, OH5NM, DK2LM, and G2BMM. The satellites came into full use as predicted in early December, and an activity period took place over the week end of December 26–28, unfortunately the news of this event coming too late for inclusion in our last issue.

For the first two days of commanding to full time operation, RS-7 was performing up to three orbits before automatically commanding itself off again due to low battery voltage protection. On the third day, with the higher sun angle, it stayed on as commanded. It has to be pointed out that this effect demonstrates that the RS-7 battery is now showing signs of storage limitation, and although not in as poor a shape as its brother RS-5, is beginning to tell us of the effect of aging. Both satellites were due to return to a low use schedule from 10 January.

The reason that the satellite had an insufficiency of power from the battery charge or from the solar panels to be able to maintain operation during the first few days following the eclipse is probably due to the fact that the "sunrise" syndrome, e.g. the sun only just peeking above the earth horizon for a time, gave attenuation to the white light required for the effective spectral range of the solar cells. Dust, plus water vapour in suspension in the upper atmosphere gives attenuation of the blue (h.f. end) of the solar spectrum, hence the red sky at dawn and dusk, whilst the increasing Carbon Dioxide content of our world's atmosphere gives the "greenhouse" effect and attenuates the red (l.f. end) of the spectrum.

As this forms the basis of an interesting experiment for observers, Fig. 6 (a) to (e) are produced, printed from the GM4IHJ "SATSUN" Spectrum program. The plot of RS-7, shown in Fig. 6 (a), in continuous sunlight for the orbital period commencing at 0000UTC on Saturday 3 January 1987. On the following day the earth had interposed between the satellite orbit path and the sun, from 0014 to 0021UTC, giving a five minute period of eclipse by then, Fig. 6 (b). Each orbit will have the same condition when the satellite is at that part of its orbit giving the equivalent attitude to earth and sun, and this period of darkness will magnify with each successive each orbit until half way to the next full sun condition.

RS-7 at mid-eclipse, shown in Fig. 6 (c), with the solar cells out of the sun for a period of thirty-five minutes each orbit when the satellite is on the opposite side of earth to the sun, and with the optimum solar cell charging efficiency now reduced by 29 per cent. When we get to 22 March, we have our last day of eclipse, shown by Fig. 6 (d), with now only seven minutes of shadow per orbit, and the next day, 23 March, Fig. 6 (e) shows that we come back to continuous sunlight again, with the satellite orbit path getting closer to a 90 degree sun angle. Allowing for the attenuation given close to the horizon, and the continuous health of the satellite, we can then expect a further full time transponder operational period to begin on RS-7, with RS-5 not far behind, until a new eclipse commences on 7 May 1987.

If, hopefully, the telemetry beacon can be put on over the critical periods, observers can deduce some interesting phenomena by studying the channels relating to the solar panels, temperatures, the action of the active temperature control heating element, and the battery charging and voltage, and relate these to the marginal and total eclipse times.

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144-8T	8 Ele Long	11·0dBd	£35.95	A
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144-19T	19 Ele	14·2dBd	£64.26	A
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144-GP	Ground Plane	Unity	£16.57	B
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70/3	3 Ele	7·1dBd	£34.64	C
70/5	5 Ele	9·2dBd	£52.60	C

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50/3	3 Ele	7·1dBd	£39.95	A
50/5	5 Ele	9·2dBd	£59.90	A
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	4 Way		£27.60	B
2M	2 Way		£30.60	B
	4 Way		£34.50	B
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OSCAR-10

Our elliptical orbiter continues to change its operational status just about as fast as the controllers and media can keep up with it. It went from quite dead to active operation, to unmodulated beacon only, to transponder only, both half and full power, to telemetry only, then to both, and in late December was switching between the beacon and the transponder at a twice per second rate producing merely audible ticks from both the beacon and any transponded uplink, all in the space of ten days! At the time of writing it is on high power Mode "B" Transponder mode, sounding first-class, but the beacon is a plain carrier again. It could be doing anything or nothing by the time these words reach you. VK5AGR and DB2OS continue to valiantly fight the ever decaying memory of the IHU, and are creating at least three miracles per week. As we said in the January issue, the long term outlook is very bleak, and any operation that we get is a bonus.

Phase III-C

Heinz DL1CF reports that it now appears that the joyfully received ESA news of a possible June lift-off for the new elliptical Phase III satellite was meant as June 1988 and not 1987 as understood, and that a further year may elapse before it gets into orbit.

In the meanwhile, AMSAT HQ have received the generously donated $US80 000 worth of HS-6564RH radiation hardened memory circuits from the Custom Integrated Circuit Division of the Harris Corporation of Melbourne, Florida, for the satellite. These will permit an increased memory of 32K for Phase III-C which will withstand an accumulated radiation dose of 100 kilo-rads before failure. This is twice the memory and ten times the radiation resistance of OSCAR-10, and as the new satellite should be in an elliptical orbit that does not take it right through the most severe part of the Van-Allen belt as was the case with OSCAR-10, which did not achieve the intended high enough inclination or the low enough perigee, it should last for many years.

The latest photograph, Fig. 5, taken and sent to us by Joe Flaska WB0RLY of Colorado, as his OSCAR QSL card. It shows the 3A arm on the left containing the IHU at the left hand side and the helium pressure bottle part obscured by the bracket faceplate on the right. The right hand arm is the 3B, containing the two encased back-up batteries on the left, and the battery charge regulator to their right. The new IHU with the radiation hard memory is now being built by KE3D, with help from W3GEY, W0PN, W2FPY, KA1M and others, and will replace the old unit depicted. The DL AMSAT Group will adjust, balance and vibration test the completed satellite, and install the kick motor and its mounting bracket. Over 3200 man hours were logged at the AMSAT laboratory by W0VO, W8FAR, KA0HPP, KA0SRO and others, and many more will be spent by AMSAT-DL before launch. Funding was provided by AMSAT groups in the USA, Germany, South Africa, the UK and others, for what is truly an International satellite.

For more information on satellites contact: AMSAT-UK, 94 Herongate Road, Wanstead Park, London E12 5EQ. Please enclose an s.a.e.

VHF BANDS

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

by Ron Ham BRS15744

While observing the sun with his spectro-helioscope from his home in Sevenoaks, **Cmdr Henry Hatfield** located 1 small sunspot and 8 filaments on November 20, no spots and 5 filaments on the 26th, 27th and December 6, a small faint spot and 2 filaments on the 10th, no spots and 9 and 10 filaments respectively, on the 19th and 20th. However, by the 22nd the 3 small spots, seen in Fig. 2, had appeared and were observed and drawn by **Patrick Moore**, at his observatory in Selsey.

"An aurora occurred on November 24 and my contacts on 144MHz varied between north-west Holland, Germany and Scandinavia and the rest of the UK," wrote **Lawrence Morgan GM0ATQ** in Greenock. During a similar event on the 25th he added ON7CC and ON7RB, in BK and BL squares respectively, to his tone-A score.

Dave Lingard G0CLH in Northfield worked stations in GM, LA, OH and SM, via aurora, on the 25th.

"Auroral reports for each overnight from November 23 to 30 inclusive, were received from Peter Brown (Fort Murray), Karl Cooper (Kirkwall), the weathership *Cumulus* (Station Lima), L. B. Daunt (Sumburgh), David Gavine (Edinburgh) and Alex Murray (Wick)," wrote **Ron Livesey** from Glasgow. He is the auroral co-ordinator for the British Astronomical Association. During this period Ron's own magnetometer showed unsettled conditions on days 22, 23, 27, 29 and 30, very unsettled on the 25th and storm conditions were indicated on the 24th. Ron also received magnetic data from Karl Lewis (Saltash), NOAA Laboratories (Boulder), Owen Pearson (Edinburgh) and Jack Wright (Rugby), confirming "full magnetic storm" for the 23 to 25 and "very unsettled", for days 29 and 30.

In Wisbech, **Len Fennelow G4ODH** noted auroral signals from the 144MHz beacon at Wrotham—GB3VHF on November 18 and 26 and weak and watery signals from the 50MHz beacon—GB2NHQ at Potters Bar, on December 5 and 9.

Fig. 1: QSL card sent by Jim Willet

The 28MHz Band

"Conditions on 28MHz for November were extremely poor," wrote **Bill Kelly.** He noted that, although a few openings did occur between 0900 and 1030, there was a complete shut down with him after that time. Len Fennelow logged signals, around 29·600MHz from DL and ZS4 on November 22 and an OK1 working a G3 on December 12.

"To pull out my first real DX at this stage of the predicted solar cycle was totally unexpected and welcome," said a delighted Lawrence Morgan after c.w. contacts with J6 and VP2, within a minute of each other, during the CQ World-Wide contest on November 30. At 0840 on the 29th, Ted Owen in Maldon copied c.w. signals from VK6. Fred Pallant G3RNM in Storrington heard ZS6 at RS57, on 28·5MHz, at 1045 on the 30th.

Dave Lingard worked 9J2 on the 28th, VE3/ZS4 and ZS3 on the 29th, KP2 and KP4 during the c.w. contest on the 30th, SV0 on December 1, VU2 on the 15th and 4Z4 on the 16th. Dave's final score for 1986 was 116 countries heard on 28MHz and 70 worked.

