JANUARY 1987 £1·10

ISSN 0141-0857

Practical Wireless

The Radio Magazine

Build The PW 'WESTBURY' Basic Wobbulator

PLUS
A Small Isolated Power Supply

REVIEWED
The ICS RM-1 RTTY Modem

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Yaesu

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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			
MML144/30-LS	inc preamp (1/3 w i/p)	94.30	(2.50)
MML144/50-S	inc preamp, switchable	106.95	(2.50)
ML144/100-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 – TET – MET – TONNA

Icom Products

IC751	HF Transceiver	P.O.A.	(—)
IC745	HF Transceiver	P.O.A.	(—)
IC735	New HF Transceiver	P.O.A.	(—)
PS15	P.S. Unit	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)
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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	329.00	(3.00)
ICS/AEA			
PK64	Complete Packet/Amtor terminal	166.26	(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	7cms 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	Synthesiser 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			
RU120406	4 amp Power Supply	14.95	(3.00)

Aerial Rotators

KR250	Light Duty	78.00	(3.00)
FU200	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)
T2X	8 core Very Heavy Duty	499.00	(—)
KR5400	Elevation/Azimuth	279.00	(3.00)
KR5600	Elevation/Azimuth	369.00	(3.50)

Switches

SMCS 2U	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 KP21N	2 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)
CT530	100W Dummy Load (500WHmin)	79.00	(2.50)
DRAE	2m Pre-set A.T.U.	14.50	(2.00)
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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)

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The Radio Magazine

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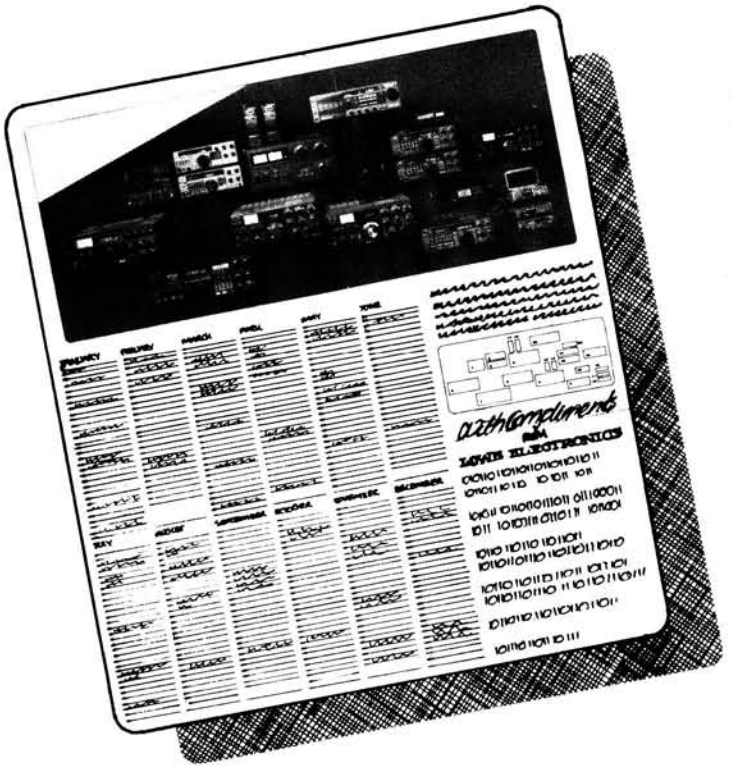

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AR2002 receiver

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.

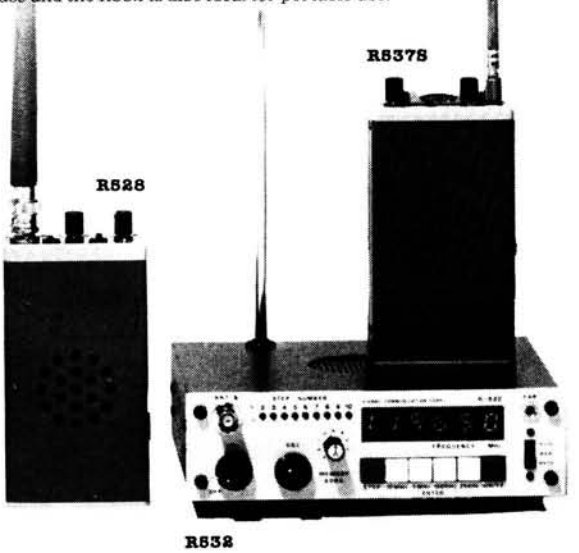
A socket for the optional RS232 interface (RC PACK) is provided on the rear panel. The RC PACK consists of an 8 bit CPU with its own ROM and RAM and with your own computer acting as a dumb terminal many additional operating facilities become available. Of course, if you want to write your own programs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

airband receivers

R537S... a tunable airband receiver covering 118 to 136 MHz plus the facility for two crystal controlled channels (crystals not included).