"Right now the 28MHz band is very quiet, but there has been some activity during the past month," wrote **Don Hodgkinson G0EZL** from Hanworth on December 19. On various days between November 22 and December 14 he worked stations in CT, D68, EA, EA6, HA, I, LZ, UA6, UP, YU, ZS, 4X4 and 5B4.

Propagation Beacons

"The chart of 14MHz beacons, Fig. 3, shows very clearly what state the h.f. bands have been in during the period November 20 to December 18," wrote Len Fennelow. He found the 14MHz band closed on November 18, 19 and December 1 and he highlights the good conditions on the 22nd when OH2B was 599+ and WS6WX/B appeared for the first time in months. "Only three 28MHz beacons graced my log this time and two of them were South Africans—ZS6PW and Z21ANB," said Len.

However, **Gordon Pheasant** did much better by sometimes logging LU1UG, PY2AMK and VS6TEN between November 23 and 29 and the German and South African beacons almost daily throughout this period, using his computer controlled monitoring system. Credit for hearing the two Australian beacons, VK3RSY and VK3RTW, listed in Fig. 4, goes to Dave Lingard and Gordon Pheasant, respectively. Fred Pallant logged 4N3ZH on December 11. Signals from 5Z4ERR and OH1ZAA (a possible new one) were heard, on the 14th only by Gordon Pheasant and Ted Own respectively.

Norman Hyde G2AIH from Epsom Downs logged signals from the 50MHz beacons in Anglesey—GB3SIX via meteor scatter and Potters Bar—GB3NHQ each day. On some days, GB3SIX was heard by that mode up to late morning.

Don Hodgkinson has re-installed his ZL Special 12-element antenna for 144MHz and has since logged signals from the

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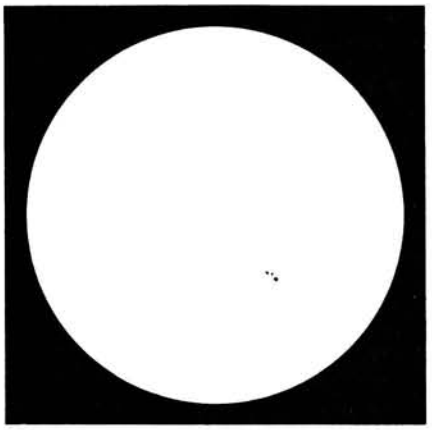


Fig. 2

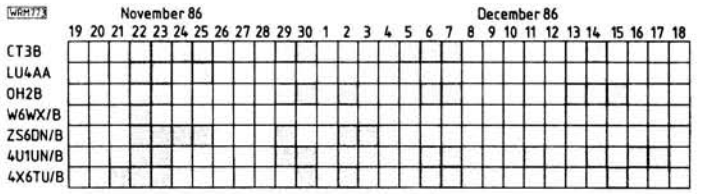


Fig. 3 ▶

Fig. 4 ▶

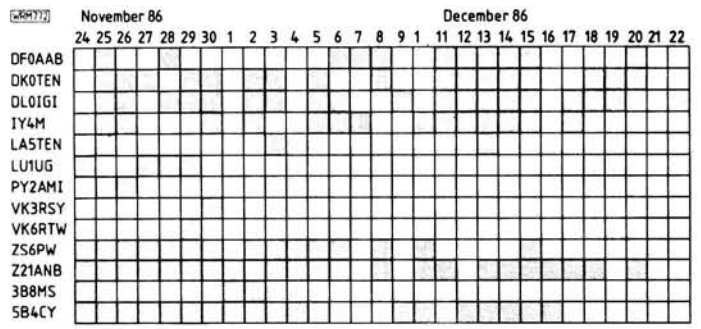
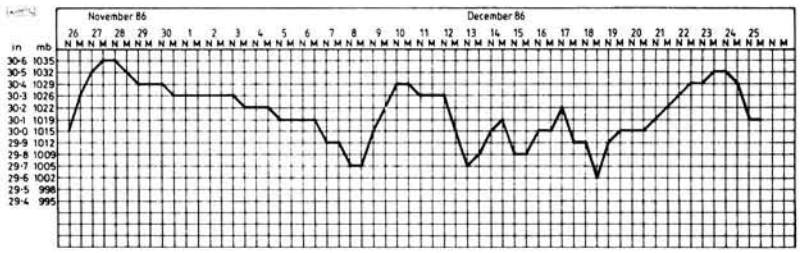


Fig. 5 ▼



beacons in Cornwall—GB3CTC and Wrotham—GB2VHF almost daily from December 9 to 20. In The Hague, **Chris van den Berg** copied GB3CTC during the lift on November 29 and 30 and GB3VHF daily from November 22 to December 1 and again on days 5, 8, 9, 10, 12, 15 and 18. He also heard the German v.h.f. beacon—DL0PR during the morning of the 30th.

My thanks to all for the details in your logs.

Tropospheric

My barograph showed that the high pressure system, which gave us the tropospheric opening from November 28 to December 1, began moving towards us on the 23rd, when a gradual rise began at 29·5in and reached around 30·5 around 1100 on the 27th. Proving once again that it pays v.h.f. enthusiasts to watch your barometer. My first indication of this big lift came at midday on the 28th, when I received many French stations between 98 and 101MHz and negative pictures on three channels in Band III, while using my Plustron TVR5D with its telescopic antenna on Telegraph Hill, near the Hampshire/Sussex border. Similar barometer readings to mine, Fig. 5, were received from Harold Brodribb, Mike Newey and Ted Owen.

"The 144MHz band was really bubbling," wrote **Mark Austin G1RGL** from London. On the 30th he drove to Botley Hill, on the North Downs in Surrey and with his FT-290R, 30W linear and 7/8 wave vertical antenna, gutter mounted on his car, had many QSOs including EA1, F6 in central Brittany, G1s in Humberside, Leeds and Leicester, GW8 in Cardiff, GJ6/M using 1·5W and ONs in Antwerp and on the Luxembourg border.

Around 1800 on the 29th, Bill Kelly received signals via the 144MHz repeaters at Duns—GB3SB on R2, Dublin—EI1DK R0 and Stockport—GB3MN R2 using a Yaesu 9600 and ground-plane antenna.

"Conditions to the continent increased as the weekend wore on," said **Mike Newey G4SND**. This was after working 4 stations in Belgium, 5 in France, 1 in Germany and 11 in Holland on 144MHz from his QTH in Stourport-On-Severn. Although his QTH is 250m a.s.l., conditions on the 29th enabled Dave Lingard, with a Palm 2 hand-held and 1/4 wave antenna on the living room window sill, to log stations at varying strengths, from Cambridge, Lincolnshire, Nottinghamshire and South Wales on the simplex channels. He also received a variety of stations via the 144MHz repeaters GV3CF and WR on R0; MH, NB and WL on R1; BX, SL and WH on R2; BM, PO, RD on R3; HH and VA on R4; DA, LM, SN and VT on R5; AM, BC, MP and PI on R6 and PW, WK and WW on R7.

Repeater signals from Danbury, Dover, Maidstone and Tacolneston were often received by Chris van den Berg between November 27 and 30. During the morning of the 30th, he added the repeaters in Aylesbury, Hillingdon and West Devon to his list.

While only 50m a.s.l. in Swardeston, complete with his FT-790 and a plug-on whip antenna, **Jim Cord G6SFU** from Birmingham received a RS58 report from a PA0 in Terneuzen at midnight on the 29th. "That site seemed to be in the path of many trans-north sea QSOs," said Jim. On the 30th, he heard stations from Hertfordshire, Northern Ireland, Oswestry and Worcestershire, working or calling ON or PA and noted that the east-coast repeaters were full of Continentals enjoying the good conditions.

Another u.h.f. enthusiast, Len Fennelow, is now active on the 1296MHz band and is using the repeater GB3BPO as a propagation indicator.

934MHz CB

It is not surprising tht these good conditions at the end of November enabled the 934MHz enthusiasts to increase their DX scores. During previous openings **John Smith GB581**, has worked as far south as Guernsey and Jersey, from this QTH in Chasetown, However, this time, at 1300 on November 29, he logged signals from fellow CBers in Banbury, Birmingham, Brighton, Bristol, Canvey Island, Dorset, Hastings, Isle of Sheppey, Maidstone and Sittingbourne. During the afternoon of the 28th, **Noel Smythe CD.01** from Caerphilly, worked stations in Brighton, Guernsey and Jersey and heard one in Shropshire, a normally poor direction from Noel's QTH.

In Hampshire, **John Levesley UK627**, found conditions at their best as the established high atmospheric pressure began to decline and made contact with stations in Bridgend, Jersey and Swansea. John is also active as G1TZT and, as a member of the UK 934 Club, he tells me that a National Field Day is proposed for early May and that the Club has an award scheme for contacts in 5, 10, 25 and all UK counties. **Edward Swan UK 512** in Eastbourne, also enjoys using this band. So does **Jim Willet CL 24** (Fig. 1) who operates both from his QTH in Grimsby and from his car and has contacted stations ranging from the Midlands to Dover, along the south coast to Weymouth and across to the Channel Islands. His average DX is 95km and his best, mobile, is about 190km.