R528... an airband receiver scanning four out of six crystal controlled channels (crystals not included). The R528 also has a manual channel selection switch.

R532... not needing crystals, the R532 is a synthesized receiver covering the airbands from 110 to 136 MHz and having 100 programmable memory channels (ten banks of ten). Operating on 12 volts DC, the R532 can be used either mobile or at home with the optional mains power supply. Add a nicad battery pack and carrying case and the R532 is also ideal for portable use.



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DAIWA meters

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NS448 with remote head . . . Frequency range 900 to 1300 MHz, forward power switchable 5/20 Watts, reflected 1.6/6.6 Watts, N type connectors.

NS660P . . . switchable meter reading (average, normal PEP and hold PEP) and provision for optional remote head (U66V), frequency range 1.8 to 150 MHz, forward power switchable 15/150/1500 Watts, SO239 connectors.

U66V . . . remote head, frequency range 140/525 MHz, max 300 Watts, N type connectors.

SC20 . . . extension cable for U66V, approx 20 metres long.

HOKUSHIN aerials

Base station aerials

HF5 . . . 80 to 10 metre vertical, no radials are required when it is mounted at ground level.

HF5R . . . Radial kit for use with the HF5 when it is mounted on a chimney or gable end.

GPV8 . . . Two metre base station colinear, 6.5 dB gain, 3.1 metres high.

GPV23 . . . as above but a 3 section version, 7.8 dB gain, 4.45 metres high.

GPV7 . . . Seventy centimetre 5/8 over 5/8 over 5/8 base station colinear, 6.8 dB gain.

GPV720 . . . Dual band (144/430 MHz) base station aerial.

Mobile aerials

2E . . . Two metre 5/8 whip, 3.4 dB gain, foldover base.

2NE . . . Two metre 7/8 whip, 4.5 dB gain, foldover base.

OSCAR430 . . . Seventy centimetre 5/8 over 5/8 over 5/8 whip, 6.3 dB gain.

OSCAR720 . . . Dual band (144/430 MHz) whip.

HS770 . . . 144/430 MHz diplexer for use with OSCAR720.

GSS . . . Gutter mount (requires RG4M cable assembly).

RG4M . . . Cable assembly for GSS base, complete with SO239 and PL259 plug.

12B . . . Car wing mount with SO239 top and bottom.

HSTMB . . . Car boot mount including cable and PL259.

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data equipment

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Seasons Greetings to ICOM users the world over

NEW! IC-MICRO TWO, Mini-handportable.

This is the smallest handportable transceiver from ICOM. The MICRO-TWO, 2 metre FM measures only 148 x 61 x 31mm. with BP22 battery pack (not shown here). The MICRO-TWO is a hand-size transceiver which will equally fit most pockets.

On the top panel a clear LCD readout gives frequency and memory channel number. Tuning is made easy using up/down toggle switches to select 1MHz, 100kHz or 12.5kHz steps as well as the 10 memory channels. Full repeater and reverse duplex operation facilities are featured including repeater access tone. An automatic power saving function reduces battery power consumption when in receive mode. Output power is 1 watt or 100 milliwatts (low) with the BP22 nicad pack.

The ICOM MICRO-TWO is the ultimate in 2 metre miniature handheld transceivers, yet despite it's small size the receiver sensitivity and performance has not been compromised. This handy transceiver comes complete with the BP22 nicad pack (not shown here), A.C. wall charger, helical antenna. Most existing ICOM accessories can also be used.

An optional extra, the BC50 desk charger will rapidly charge the BP22 battery in just one hour. Other options include the BP23 long-life, low-power and BP24 medium-life, high-power nicad battery packs. Contact us 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.

BASE STATIONS

IC-1271E, 1.2GHz Multimode Transceiver

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

IC-AG1200 Masthead pre-amp. Designed for use with the IC-1271E, the D.C. voltage and T/R switching for the amplifier is super-imposed on the R.F. coaxial cable and switched by the pre-amp switch on the IC-1271E front panel. The new pre-amp provides excellent performance as a low noise microwave amplifier (0.606 noise figure typical).

IC-271 & 471 Multimode Base stations.

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

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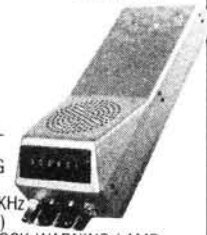

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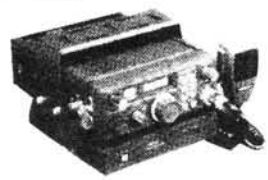

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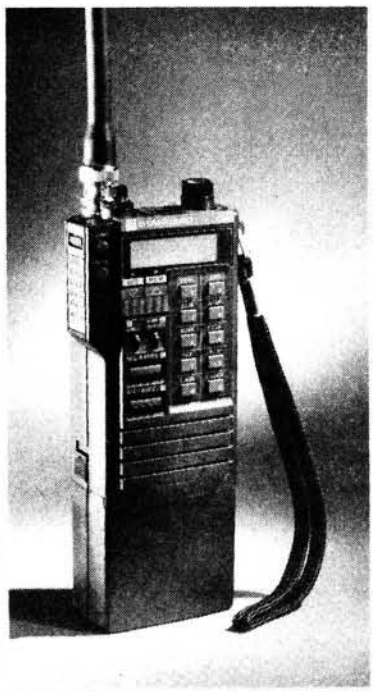

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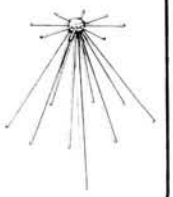

PRE-AMPLIFIERS

Broadband antennas usually have no gain, so pre-amps are often desirable. One mounted at the masthead amplifies the weak signals but not the noise generated in the feeder cable.

The **REVCO PA2** in-line masthead pre-amplifier gives useful gain from 10MHz to over 1GHz. Includes special mains psu..... **£49.95**

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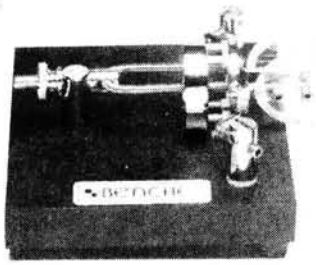

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WRITE ON... *the page where you have your say*

STAR £10 LETTER

That Morse Test!

Sir: May I please add my penn'orth to the varied and most interesting letters you have published recently in *Write On*.

Peter Crosland and Mike Dixon both mention the pressures and enormous workload of the staff at RSGB HQ, and I would agree with them but I must ask the question: "Why did an over-worked, under-staffed, million-pound business take on extra work in the form of Morse Tests?" Out in the competitive world of business, customers must be kept happy or their trade goes elsewhere. However, where there is a monopoly or a single source of supply the customer has no option but to accept the product/service offered, even, as in my case, in very frustrating circumstances.

Earlier this year, as a result of a notice published in *RadCom*, I wrote to the RSGB asking if any Morse Testing Stations were to be set up in Lancashire or neighbouring counties. The reply was a list of Rallies up and down the country where I could take the test if I wished. The nearest was too far and they were all, in any case, oversubscribed. In June, things started to buck up when three of our local amateurs went to the Elvaston Castle Rally to be tested as examiners. It is interesting to note that after waiting for two hours past their appointment time, they were given a receiving test at 25 w.p.m. and were quite amazed when not asked to "send" at the speed of the test. They all passed and immediately fixed a date at the end of July in very suitable premises (Fleetwood Nautical College) to hold the first RSGB tests in Lancashire.

Armed with this information I sent my application form off to RSGB HQ for a Morse Test at Fleetwood on July 27 (1st choice) or at the Preston Rally held at Lancaster University on August 24 (2nd choice). In the meanwhile I heard that the end of July was too soon for the RSGB to administer any tests, so I naturally expected an appointment for my second choice at Lancaster. My appointment letter arrived and informed me that I had a place at the Red Rose Rally at Haydock on August 17! This was a little inconvenient as I knew that I would be in Scotland on that date, recovering from my daughter's wedding on the 16th.