Fig. 6: Car sticker sent to Harold Brodribb from Radio France after his reception report

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Band II

I frequently tuned through the band on November 30 and each time I found an abundance of Dutch and French and some German voices with plenty of interstation warbles which sometimes made it impossible to hear the local UK stations properly. On the 29th, Simon Hamer identified BRT-1 and 2 from Belgium; TDF Culture, Frequence-Nord and Musique from France; NOS-1 from Holland and the British Forces Broadcasting Service from Germany between 88 and 103MHz.

Across the water in Belfast, Bill Kelly logged BBC Radio Lancashire, Radio Dublin and some private stations from Eire on the 29th using a JVC T-X300L tuner and 2-element vertical antenna. **Francis Hearne** in Ilford mentions that Severn Sound changed frequency from 95 to 102·4MHz last October 23.

"I enjoyed the late November lift on Band II when I received several Dutch and French stations, in stereo, with a loft dipole, plus Radio Kent and various others from the south-east," wrote **John Willett** from Stoke-on-Trent.

As usual, Harold Brodribb logged the Belgian station at Egem and had a good haul from the French networks during this lift and in addition to many "Libre" stations, he also identified Radio France transmissions, often in good stereo, from Abbeville, Amiens, Boulogne, Lille, Neufchatel, Paris and Rouen. The Director of Radio Normandie was pleased to know that Harold had received their signals from Rouen and sent him one of their car stickers, Fig. 6.

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TELEVISION

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

During the 1986 Sporadic-E season, **John Willett G6TRR** in Stoke-on-Trent, logged pictures from almost all possible countries in Band I, 40 to 68MHz. He used a Pye Rambler, Labgear converter and a home-brew loft dipole. With camera ready, he recorded a programme caption from Spain, Fig. 1, and a documentary introduction from the USSR, Fig. 2.

Pictures from Yugoslavia, Fig. 3, were featured among the DX logged by **Neil Purling** in Hull last May. In Belper, **Edwina and Tony Mancini** had a good winter haul when they received pictures from Austria; Czechoslovakia; Denmark; East and West Germany; Holland; Iceland; Italy; Norway —Bremanger, Gamlen, Kongsberg and Melhus; Poland; Sweden; Spain; Switzerland and the USSR, at various times and durations from November 20 to December 15. They also reported seeing the German captions Grunten, SWF/BADN and SWF/RBG-Raichberg, as well as *Domator* (current affairs) from Poland's TVP-1.

In New Radnor, **Simon Hamer** received test cards from Poland and Sweden on November 18, Austria on December 2, a documentary with Cyrillic captions from the USSR on the 4th and programmes, with corner idents, from Italy on the 5th. He also logged test cards from Portugal—RTP; Spain—RTVE-2; Poland—TVP news caption—dt, on the 13th. Then on the 14th there was a documentary from the USSR and test cards from Denmark—DR, Iceland—RUV Island, Norway —Greipstad and Sweden—SVT.

Gordon Pheasant in Walsall saw the Icelandic test card for a short while around 1700 on the 11th. At 1330 on the 14th, Gordon watched horse-racing from Portugal or Spain.

Noel Smythe in Caerphilly received a test card from Denmark and identified a newscaster from Italy at 2030 on the 13th.

Around 0940 on the 14th, **Harold Brodribb** in St. Leonards-on-Sea caught a very clear glimpse of Austria's ORF-FS1 test card.

Just to remind the old hands and to show prospective DXers what signal strengths to expect during a Sporadic-E disturbance, **Len Eastman** sent in pictures, Figs. 4, 5 and 6, that he saw on Polish TV at his QTH in Bristol, during the 1986 season.

Tropospheric

Apologies for poor reception, due to co-channel interference, were frequently broadcast by the BBC and the IBA during the evening of November 29 and throughout the 30th. Such conditions in the u.h.f. bands usually means that there is plenty on DX to be seen lower down in Band III, 175 to 225MHz. True to form, while the high atmospheric pressure was falling, I received test cards from Belgium, Fig. 7, Denmark—DR, Germany, Holland—PTT NED-1 and Ireland—RTE-2. I also noted various programme logos from Belgium BRT-1 and RTBF-1 (Fig. 8) and Germany

Fig. 1: Programme caption from Spain


Fig. 2: Documentary intro from USSR

Fig. 3: Caption from Yugoslavia


Fig. 4: Polish TV in 1986


Fig. 5: Polish TV in 1986


Fig. 6: Polish TV in 1986

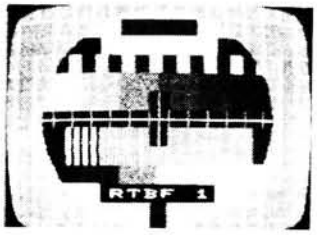

Fig. 7: Test card from Belgium

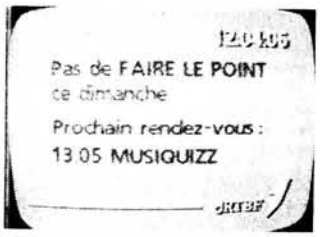

Fig. 8: RTBF–1 caption

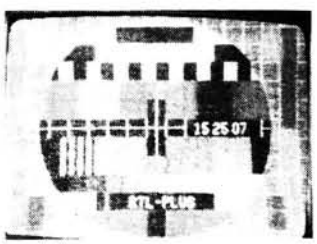

Fig. 9: Test card from Luxembourg RTL-Plus


Fig. 10: Pictures from RTBF


Fig. 11: Announcer on Peshawar TV


Fig. 12: Programme caption on Peshawar TV

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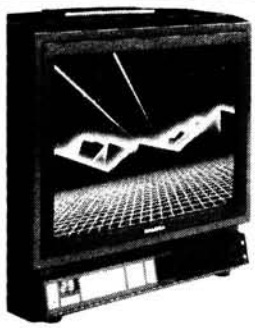

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ARD-1, plus the news programme *Taggeschau* from Germany and *Nieuws, Het Weer Knmi Nos Journaal* on NCRV from Holland.

At times, especially on the 30th, these Band III signals were exceptionally strong and in good colour, as Noel Smythe found when he watched football, folk singing and a farming programme, followed by a test card from Luxembourg RTL-Plus, Fig. 9, in addition to the other stations already mentioned.

Harold Brodribb received French pictures on Chs. F5, 6, 7, 8 and a weak 10, a record number, at 1515 on the 28th and RTL-Plus at 1050 and 1540 on the 30th and again at 0940 on December 1.

John Willett recently added a wide band TV antenna with head amplifier to his system and logged his first Band III station, BRT, during this lift.

Between November 28 and 30, Simon Hamer received pictures from Belgium—BRT-1 and RTBF-1, Denmark—DR, France—TDF Canal Plus, East Germany—DDF, West Germany—ARD/WDR-1, Holland—NED-1 and Luxembourg—RTL-Plus in Band III. In the u.h.f. band there were pictures from Belgium—BRT-1 and -2, RTBF-2 and TELE-2, France—TDF, Germany—ARD/NDR-1 and -3 and ZDF, Holland—NED-1 and -2 and Ireland—RTE-1 and -2.

These stations were also received in Slough by **Mike Bennett**. He also saw basketball on TF1 and the caption, *Reseau Speciales et Reseau FR3*, from TDF and the logo KRO from Holland on the 29th. There was a discussion programme and a church service from Belgium, BRT and RTBF (Fig. 10) respectively, music and gymnastics from France, TF1 and FR3 respectively and an art class from Holland—NED-1 on the 30th.

In addition to logging the previously listed continentals in Band III, the Mancinis received programmes throughout the evening on the 30th from the IBA stations Anglia, London Weekend, TV South and TV Southwest, all at the lower end of Band IV, which they identified by their respective logos. Cartoons, sport and teletext from Belgium, films from France and news, *Aktuelle Kamera*, and *Tagesschau* from East and West Germany respectively, were among the programme contents recorded in the Mancinis' log.

PLEASE GET YOUR REPORTS TO RON BY FEBRUARY 20

News From India

During Sporadic-E disturbances last August 3, 5, 6, 7 and 9, **Major Rana Roy** watched a Bengali feature film from Calcutta TV, American cartoons, test cards and a programme about animals from Dubai TV. Despite fading signals, he identified a news bulletin and a documentary on farming from Pakistan TV, on Ch. 10, via tropo, during the evening of July 25, when he saw their *World of Sport* programme, a children's film called *Clue Club*, news and Urdu songs, advertisements and the press conference of Prime Minister Junejo after his foreign tour. "Very good tropo signals came again from Pakistan TV, Ch. 10, from 1630 onwards on August 6," said Rana. He photographed an announcer from Peshawar TV, Fig. 11, and a programme caption, Fig. 12, to include with his report. While in Meerut, early on November 16, he logged fairly clear pictures from India's Jaipur TV, on Ch. 5, and Jullundur TV, on Ch. 9, until about 1000.

Amateur Fast Scan TV

At 1317 on November 30, Simon Hamer received a strong computer generated caption from PE1DWL on the 435MHz band.

MW BROADCAST BAND DX

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

by Brian Oddy G3FEX

During the last two decades or so medium wave receivers have been designed around transistors and integrated circuits and almost all of them utilise the superheterodyne principle of reception. Because of this, many of the interesting valve circuits which followed the crystal set era have long since been forgotten, which is a great pity, because there were many very simple but effective designs employed in those days.