You may well imagine that I was somewhat annoyed by now, and I wrote a long critical letter to RSGB HQ closing with a request to take the test at Lancaster on August 24 or at Fleetwood on September 27. The reply came in the form of a new test appointment and a one-line apology blaming human error for giving me a place at Haydock. All other points of my letter were ignored, and to rub salt into the wounds my new test date was for my second choice at Fleetwood, even though only 12 candidates were booked in for the Lancaster Rally! Yes, it must be pressure of work.

Perhaps I ought to mention that my Radio Amateur Licence renewal date was August 20, and I was naturally keen to avoid paying two lots of renewal fees in quick succession. When the red reminder came, I phoned RALU and explained my position to a very understanding and helpful gentleman. I would renew either as a G1 or as G0 depending on the Morse Test result.

At last September 27 came and I presented myself for test at Fleetwood Nautical College. I understand that a total of 27 candidates turned up, resulting in quite a busy day for the examiners. I came away feeling fairly confident but wondering why the duty examiners were not allowed to tell me the result. I applaud the RSGB for the way that they are insisting

LAUGH WITH BARTHES

I WAS USING TWO STACKED FOUR ELEMENT MONO-BANDERS...

PW COMMENT

Initiative

PRESENT-DAY RADIO HOBBYISTS can be divided into two broad camps, those who like to build the equipment they use, and those that prefer to buy it ready-made from one of the emporiums (should it be emporia, I wonder?), or on the second-hand market. Those that like to build can be subdivided yet again, into those who want to be able to take the easier way out by buying a kit of parts, and those that prefer to search through magazines, mail-order catalogues, radio rally stands and their "junk-boxes", painstakingly gathering together all the bits and pieces required.

Many enthusiasts scorn the "ready-made" brigade, and I am sure that the fewer people who build (even if only the little add-ons), the poorer the hobby becomes. I must, however, admit to a certain sympathy for the ones who hardly ever get a soldering iron out, for it's nowhere near as easy to find the sort of components you need to build radio equipment as it used to be. Major mail-order catalogue suppliers such as Cirkit, Electrovalue, Maplin and more recently Electromail (RS Components), plus some of the smaller dealers, cover quite a broad range now, but ever-increasing postage and telephone costs mean that you need to be quite well-organised, with a substantial investment in stocks of resistors, capacitors, semiconductors, etc., if you are not to finish up having to pay upwards of 50p for that lone ¼ watt resistor you need to finish a project! The days of nipping down to the radio dealer's shop on the corner for the odd few components are long gone for most of us.

Because of these difficulties, I can understand why quite a few constructors prefer the kit approach, and I'm glad to see a good selection of these offered by several of our advertisers. When there isn't a kit available, though, it totally throws some people—they just don't know where to start looking for the bits they need. They write to us, or come on the 'phone asking: "Where can I get such-and-such?" Often, they haven't invested in even one of the mail-order suppliers' catalogues, and maybe haven't noticed the adverts offering them, either.

It particularly worries me when, as so often happens, such enquiries come from someone obviously in their 'teens or early twenties, who has undoubtedly been through school since the introduction of the "project" approach to learning. Somehow, the teaching of how and where to go about finding the information and materials needed to complete a project just doesn't seem to get transferred from the school environment to the outside world, yet that approach is needed for success in almost every activity that forms part of life. As is often said, it's not necessary to know the answer to every problem or question that comes your way, what matters is knowing how to go about finding the answer.

Geoff Arnold

on fairness and require two examiners to be present, but for goodness' sake, let's be told there and then—Pass or Fail—and the relevant documents issued. Far better for the candidate and surely less work for RSGB HQ? To the best of my knowledge, all the lads who took their tests on the old system knew the result right away.

Not to worry, just sit back and wait a short while for the official result to arrive. I knew it would not take long because I remember reading a "Question and Answer" handout prepared by the RSGB which clearly stated that results would be known within 7 to 10 working days.

So I waited, and waited, and waited, until 25 days after my test. On October 22, I received the result slip from the RSGB. I did hear that a certain gentleman at HQ had been away on holiday, hence the delay in sending out the results. Surely such an important function should not grind to a halt if one man goes away on holiday!

Finally, in response to E. Allen's letter in September *PW,* I do have concrete suggestions to remedy the shortcomings and I do have past experience in administration and practical organisation. It's not much use writing to the RSGB about it because they don't seem to have the time to read my letters and formulate a correct reply. I'm not impressed by the RSGB—can you really blame me?

Norman Dickinson G0???
Morecambe, Lancs

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.

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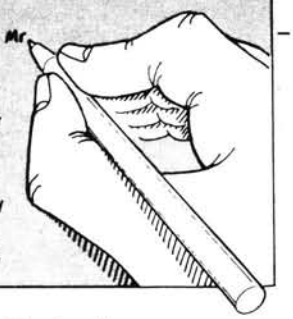


28MHz Bandplan

Sir: I would like to point out an error in the article on 10m in your October issue and ask you to bring it to your readers' attention. In Table 2, the author lists 29·310–29·400MHz as available for f.m. working, with 29·400–19·550 as the satellite band, whereas the IARU Bandplan (as shown in the current RSGB *Callbook* and the 3rd edition of the *Operating Manual*) lists the satellite band as 29·300–29·550.

A 29·400–29·550 satellite allocation was agreed at the IARU Warsaw conference in 1975, but was expanded to its present size at the Cefalu conference in 1984. The Soviet RS satellites have made use of the band extension in the past and are expected to continue to do so in the future. 73.

Martin Atherton G3ZAY
(Chairman, RSGB HF Committee)
Cambridge

Pollution

Sir: Can anything be done to prohibit the jamming of radio transmissions? We hear much about pollution by acid rain, nuclear radiation and sewage on the sea shore, but overlook pollution of the radio waves.

This pollution, mainly on short waves, is now worse than I have known it in fifty years of DXing. It is mainly caused by the jamming of broadcasts beamed towards Iron Curtain countries, and is also endemic in areas of conflict, particularly in the Middle East. What makes the jamming even more objectionable is that, more often than not, it spreads wider than the station at which it is directed and interferes with other uninvolved broadcasts on adjacent frequencies.

Should there not be international consideration of this undesirable pollution?

Philip Rambaut
Macclesfield, Cheshire

Causing deliberate interference to radio transmissions is already outlawed by the International Radio Regulations, to which most countries are signatories. Unfortunately, some national administrations consider broadcasts from countries with differing political systems to be subversive propaganda, from which their citizens should be protected, and seek to achieve that "protection" by putting many high-powered jamming transmitters on the air.

Due to the characteristics of short-wave propagation, this jamming is not entirely effective in preventing reception of overseas broadcasts in the target country, but it certainly does cause interference over the remainder of the world. In an effort to break through the jamming, major broadcasters are using more channels, at higher powers, causing even more congestion. I sometimes wonder just how many megawatts of electrical power are wasted by both sides in this pointless battle.—Ed.

BOOKSHELF... *available from book stockists*

RADIO DATABASE INTERNATIONAL 1987 Edition.
Published by International Broadcasting Services Ltd.
Available from Interbooks, Lynton, Stanley, Perth PH1 4QQ.
352 pages, 177 x 254mm (paperback).
Price £12.50 plus £1 P&P UK.
ISBN 0 914941 03 8

The first thing I noticed about this book is the section at the end, 1987 Buyer's Guide to World-Band Radios. It's a guide to the suitability of a receiver for s.w.l.ing, both portable and tabletop versions. The authors are very frank about each receiver and give it a star rating on its overall performance. This could be helpful if you are somewhat bewildered by the array of receivers available for the hobby.

The bulk of the book contains a worldscan chart. This is a frequency-by-frequency chart of radio stations, their power, the time they transmit and their target areas. It takes a little working out to start with, but after a while you can get quite quick at looking up stations and finding out details about them.

If you are interested in s.w.l.ing then this book could prove a very useful reference manual that won't spend much time on the shelf gathering dust.

A TV-DXERS HANDBOOK.
By R. Bunney.
Published by Bernard Babani (publishers) Ltd.
97 pages, 195 x 265mm.
Price £5.95 plus 75p P&P from *PW* Book Service.
ISBN 0 85934 150X

A lot of TV-DXers have been waiting, with baited breath, for this book to appear. Now it's arrived it should find its way into many shacks and workshops. Not just TV-DXers, but anyone with an interest in video, including TV engineers and satellite TV buffs.