Many of the early valve receivers were constructed at home on the kitchen table and their general principles could still be used today with modern components to provide an excellent introduction to home built receivers. Most of the early valve receivers were straight sets, which consisted of a regenerative detector stage (V) followed by an audio amplifying stage (1), coded 0-V-1. Other designs were known as t.r.f. sets which implied a tuned r.f. amplifier stage (1) ahead of the detector (V) and audio stage (1), coded 1-V-1. Some however, employed very ingenious reflex circuits.

Some of the controls on those old receivers may sound strange to the modern listener, like FIL, RHEOSTAT and REGENERATION. Some of the components used in their construction may be unfamiliar too—swinging coils, grid leaks, r.f. chokes, intervalve transformers. Power was often provided by tapped batteries—"wander plugs" being used to select the h.t. and grid bias voltages required, while "spade terminals" connected the l.t. leads to a 2V accumulator to power the valve filaments.

Restoration

There are many "Old Timers" who enjoy restoring old receivers—among them is **John Tuke** of Bonnyrigg, Scotland. He recently found an old Cossor Melody Maker t.r.f. set in a dusty heap at a sale. After restoration, he decided to put it to the ultimate test—see Transatlantic DX! If you would like to see some of the early designs, many of which were made popular by *Practical Wireless*, then pay a visit to the Chalkpits Museum at Amberley, W. Sussex, (adjacent to Amberley BR Station) where radio equipment from before WW1 to date is on show—it re-opens for the Summer season on April 1.

Fig. 1: GM3BST with a real receiver!

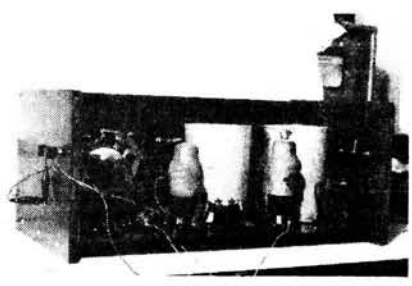

Fig. 2: The "innards" of the Cossor Melody Maker circa 1931

DX Report

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

Transatlantic DX: The long winter periods of darkness have encouraged many listeners to explore the transatlantic DX scene for the first time and since the conditions are good they have not been disappointed. In fact, some of their results have been quite remarkable.

Alan Jarvis in Cardiff heard an advertisement for Fisherman's Friend throat sweets spoken in a rich north-country accent, followed by an east coast American voice urging him to go out and buy these sweets imported from England! The frequency readout said 1010 and a station announcement confirmed that it was WINS in NY, at 0005 using his "Sooper Loop".

He then tuned around the band and picked up another NY station, this time WHN on 1050. However their signal was quite weak and spoilt by interference. Using the Yaesu FRG-8800 receiver on s.s.b. mode he tried exalted carrier reception, eventually selecting u.s.b. for best results. This is a good tip for those with s.s.b. receivers, that technique is often a great help on congested bands.

Geoff Blakey listened to the news via WCAU in Philadelphia on 1210 using his bedside Vega 206 in Gosport at 0210. Their signal has also been well received in Glasgow by **Alexander Little**, he heard an American football game at 0340. A 0·5m square loop antenna is now used with his Selena B210 receiver. It has improved reception so much that CKYQ in Grand Bank NF-610; CBA in Moncton NB-1070; WHDH in Boston-850; WFTQ in Worcester MA-1440 and WTOP in Washington-1500 have beenn added to his growing list of DX—all were received between 0230 and 0330.

Following the restoration of the old Cossor Melody Maker t.r.f. battery receiver, John Tuke (Fig. 1) discovered there was no difficulty in receiving local stations and so tried to "bridge the Atlantic". Soon after 0100 he heard CJYQ in St Johns NF-930, although it was not exactly loud and

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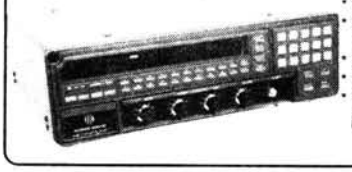

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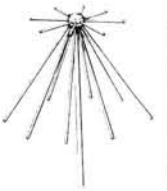

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clear, there was no difficulty in making a positive identification. On the FT-757 it was only marginally louder. It was of course easier to find on the FT-757 and clear of interference.

CJYQ was monitored on eight nights during the month by **John Sheridan** of Mapperley. Reception was best at 2354 with SINPO 33433 falling to 22322 by 0129. Two other stations in St Johns NF were also logged, VOCM on 590 at 0013 with SINPO 22422 and CFBC on 930 at 0006 with SINPO 23322. John also heard CJCH in Halifax NS on 920 with SINPO 22422 and from the USA picked up WHDH 850; WINS 1010 and WHN 1050. Using an RCA AR88D receiver with a long wire antenna in Bath, **Adrian Bryant** has also been monitoring CJYQ and noticed fading on the signal by 0300.

Simon Hamer in New Radnor also noticed that the conditions seem to deteriorate after 0100 with characteristic slow fades setting in. The four Newfoundland stations he received were VOCM on 590; CKYQ Grand Falls on 610; CBGY Bonavista Bay 750 and CJYQ on 930, all were SINPO 33333 between 0038 and 0100. A number of other Canadian stations were also logged by Simon, both CBA on 1070 and CKCW on 1220 in Moncton NB as well as CBN on 940 and CKLM on 1570 in Montreal. From the USA were WHAS on 840 in Louisville, WINS on 1010, WHN on 1050 and WNEW on 1130 all in NY, WCAU on 1210 in Philadelphia PA, WTOP on 1500 in Washington DC and WMRE on 1510 in Boston with SINPO 44444. The Caribbean Beacon in Anguilla on 1610, Radio Globo in Sao Paulo Brazil on 1100 and Radio Globo Rio on 1220 in Brazil were also noted.

In Port Glasgow, **Rab Freeman** also logged WRME on 1510, but by 0145 the signal was SINPO 22212. He received sports news from three areas of the USA, New York—WINS on 1010 at 0245, Philadelphia—WCAU on 1210 at 0322 and Baltimore—WBAL on 1090 at 0333. Rab noted the signals from Newfoundland's CKYQ on 610 were SINPO 24333 at 0248 and those from CJYQ on 930 were 34433 at 0350.

Using a loop antenna ahead of his RCA AR77 receiver, **Jim Willett** found it a definite improvement over his wire antenna when searching for transatlantic DX. From Grimsby he logged Radio Paradise in St Kitts on 825 at 0150, Radio Antilles in Monserrat on 930 at 0200, ZDK in Antigua on 1100 at 0150, Radio Caraibes in Dominica on 1210 at 0215, Radio Cayman on Cayman Island on 1555 at 0225, VOA in Antigua on 1580 at 0150 and Caribbean Beacon in Anguilla on 1610—all from the Caribbean area.

From the USA he logged WHN on 1010 at 0200, WNEW on 1130 at 0215 and WQXR on 1560 at 0220—all from NY. WCAU on 1210 at 0225 and WMRE on 1510 at 0245 were also heard. From Canada he received CJYQ on (930 at 0150, CBM on 940 at 0135, CIGO in Port Hawkesbury NS on 1410 at 0300 and CKLM on 1570 at 0210.

George Morley of Redhill found conditions very good and picked up CJYQ on 930 as early as 2117 one night, hearing their station callsign announcement at 2128 followed by a weather report quoting −7 falling to −15°C by night. By contrast the weather report from the Caribbean Beacon in Anguilla on 1610 was +25°C at 2116. Between 2117 and 0500, George logged WNBC on 660, WABC on 770, WINS on 1010, WHN on 1050 and WQXR on 1560—all from NY as well as WBZ on 1030 and WMRE on 1510. Signals noted from other US areas were WHAS on 840, WBAL on 1090, WTOP on 1500 and WPGC in Morningside MD on 1580. Those from Canada were VOCM on 590, CKYQ on 610, CHML in Hamilton ON on 900 and CKLM on 1570.

Bill Kelly has been checking out his new NRD 525 receiver in Belfast. He found the s.w. performance was brilliant but on the m.w. band it seemed to be rather noisy, with general blending of signals which makes it difficult to pin-point a station —possibly caused by the r.f. amplifier stage. Starting at 2300 the transatlantic DX logged included the Caribbean beacon in Anguilla on 1610 at 2310, Radio Globo Rio in Brazil on 1220 at 0015, CBT in Grand Falls NF on 540 at 0030; XEBBC in Tijuana Mexico on 1470 at 0035, WQXR in NY on 1560 at 0045 and CKLM on 1570 at 0420.

Ian Smith in Paisley uses a 1m loop antenna with his Grundig 1400SL receiver. He logged stations which have not been reported before in this series and are subject to confirmation by QSL card. These were CBV in Quebec on 980 at 0248 —with programmes in French, CKBW in Bridgewater NS on 1000 at 0635, CFRB in Toronto ON on 1010 at 0706, CBA in Moncton NB on 1070 at 0155, CBD in St John NB on 1110 at 0213, CFGM in Richmond Hill ON on 1320 at 0623, CIGO on 1410 at 0108 and CHRD in Drummondville PQ on 1480 at 0652—with programmes in French. From the USA were WGY in Schenectady NY on 810 at 0205, WWL in New Orleans LA on 870 at 0633, WWWE in Cleveland OH on 1100 at 0033, KMOX in St Louis MO on 1120 at 0309, WPOP in Hartford CT on 1410 at 0022 and WMER in Westbrook ME on 1440 at 0238.