Subjects covered in depth are, propagation, practical video and r.f. processing plus satellite TV, antenna technology and last, but not least, how to improve your reception of that elusive TV-DX, all interlaced with a good selection of TV test card and band-plan information.

Being a keen TV-DXer with an interest in d.i.y. satellite TV reception, this book is a must for my own shack.

G6AKG

Yeovil Mayor and MP join in

During the 40th Anniversary Day of the Yeovil ARC, held on Oct 17, the mayor and MP for Yeovil joined in the celebrations. The club held its first meeting on 17 October 1946 and there are still four founder members.

The photograph shows, (l-r) G3MYM; G3NOF (founder member); G3GC (Secretary); G3OMH (founder member); Mrs Joy Stanton (Mayor); Mr Paddy Ashdown MP; G3BEC (President and founder member) and BRS10663 (founder member).

Ocean Sound

ILR opened a new radio station in October, down on the south coast. They are transmitting on 1170kHz and 97·5MHz in the east of the region and 1557kHz and 103·2MHz in the west.

The "catchment area" is South Hampshire, West Sussex and the Isle of Wight, but as readers of *Medium* and *VHF Bands* in *On the Air* know it's probably heard much further afield.

The photographs show the studios on the opening day with Matt Hopper and Chris Carnegy (both presenters), and some of the Ocean Sound radio station staff cutting their cake.

If you do hear the station or want more details, then the address to write to is; ***Ocean Sound, PO Box 99, Fareham, Hants PO15 5TA.***

EATWG

Europe now has its own internatonal ATV organisation, European Amateur Television Working Group.

It is an umbrella organisation which will promote and protect the interests of ATVers with national amateur radio societies, licensing authorities and the IARU.

The first meeting was held on 20/21 September 1986 in Basel, Switzerland. A total of 35 representatives attended from Britain, France, Belgium, Holland, Italy, Austria, Germany and, of course, Switzerland.

More information about EATWG can be obtained from The British Amateur Television Club (BATC), c/o "Grenehurst", Pinewood Road, High Wycombe, Bucks HP12 4DD.

Stereo TV Sound

The introduction of digital stereo sound with TV has moved a step closer following the Government's approval of the joint BBC/IBA specification for a new transmission standard.

The system, developed by BBC engineers, is currently undergoing experimental tests from the BBC2 transmitter at Crystal Palace. The stereo signals are transmitted via a digitally modulated carrier at 6·552MHz above the vision carrier.

Although there are no immediate plans to introduce a full stereo service, the experimental tests will be extended to include both BBC1 and 2.

Can You Help?

Does anyone know the whereabouts of the µA753 i.c. as used in the *PW* Nimbus. If so then ***Garrey Learmonth of 60 Greenock Road, Bishopton, Renfrewshire,*** would like to hear from you.

Mr T. F. Bernascone is engaged on a programme of research into a very low frequency transmitting radio station established in Germany late autumn 1941. The station called "Goliath", was near the village of Kalbe and partially straddles the River Milde.

He is looking for information, no matter how small or seemingly trivial. Any drawings, photographs, technical details or personal memories by German or Allied personnel would be especially welcome. Any documents loaned would be treated with care and postage refunded.

If you can help, write to ***Mr T. F. Bernascone (Goliath Research Project), Teesside Polytechnic, Borough Road, Middlesbrough, Cleveland TS1 3BA.***

The circuit diagram for a Teleton 8-band receiver, model TF182, is being sought by Mr E. G. Thomas. He says that either loan or purchase could be agreed. If you can help then write to: ***Mr E. G. Thomas, 11 Burrell Avenue, Lancing, Sussex BN15 8QB.***

Morsum Magnificat

My first copy of the above magazine arrived on my desk this month. It is published quarterly to provide international in-depth coverage of all aspects of Morse telegraphy, from its earliest concept to the present time.

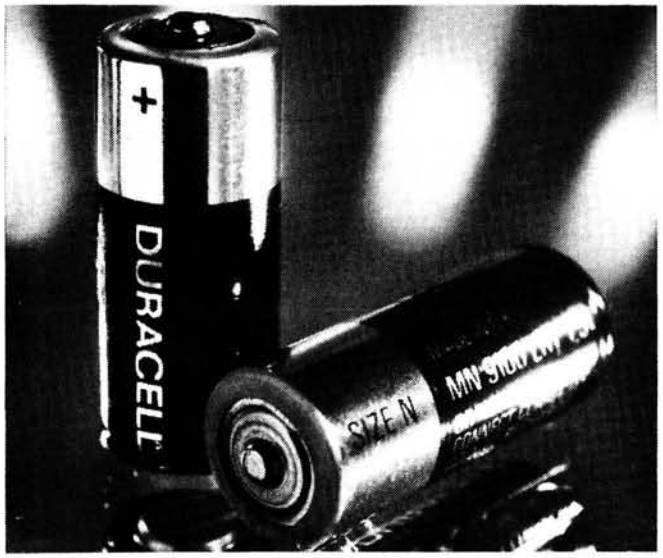
The subscription cost for the UK is £6 per annum, cheques should be made out to Morsum Magnificat, and sent to G4FAI, 1 Tash Place, London N11 1PA.

The magazine covers a wide range of topics, historical items, amusing anecdotes, news items and even the odd constructional. A must for c.w. enthusiasts everywhere.

1·5V Enhanced from Duracell

Duracell have produced an enhanced version of the MN1900 1·5V alkaline manganese cell. The new battery has a capacity of 800mA/h compared with a previous capacity of 650mA/h.

Cylindrical in shape, with a diameter of 11mm and a height of 30mm, it has a life of 65 hours on 100Ω to 0·8V at 20°C. It will be useful in applications like radio pagers, calculators and electronic instruments.



Dial Search

The fourth edition of this publication is available. It's the listeners' check-list and guide to European Broadcasting. It provides the essential information for the home listeners using a portable radio and its own normal antenna.

It is largely a question of having the right numbers to hand, just like a phone book, and knowing which way the set should face.

The fourth edition is available at £3.00 (plus 30p P&P) direct from ***George Wilcox, 9 Thurrock Close, Lower Willingdean, Eastbourne, East Sussex BN20 9NF, or through booksellers ISBN 09508575 2 1.***

Diary Dates

March 1: Barry College of Further Education RS are holding their 7th Amateur Radio Rally at Barry Leisure Centre. Many trade exhibitors will be present, together with the usual Bring and Buy, RSGB bookstall and Morse testing facilities; the rally opens at 11am (10.30 for the disabled).

For more details contact ***Mike Adcock GW8CMU on 0446 711426.***

April 5: Pontefract and District ARS are holding their 7th Annual Components Fair. The venue is the Carleton Community Centre, Carleton.

The event is designed to encourage radio and electronic enthusiasts to "build your own".

The Fair opens at 11am and closes at 4.30pm, admission free. There will be the usual trade and club stands, bring and buy, bookstall, licensed bar, refeshments, etc. and parking is free. Further details can be obtained from ***C. Armitage, 31 Woodleigh Crescent, Ackworth, Pontefract. Tel: 0977 617951.***

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Voice of the North East

Open Days

BBC Radio Newcastle were delighted by the number of visitors that turned up for their open day last October. The last exhibit they all saw was the special event station GB2FBC, run by Tyneside ARS. There's no doubt the news spread by the amateurs brought many people to the BBC Studios. All contacts will receive a QSL card in due course.

If you have an event coming up, let us know about it and we'll see what we can do to help.

New Engineering Details

Bargoed: Improvements should have been made to the antenna system at the Bargoed TV transmitter in Mid Glamorgan. The channels remain unchanged at:

Ch. 21 BBC1 Wales
Ch. 24 HTV Wales
Ch. 27 BBC2
Ch. 31 Sianel 4 Cymru

Viewers need vertical Group A antennas, fitted outside.

East Dean: A new TV relay transmitting station should open in December in time for Christmas viewing. The new relay has been built at the rear of The Link, East Dean. The channels to be used are:

Ch. 42 Channel 4
Ch. 44 BBC2
Ch. 54 TVS
Ch. 62 BBC1

Viewers will need to use vertical Group E or wideband antennas, fitted outside.