From the Caribbean area were Radio Paradise in St. Kitts on 825 at 0143 with religious programmes in English and Radio Caribbean in St Lucia on 840 at 0143 with programmes in French. From S. America were Radio Monte-Carlo in Montevideo Uruguay on 930 at 0033 with idents in Spanish and Radio Nacional in Rio Brazil on 1130 at 0034 with idents in Portuguese. So far Ian has received QSLs from WWL, CBD, KMOX, CFGO and WTIC on 1080kHz.

In Southport, Queensland, Australia, **John Ratcliffe** says that he has decided to give up m.w. DXing for the rest of the summer because the static levels are dreadful.

In a report from Christchurch, New Zealand, **David Howe** says that most US stations are well down in the noise, although he did receive KLZZ on 600—which is a 5kW station in California. He also heard a station on 1570 calling itself the mighty Atlantic Beacon located on Turks & Caicos Islands—it was a very strong signal with a Evangelist programme. He is now awaiting their QSL.

Other DX

Alex Mackow in London has attached a long wire to the whip of his Sony ICF-7600D. It certainly improved things and between 1605 and 1815 he logged Andorra—Sud Radio on 819; Austria—Wien on 1476; Belgium—Wavre on 621, Wolverton on 1512; Czechoslovakia—Praha on 639 and 1233, Ceskoslovenskco on 1287, Kosice on 1521; Denmark—Kalundborg on 1062; France—Lyon on 603, Marseille on 675, Rennes on 711, Limoges on 792, Nancy on 837, Paris on 864, Toulouse on 945, Lille on 1071 and 1377, Strasbourg on 1161 and 1276, Nice on 1350 and 1557; Germany (E)—Burg on 783 and 1044; Germany (W)—Bayreuth on 549, Stuttgart on 576, Frankfurt on 594, Braunschweig on 756, Munchen on 801, Bremen on 936, Hamburg on 972. Wolfsheim on 1017, Neumunster in 1269, Saarbrucken on 1422, Langenberg on 1593; Holland—Flevoland on 747; Italy —Milano on 900, Roma on 1332, Genova on 1575; Monaco—Monte-Carlo on 1467; Norway—Kvitsoy on 1314; Portugal—Lisbon on 1035; Spain—Madrid on 535, Oviedo on 729, Barcelona on 738, Cacares on 774, Murcia on 855; Sweden on Solvesborg on 1179; Switzerland—Sarnen on 1566; Vatican City—Vatican Radio on 1530 and Yugoslavia—Zadar on 1134.

Using a Toshiba RP F11L receiver with just its whip antenna, **Robert Taylor** has been hearing Kvitsoy in Norway on 1314 at 1600 with SINPO 55555. No doubt the clear sea path between Norway and Edinburgh helps the daytime reception. Two other signals are noted in his log as SINPO 55555, the 600kW DLF transmitter in Neuminster on 1269 at 1915 and the 600kW transmitter in Solvesborg Sweden on 1179 at 2130. **Bill Stewart** also rated this station as SINPO 55555 in Lossiemouth at 1830, he found their news broadcast and feature programme in Russian was unjammed.

Stewart Russell in Forfar heard the low power BBC relay stations—the 1kW Redmoss relay on 990 and the 2kW Dumfries relay on 585 have now been logged. **David Middlemiss** of Eyemouth, has been listening to the Voice of America (VOA) at 0815—their m.w. transmission to Europe can be found on 1197. David also listened to the Armed Forces Network (AFN) in Frankfurt, Germany on 873 at 0230.

Following comments from **John Greenwood** about the 20dB changes in signal level of BRT on 1512 as dusk arrives in Belgium, **Wyn Mainwaring** has monitored their signal in Cowes IOW. Wyn has noticed that the fades at 1800 occur about every five minutes and are very deep indeed, causing severe distortion of the audio. The rate of fading gradually increases until it is about four times a second by 1900—has anyone else noticed the "BRT-IOW" flutter as Wyn has named it? It seems that Wyn's suggestion of an increase of power at BRT may well be correct, since a letter from **Maurice Andries** in Dendermonde Belgium indicates that the power is increased at 1800 from 300 to 600kW (3dB). However this would not altogether explain the 20dB increase mentioned by John and subsequently confirmed by other *PW* readers, so reports on this effect are still welcome.

Maurice sent along an extensive log of the stations he can hear in Dendermonde at some time between 0830 and 1405. While many of those detailed were in Belgium, France, Germany, Holland and Luxembourg, some were in more distant countries. Czechoslovakia—Bratislava on 1098; Denmark—Kalundborg on 1062; Norway—Kvitsoy on 1314; Poland—Katowice on 1080; Sweden—Solvesborg on 1179 and Vatican City—Vatican Radio on 1530. Several BBC transmitters were noted too, including Orfordness on 648 and 1296, Lisnagarvey N. Ireland on 1341 and Brookman's Park on 1458.

John Greenwood has been busy checking winter daytime reception in Evesham against last summer's daytime log. The listing showed no change apart from one

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Freq (kHz)	Station	ILR/ BBC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
603	Invicta Sound	I					N	N					D			
630	R. Bedfordshire	B		D				N					D	D		D
657	R. Clwyd	B									D					
666	Devonair R.	I		D												
666	R. York	B			D				D				D			D
729	R. Essex	I	D			D							D			
756	R. Shropshire	B											D			
765	BBC Essex	B	D			D							D			
774	R. Kent	B		D						N			D			
774	R. Leeds	B							D				D			
774	Severn Sound	I											D			
792	Chiltern R.	I											D			D
801	R. Devon	B											D			
828	2CR	I		D												
828	R. WM	B											D			
828	R. Aire	I											D			D
828	Chiltern Radio	I				X		N								
837	R. Leicester	B														D
855	R. Devon	B		D												
855	R. Lancashire	B			D											D
873	R. Norfolk	B							D	N			D			
936	GWR	I		D				N					D			
954	Devonair R.	I		D												
954	R. Wyvern	I											D			
990	R. Devon	B							D							
990	Beacon R.	I											D			D
999	R. Solent	B		D												
999	Red Rose R.	I			D							N				
999	R. Trent	I											D			
1026	Downtown R.	I			D								D			
1026	R. Jersey	B		D												
1026	R. Cambridgeshire	B				X		N								
1035	R. Sheffield	B											D			
1035	Northsound R.	I						N				X				
1035	West Sound	I			D											
1107	Moray Firth R.	I		D	D			N				X				
1107	R. Northampton	B								N			D			
1116	R. Derby	B			D								D			
1116	R. Guernsey	B		D				N								
1152	LBC	I		D												
1152	R. Clyde	I			D							X				
1152	BRMB	I											D			
1152	R. Broadland	I													N	
1161	R. Sussex	B		D												
1161	R. Tay	I			D							X				
1161	Viking R.	I											D			
1161	R. Bedfordshire	B											D			

Freq (kHz)	Station	ILR/ BBC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1170	R. Orwell	I												D		
1170	Ocean Sound	I		N												
1170	Signal R.	I											D			
1242	Invicta Sound	I		N		X										
1251	Saxon Radio	I											D			
1260	GWR	I		D												
1260	Marcher Sound	I			X											
1260	Leicester Sound	I											D			
1305	R. Hallam	I											D			
1323	R. Bristol	B		D	D			N	D	N			D			
1323	Southern Sound	I		D	D		N	N		N						
1332	Hereward R.	I		N	D							N	D	D		D
1359	R. Solent	B		D												
1359	Red Dragon	I			D											
1359	Mercia Sound	I						D					D			
1368	R. Lincolnshire	B		D												
1368	R. Sussex	B		D												
1431	Essex R.	I				X							D	D		
1431	R. 210	I		D				N								
1449	R. Cambridgeshire	B								N			D			
1458	R. London	B		D	N			N				N	D			
1458	R. WM	B					N						D			
1458	R. Manchester	B			D											
1458	R. Newcastle	B			D			D	D							
1458	R. Devon	B		D												
1476	County Sound	I											D			
1485	R. Merseyside	B			D		D									
1485	R. Humberside	B						D					D			
1485	R. Oxford	B								N						
1485	R. Sussex	B		D												
1503	R. Stoke-on-Trent	B											D			
1521	R. Mercury	I			D											
1521	R. Nottingham	B											D			
1530	Pennine R.	I										X				
1530	BBC Essex	B	D		D	D										
1530	R. Wyvern	I			D		D						D			D
1548	Capital R.	I		D	D											
1548	R. Bristol	B		D												
1548	R. Forth	I			D							X				
1548	R. Hallam	I											D			
1548	R. Cleveland	B						D								
1557	Hereward R.	I										N	D			
1557	Ocean Sound	I		N	D			N								
1584	R. Nottingham	B			D		D					D				
1584	R. Tay	I			D							X				D
1602	R. Kent	B						N								D

Key: D—Day; N—Night; X—Heard but no data

DXers

1 Reg Billing, Rochester
2 Geoff Blakey, Gosport
3 Rab Freeman, Port Glasgow
4 Francis Hearne, Ilford
5 Bill Kelly, Belfast
6 Alexander Little, Glasgow
7 David Middlemiss, Eyemouth
8 Kari Nieminen, Turku, Finland
9 John Parry, Northwich
10 Stuart Russell, Forfar
11 John Sheridan, Mapperley
12 Darren Taplin, Tunbridge Wells
13 Robert Taylor, Edinburgh
14 Jim Willett, Grimsby

extra station on 576kHz. The complete check of 120 channels took only 15 minutes using his Sony ICF-7600D receiver.

Kari Nieminen in Turku Finland uses a Panasonic RF 2900LBS receiver plus whip antenna. His best DX is RTE-1 Tullamore S. Ireland on 567, although two stations in Norway—Vigra on 630 and Finnmark on 702 took more time to catch. He has heard the BBC 2kW relay in Dumfries and RNE Madrid on 585, but the 600kW transmitter in Wein Austria makes things difficult.

Local Radio DX

There has been a high level of activity as can be seen from the chart. The three BBC Essex transmitters are being well received in some areas.

No doubt many DXers will have wondered when to listen for Red Dragon DX. **Terrance James** of Newport wrote to ILR Red Dragon Radio in Cardiff for the details and received the sad news that it has been discontinued. In fact Al Dupres has re-signed to take up another career.

QSL Addresses

ILR Radio Clyde, Clydebank Business Park, Clydebank, Glasgow G81 2RX.

ILR Metro Radio, Radio House, Long Rigg, Swalwell, Newcastle-upon-Tyne NE99 1BB.

ILR BRMB, PO Box 555, Radio House, Aston Road North, Aston, Birmingham B6 4BX.

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SW BROADCAST BANDS

Reports as for Medium Wave DX, but please keep separate

by Brian Oddy G3FEX

For the Newcomer SWL

One of the biggest problems encountered by a listener these days is r.f. interference (r.f.i.)—a simple name for a multitude of effects, all of which are likely to spoil the pleasures of DXing.

The are two main categories of r.f.i., natural and man-made. The effects produced by natural sources include atmospheric noises, often called atmospherics or static. Lightning discharges from earth to cloud cause electromagnetic radiations that cover wide band and it is not possible to tune them out, although their intensity becomes less as the frequency of reception is increased. Thunderstorms produce static which is particularly noticeable on the lower frequencies, especially during summer.

Another natural source of interference, precipitation static, is often present when rain or hail falls from an electrified cloud. A charge is carried by each droplet of rain and any that fall on an antenna gradually build up a charge on it to produce a hiss or even a distinct crackling noise as it discharges to earth. If no easy path to earth exists, a very high potential can build up, so always earth an antenna before a storm or when not in use!

Although atmospheric noise predominates on frequencies up to about 20MHz, another form called galactic noise extends from about 15MHz upwards. There is also sky noise which becomes evident at frequencies above about 500MHz.

Man-made noise is a much greater problem, so let us now consider that. Man-made interference sources surround us, and it reaches the listener's receiver and other items of equipment by either **radiation, conduction** or **induction** or a combination of them.

One of the most common forms of man-made interference is produced by the action of breaking an electrical circuit, this causes a **spark discharge** to occur. A click is usually heard if the contact break is quick and clean, but a device with contacts

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which open slowly, such as a thermostat, usually produce a characteristic "bzzt, bzzt". In fact many of the r.f.i. sounds produced in a receiver give a clue to their origin!

Many communications receiver designs include a noise limiter circuit to reduce the effects of the interference "spikes" produced by spark discharge—although many ingenious and fairly effective designs have evolved over the years, the best way to eliminate the problem is to suppress it at source.

It is a sad fact that few manufacturers of domestic electronic equipment such as TV and radio receivers, hi-fi equipment, electronic organs, video recorders and microcomputers are prepared to incorporate sufficient protection devices into their designs to prevent them from either causing, or being affected by, r.f.i. The truth is that the cost of doing so is likely to place them at a disadvantage with their competitors.

One of the most common problems must surely be the interference caused by direct radiation from the "line timebase" oscillator and amplifier in a TV receiver which plagues so many DXers at night. The line oscillator generates a sawtooth waveform on 15·625kHz which is rich in harmonics and multiples of that frequency are radiated as r.f.i. Some improvement in s.w. reception may be possible by using a well screened receiver in conjunction with a remote outdoor dipole antenna. See *PW* February '87 for more details.

Some types of interference may travel along the mains wiring in a house or via supply cables from another area by means of conduction. A mains filter may help in these circumstances, especially if it can be fitted close to the source of interference. High voltage power lines set up high fields around them and these can cause nearby metal items to generate interference through electrostatic induction. In wet weather, the leakage across insulators of such lines can also create havoc for the nearby DXer. With so much man-made interference around it is a wonder we can hear any DX at all!

Conditions on 25 and 21MHz

(Note: Frequencies in MHz, Time in UTC = GMT)

Due to the solar sunspot minimum period just now, broadcasters are forced to use lower frequencies to provide a reliable service, consequently the 25MHz (11m) band is very quiet here in the UK. VOA are known to beam programmes in English to Australia on this band via a relay station in Poro, Philippines on 26·000 between 0000 and 0200, but the latest reports from listeners "down under" do not mention them.

The conditions on the 21MHz (13m) band have been generally unstable and daily variations in the strength of signals received during daylight hours have been noted—the band closes very soon after dark here in the UK. The reception of the broadcasts beamed to Europe on 21·590 by Radio RSA in Johannesburg, S.Africa has been generally good. Their programmes commence at 1000 in Portuguese, but are mainly in English with a segment in French around 1200—close down is at 1556. As expected, the signal tends to peak up around midday and the SINPO ratings in the logs from three DXers illustrate this rather well—**George Morley** noted 25343 in Redhill at 1007; **Bill Stewart** noted 44444 in Lossiemouth at 1224 and **Leslie Biss** noted 35544 at 1435 in Knaresborough. Another broadcast intended for Europe and N.Africa stems from UAE Radio Dubai on 21·605—**John Parry** has been listening to their *Mailbag* programme in Northwich.

When conditions permit, a number of other Broadcasters can be heard in the UK using this band to beam their programmes to other areas of the world—**John Nash** of Brighton, listened to a programme in Malay from Radio Cairo, Egypt broadcasting to Asia on 21·465 between 1345 and 1445 and **George Morley** picked up the Kigali, Rwanda relay of Radio DW in Cologne on 21·560, beaming to Australia at 0940. George also logged Riyadh, Saudi Arabia beaming a programme in Arabic and Indonesian to Asia on 21·495 at 1017 and it seems that **Simon Illingworth** has also been hearing their signal quite well in Johannesburg, S.Africa too!

In an interesting report, Simon says that the reception conditions on the 13m band have greatly improved there, despite a lot of noisy summer storms just now. The Radio Nederlands relay transmitter in Madagascar on 21·485 comes in well, although they are beaming to Asia from 0700 until 1125. Apparently the programme intended for Asia from RBI Berlin via their Nauen, GDR transmitter on 21·540 is very well received during the morning in Johannesburg! Simon has also been listening to the *Mailbag* programme from UAE Radio Dubai on 21·605, which is a good signal at 1030—could this be off the back of their beam? He says that the World Service from Radio Moscow on 21·725 has improved considerably. The BBC World Service, broadcast on 21·470 via their Masirah Island, Oman relay from 0900–1130 and from Daventry between 110 and 1345 are both well received—their 21·710 transmission is good too. Actually two BBC UK based transmitters share 21·710 from 1100—this shared technique is called "Inter-station synchronisation" and calls for highly accurate and stable frequency generation at the transmitters. The two transmitting stations concerned are Daventry, which beams the World Service to the Middle East until 1345 and Rampisham, which beams it towards N. Africa until 1515—it may be of interest to observe the change in reception which occurs when Daventry closes down at 1345!

Writing from Selangor, Malaysia, **Mat Jusoh** says that his past records show that the conditions have much improved and that some 13m signals are now well received there during daylight. The SINPO ratings quoted in his report are especially interesting, because some of the stations with high ratings are actually broadcasting to other areas of the World at the times quoted—RFI beams programmes in French from Allouis, France to E.Africa at 0700 on 21·620, but these reach Mat at SINPO 55545 around 0945! The broadcasts detailed earlier from Radio RSA on 21·590 at 1000 for Europe, rate as 55555 in Malaysia!! The programmes from Radio DW in Cologne at 0900, are relayed to Australia via Kigali, Rwanda on 21·560 and rate as 54333 in Selangor. Mat has also been receiving the programmes intended for Asia from RBI Berlin via their Nauen GDR transmitter on 21·540 at 0700—they rate as SINPO 54343.

The 17 and 15MHz Bands

Signals from several continents can usually be heard on the 17MHz (16m) band during daylight hours, but reception conditions tend to be unreliable—the band often closes soon after sunset in the UK. When conditions permit, the broadcasts from Radio Australia to Asia can be received in the UK via their Carnarvon transmitter in Western Australia on 17·715—**Bill Reid**, who uses a Yaesu FR-101 receiver and inverted "L" antenna in Finchampstead, has been listening to their News at 0830 and noted SIO 523 in his log.

Fig. 1: QSL card from VOFC in Taipei, Taiwan

By carefully listening on 17·880 in the UK at 0900, it may be possible to hear the BBC relay transmitter in Kranji, Singapore beaming the BBC World Service to Asia—the SINPO 13321 noted by George Morley in his log at 0924 is a typical rating! In his report from Macclesfield, **Philip Rambaut** mentioned All India Radio, New Delhi which can sometimes be heard from 1115 beaming programmes in Burmese to Asia on 17·780. Radio Pakistan beam programmes in Urdu and English towards Europe from 0715 on 17·660 until 1115—John Nash picked them up at 0900 and noted SIO 434 in his log. Their broadcasts of live cricket commentaries when Test Matches are in progress are very popular!

Using a Toshiba RP F11L receiver with just its whip antenna, **Robert Taylor** of Edinburgh has been getting good reception of UAE Radio Dubai on 17·775 from 1300—their programmes for listeners in Europe are mainly in Arabic and commence at 1000 and close at 1500. Two periods, 1030–1100 and 1330–1400 usually contain well produced items of interest to listeners who speak English. Robert has also been listening to the lively music and interesting programmes from the Voice of Israel on 17·630—their transmission to Europe, which starts in English and ends in French, can be heard between 1100 and 1200. The broadcast beamed to S.E.Asia and Australia from Vatican Radio, Rome on 17·840 was mentioned in the report compiled by **Alan Curry** up in Stockton-upon-Tees—this is in English from 1200 until 1230.

Tuning around the band during the afternoon in London, **Alex Mackow** was surprised at the number of broadcasts from the USSR—between 1430 and 1455 he picked up Radio Moscow's World Service on 17·655 beamed towards Africa and noted their transmissions in Russian to the Middle East on 17·680, to Europe on 17·745 and to W.Africa on 17·880. He noted another broadcast in Russian at 1500—this one came from VOA via their transmitter in Tangier, Morocco which is beamed towards Eastern Europe! The Voice of Greece broadcast in Greek and English to Eastern Canada on 17·565 at 1500 and Alex logged them just before close down at 1550.

Leslie Biss found great difficulty in hearing the broadcast to Europe from Radio Japan at 1500 via their relay in Moyabi, Gabon on 17·785 due to adjacent channel interference—he tried using his Trio R600

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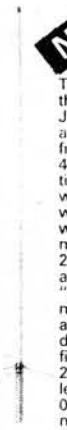

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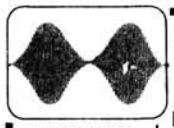

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Freq (MHz)	Station	Country	UTC	DXer
3·215	R. Orange	S. Africa	1857	C
3·230	ELWA Monrovia	Liberia	1836	C,P
3·230	R. RSA	S. Africa	1857	G,P
3·270	SWABC 1	Namibia	1940	N,Q,R
3·275	AIR Srinagar	India	0130	R
3·300	V. of Revol. Bujumb	Kigali	1944	Q
3·330	R. Rwanda	Kigali	1950	Q
3·355	R. Botswana	Gabarone	1915	G,N
3·365	GBC Radio 2	Ghana	2255	J
3·905	AIR Delhi	India	1829	G,J,N,Q
3·915	BBC Kranji	Singapore	1831	C,N
3·925	AIR Delhi	India	2124	G,R
3·940	PBS Hubei Wuhan	China	2252	J
3·955	BBC WS Daventry	England	2240	K
3·965	RFI Paris	France	1832	N
3·970	R. Buca	Cameroon	2200	D
3·975	BBC WS Skelton	England	1735	C
3·980	VOA Munich	W. Germany	1730	C
3·985	SRI Berne	Switzerland	1835	A,H,N
3·995	DW Cologne	W. Germany	1836	N
4·030	R. Anadyr	USSR	1838	N
4·045	R. Moscow	USSR	1839	N
4·060	R. Moscow Kharkov	USSR	1915	A,G,H,N
4·450	R. Afghanistan	via USSR	0215	R
4·500	VNG Lyndhurst	Australia	XXXX	M
4·500	Xinjiang	China	XXXX	M
4·735	Xinjiang	China	1900	R
4·740	R. Afghanistan	via USSR	1840	A,C,G,N
4·750	R. Bertoura	Cameroon	2110	L,N
4·760	ELWA Monrovia	Liberia	2140	C,J,L
4·760	TWR	Swaziland	1745	L,R
4·765	R. Nac Cruzerio	Brazil	2310	P,R
4·765	Habana	Cuba	2259	R
4·765	RRI Medan	Indonesia	2200	A
4·770	FRCN, Kaduna	Nigeria	2030	D,E,H,I,L,N,R
4·770	R. Mundial, Bolivar	Venezuela	2315	P
4·780	RTD	Djibouti	2035	E
4·780	V. Carabobo	Venezuela	0007	P
4·785	RTM Bamako	Mali	1841	C,N
4·785	R. Tanzania	Dar-es-Salaam	2300	E,G,R
4·785	R. Baku	USSR	1840	N
4·795	R. Douala	Cameroon	2030	A,E,L,N,R
4·800	LNBS Lesotho	Maeru	2020	C,L,R,Q
4·805	R. Nac Amazonas	Brazil	2230	C,P
4·805	RN Sao Tome		2305	R
4·810	RSA	S. Africa	2035	L,Q
4·815	R. Diff TV Burkina	Ouagadougou	2116	A,C,E,H,L,N,P,R,G
4·820	E. Prov. Huila	Angola	2200	L
4·820	R. Botswana	Botswana	1930	C,L,N
4·820	Khanty-Mansiysk	USSR	0103	H
4·820	La Voz Evangelica	Honduras	0140	P
4·830	Africa No. 1	Gabon	2046	C,D,E,H,L,N,R
4·830	R. Tachira	Venezuela	0147	C,H,P
4·830	R. Reloj	Costa Rica	0230	D,P,Q
4·835	RTM Bamako	Mali	2010	G,L,N
4·845	R. Nacional, Manus	Brazil	0115	A,D,P
4·845	RTM K. Lumpur	Malaysia	0715	G
4·845	ORTM Nouakchott	Mauritania	2000	A,C,E,G,L,N,R
4·850	R. Capital, Caracas	Venezuela	0120	P
4·860	Kalinin	USSR	2110	A,N
4·865	V of Cinaruco	Columbia	XXXX	Q

Freq (MHz)	Station	Country	UTC	DXer
4·865	PBS Lanzhou	China	2245	P,Q,R
4·865	R. Mozambique	Mozambique	2054	E
4·870	R. Cotonou	Benin	2110	C,G,H,K,L,N,P,R
4·875	R. Nac. Boa Vista	Brazil	0133	C,P
4·880	R. Acreana	Brazil	0232	Q
4·880	SABC R. Suid Afrika	S. Africa	1940	A,C,E,G,L,N,R
4·885	R. Clube do Para	Brazil	0130	C,P
4·885	Voice of Kenya	Kenya	1920	L,R
4·890	R. Centinela Loga	Ecuador	0330	G
4·890	ORTS, Dakar	Senegal	1935	C,L,N,R
4·895	AIR Kurseong	India	2010	R
4·895	Ashkhabad	USSR	2315	B,C,H,N,P
4·900	R. Diff Nat Conakry	Guinea	2030	C,L
4·905	R. Abu Dhabi	UAE	1815	G,L,N
4·905	N'djamena	Chad	2312	G,R
4·905	R. Relegio, Rio	Brazil	0211	P
4·910	R. Zambia	Zambia	1930	E,L,N
4·915	Accra	Ghana	2235	C,G,J,L,N,Q
4·915	Voice of Kenya	Kenya	2025	R
4·920	R. Afghanistan	via USSR	1830	G,N
4·920	R. Nat N'djamena	Chad	1950	C,L
4·920	AIR Madras	India	2030	R
4·930	Ashkabad	USSR	2243	H
4·930	R. Tbilisi	USSR	2122	N
4·940	Kiev	USSR	1831	K,M,N
4·940	R. Yakutsk	USSR	0135	A
4·940	R. Yaracuy	Venezuela	0100	R
4·945	RSA	S. Africa	1747	L,N
4·945	R. Nat. Porto Velho	Brazil	0120	R
4·950	R. Nac. Luanda	Angola	2125	L
4·955	RRI Banda Aceh	Indonesia	2300	R
4·958	Azerbiajan	USSR	2140	C,P
4·960	R. Baku	USSR	1746	N
4·965	SWABC Windhoek	S. Africa	2310	R
4·970	R. Yaounde	Cameroon	2046	H,R
4·975	R. Uganda	Uganda	1910	C,L
4·975	Dushanbe	USSR	0125	A
4·980	Swaziland Comm. R.	Swaziland	2005	L,M
4·980	Ecos del Torbes	Venezuela	2240	C,H,J,K,N,P
4·990	FRCN, Lagos	Nigeria	2115	C,D,F,K,L,N,Q
4·990	Radio RSA	S. Africa	2040	E,P,R
4·990	Yerevan	USSR	2150	C
4·995	R. Ulan Bator	Mongolia	2400	R
5·005	R. Nacional, Bata	Eq. Guinea	2020	C,L,N,R
5·010	R. Garoua	Cameroon	2125	C,E,I,N,Q
5·015	Arkhangelsk	USSR	1745	N
5·015	R. Cultura Cuiaba	Brazil	0110	R
5·020	R. Nac Caracas	Venezuela	0135	R
5·020	ORTN Niamey	Niger	1940	L
5·025	R. Uganda, Kampala	Uganda	1917	C,N
5·035	R. Bangui	C. Africa	1815	C,E,L,N
5·040	La Voz del Upano	Ecuador	0126	D
5·040	Omdurman	Sudan	2305	R
5·040	R. Tbilisi	USSR	1743	H,N
5·045	R. Togo Lome	Togo	1815	A,D,L,N
5·050	AIR Aizawal	India	0140	R
5·057	Gjirokaster	Albania	1654	N
5·060	PBS Xinjiang	China	2317	R
5·060	R. Amazonas	Peru	0445	G
5·095	R. Sutatenza, Bogata	Colombia	0045	D,H,R

XXXX—No Time Given.

receiver in the s.s.b. mode but could only note SINPO 22333 in his log! John Parry has been listening to RCI in Montreal, Canada—their broadcasts to Europe on 17·820 can be heard from 1430 until 1800 and are in Russian, Ukrainian, French, English, Polish and German! In Morden, Surrey, **Sheila Hughes** has been trying out an old VEF Transistor receiver which her son Paul bought in a "junk sale" and picked up Radio Surinam on 17·755—their programme starts at 1700 and is relayed to Europe via an RNB transmitter in Brazil.

During daylight hours the reception conditions on the 15MHz (19m) band in the UK have tended to be more reliable than those on the higher frequencies—however this band has often been closing quite early in the evening. Although signals from several continents can be heard, a high level of illegal jamming often makes reception difficult.

Radio Australia broadcast to Asia on this band in the morning on 15·415 from 0900 until 1100 via their Carnarvon transmitter in W.Australia. Although there is often some interference present from nearby jammers around 0900, their signal gradually improves and is often very good by 1000—in fact Bill Reid listened to their *International Report* at 1010 and noted their signal as SIO 534 in his log. **Tim Shirley**, who is a regular listener to their programmes in Bristol, finds this is often the best frequency to choose. Tim has also been listening to the "Super Rock" music from KYOI in Saipan, N. Mariana Islands on 15·190 at 0900. Their broadcast is really intended for Asia and reception in Europe is often subject to considerable interference—a typical report just now might be the SINPO 23343 quoted in the log from **Maurice Andries** of Dendermonde, Belgium.

Alan Curry is a regular listener to Radio Pakistan on 15·605—their broadcast to Europe starts at 0715 in Urdu, but programmes in English follow. John Nash managed to pick up the Voice of Nigeria on 15·120 around 0900 at SIO 222, but their transmission is intended for Africa at that time. Their broadcasts to Europe take place from 0500–0657 and 1800–2057. Another interesting DX spot to look for was mentioned by Philip Rambaut, namely Tinang, Philippines—VOA relays on 15·410 and 154·425 can be heard from there at 1100 beaming their programmes to Asia. Philip also logged Radio Bangladesh, Dhakar on 15·525 at 1230.

A Leslie Biss, Knaresborough
B Alan Curry, Stockton-on-Tees
C Neil Dove, Lockerbie
D Davy Hossack, Winchburgh
E Simon Illingworth, Johannesburgh SA
F Mat Jusoh, Selangor, Malaysia
G Bill Kelly, Belfast
H Alex Mackow, London
I David Middlesmiss, Eyemouth
J George Morley, Redhill
K John Nash, Brighton
L Fred Pallant, Storrington
M John Parry, Northwich
N Philip Rambaut, Macclesfield
O John Sadler, Bishops Stortford
P John Sheridan, Mapperley
Q Tim Shirley, Bristol

Although Radio Peace and Progress beam their programme in English to Asia from Moscow on 15·470 at 1400, **Darren Taplin** managed to hear it in Tunbridge Wells, thereby adding another station to his ever growing list! using a Realistic DX-150A receiver plus a 25m wire antenna when DXing, Darren has also been listening to the programmes from WYFR in Oakland, California, who broadcast to Europe on 15·440 via their transmitter in Okeechobee, Florida at 1600. SLBC Colombo, Sri Lanka is seldom mentioned in this series, but **Mike Kitchener** of Hitchin has tracked them down to 15·425 at 1540 when he listened to their programme of pop music!

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The DX programmes from Radio Portugal, Lisbon have been attracting the attention of **John Sadler** in Bishops Stortford —look for them on 15·250 at 1730 on Fridays. **Davy Hossock** has been checking the band during the late afternoon in Broxburn, Scotland and among the stations heard at 1800 were RCI Montreal, Canada beaming to Africa on 15·260 and Radio Bras, Brazil on 15·265 with programmes for Europe in English and then German until 1950. Another broadcaster in S.America can be found on 15·345, namely RAE in Buenos Aires, Argentina—their programmes to Europe in English, German, French and Italian start at 1745. Although Mike Kitchener heard their station announcements at 2105, conditions often prevent reception before they close down at 2200!

The 13MHz (22m) Band

As mentioned last month, the majority of the broadcasts on this band stem from Moscow, USSR. Some of the other broadcasters known to be using this band at some time during the day are: Radio Baghdad on 13·600, 13·650 and 13·700; Radio Bangladesh on 13·615; Radio Pyongyang on 13·650, 13·680 and 13·750; Radio Korea on 13·670; Radio Monte-Carlo 13·695; Radio Prague on 13·715; The Voice of Israel 13·725 and 13·750; Radio Nederlands on 13·770 and ISBS Iceland on 13·775. Three of these stations were noted in the reports from DXers this time, namely ISBS Iceland, logged by Philip Rambaut at 1214; Radio Prague, logged by **Adrian Bryant** at 1430 who uses an RCA AR88D receiver plus a long wire antenna in Marksbury and Radio Nederlands logged by Darren Taplin at 1522.

The 11, 9, 7 and 6MHz Bands

The conditions have been very good in the morning on the 11MHz 25m band—so good in fact that **Colin Rolls** of Pulborough and George Morley of Redhill have been hearing the bird call, station announcement and time signal followed by the world news and weather report from Radio New Zealand on 11·780 from 0858! The direct broadcast to Europe from Radio Japan in Tokyo from 0900 on 11·955 was also received by George, but it was weak —SINPO 14432. It is also interesting to note that Philip Rambaut has been hearing the Tinang, Philippines relay of VOA on 11·965 at 1247!

Another VOA relay which is not often mentioned by DXers—Kavala, Greece, was logged by Tim Shirley on 11·805 at 0630. Tim has also been listening to the programmes from Radio HCJB in Quito, Ecuador on 11·925 which are intended for Australia at 0830, John Parry has been listening to Vatican Radio, Rome on 11·740 at 0720—they broadcast in fourteen languages to Europe from 0330 until 1730. when conditions permit, **Francis Hearne** of Ilford and **David Middlemiss** of Eyemouth listen at 2100 to Radio RSA in Johannesburg on 11·900.

Stewart Russell listens every morning to the 9MHz (31m) broadcast by Radio Australia to Europe on 9·655—reception in Forfar, Scotland has been generally good between 0815 and 0930. Another listener in Scotland, Neil Dove of Lockerbie found reception conditions from other areas good at night—Radio RSA on 9·585; AIR New Delhi, India on 9·550; Radio Cairo, Egypt on 9·655; RAE Argentina 9·690; WHRI South Bend, USA on 9·770 were all logged between 2015 and 2300. Bill Stewart has been hearing Radio Australia on the 7MHz (41m) band—listen on 7·205 between 1530 and 2040. Some of the other stations were noted by John Sadler—Radio Polonia, 7·285 at 1200; Radio Austria, 7·245 at 1400; Radio Damascus, 7·455 at 2005 and the Voice of Israel, 7·465 at 2000. Radio Australia can also be heard on the 6MHz (49m) band! Bill Reid logged them on 6·035 at 1530 with SIO 444. An RCI 250kW transmitter in Sackville, Canada now relays Radio Japan to N.America on 6·120 at 1130—can you hear it?

The conditions on the 5, 4, 3 and 2MHz bands have been good as can be seen from the chart.

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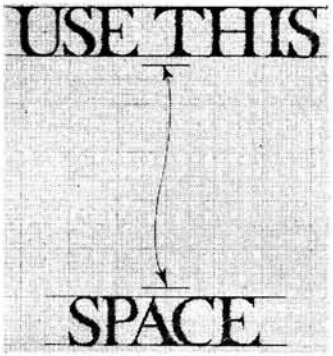

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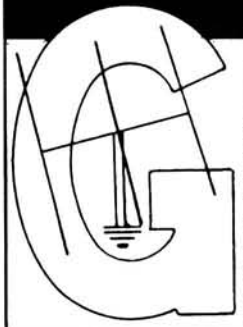

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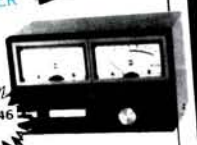

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