Edale: A new TV relay transmitter should be bringing good recepton to people living in the Vale of Edale, in the Peak District National Park. The new transmitter is sited at Greenlands Farm, to the south of the river Noe, 20km west of Sheffield. The channels to be used are:

Ch. 53 Channel 4
Ch. 57 BBC1 North
Ch. 60 YTV
Ch. 63 BBC2

Viewers will need vertical Group C/D antennas, fitted outside.

Kenley & Caterham: Two new v.h.f. f.m. stereo radio transmitters have been built to improve reception in the area. The frequencies in use are:

Kenley
Radio 1/2 — 88·4MHz
Radio 3 — 90·6MHz
Radio 4 — 92·8MHz
Caterham
Radio 1/2 — 89·7MHz
Radio 3 — 91·9MHz
Radio 4 — 94·1MHz

Shetlands: The v.h.f. f.m. radio transmitting station at Bressay in the Shetlands has been re-equipped. No changes have been made to the frequencies used, which are:

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

Radio Essex: BBC Local Radio opened their newest station on November 5. The main studio complex is at Chelmsford with manned subsidiary studios in Colchester, Southend and Harlow. They began broadcasting from five transmitters, two on v.h.f. f.m. and three on m.w.:

VHF FM
Great Braxted — 103·5MHz
South Benfleet — 95·3MHz
MW
Manningtree — 729kHz
Chelmsford — 765kHz
Southend — 1530kHz

For further information on reception, listeners should contact: ***John Lettice, BBC Essex, 198 New London Road, Chelmsford, Essex CM2 9AB.***

UK DX Foundation?

Martyn Bolt G4SUI would like to hear from readers interested in joining a United Kingdom DX Foundation. These great bodies exist in the States and he's sure there are a great many amateurs over here who will be interested in promoting the better sides of amateur radio—using quieter bands and camping out on desolate hills, etc.

If you are interested please write to ***Martyn Bolt G4SUI, 112 Leeds Road, Mirfield, West Yorkshire WF14 0JE.***

Attention Acorn Users!

If you purchased a Master 128 or ET between January–May 1986 please read on.

An advertisement in September *PCW* provides interesting reading.

"It has been found that when the battery in these models is close to exhaustion, the microcomputer may attempt to recharge it. This is contrary to the recommendations of the battery manufacturer."

"An upgrade kit which prevents this happening has been developed and is now available from any Acorn dealer at no cost . . . If you have difficulty in obtaining a kit, please call 0223 214411 and ask for Department A2 . . ."

Special Visitor to SDRC

Bob Callahan KB1AU recently paid a visit to South Dublin RC when on a trip to Ireland. He is a regular on the ATC net and has built up a large but special friendship with many EI stations. He's pictured here with SDRC members holding the callsign EI2SDR.

Calling all YLs

Whilst reading *Vital Spark,* the Hastings Electronics and Radio Club's magazine, I saw a very interesting item.

"Whilst on holiday, Eric Vast met an American lady radio amateur, who refused to believe that women are licensed in the UK, as she has had many contacts into Britain, without ever hearing one. Eric assured her that not only were there licensed women in the UK, but that some may like to have a QSO with her. Interested? The details are as follows: Josephine Clarke WB6ZUC, 207 Evergreen, Kentfield, California CA94904 USA."

So pick up your pens and let Josephine know we're here.

CREST

The 148th Annual Scientific Meeting of the British Association for the Advancement of Science—BA for short—was held at Bristol University during the first week of September.

On the first day of the meeting Philips put on a special event, "Youth Encounters with Philips Electronics", aimed at the scientists of the future.

A lively programme of presentations and demonstrations covered subjects as diverse as mobile radio communications and medical ultrasound keeping the packed lecture hall enthralled. It was good to see the youngsters, who came from schools all over southern England, so attentive but yet enjoying themselves.

To complement the lecture programme, a marquee in the university grounds housed an exhibition, giving hands-on experience of the latest Philips' equipment, obviously with a view to attracting the youngsters to enter the electronics industry when they leave school or university.

The BA meeting also provided the platform for the launch of a new awards scheme for young scientists. CREST—Awards for *CRE*ativity in *S*cience and *T*echnology—is promoted jointly by BA and the Standing Conference on Schools' Science and Technology to encourage creativity, perseverance and application in science and technology through problem solving.

Open to young people ages 11 to 18, the awards are given to individuals or teams who successfully complete a scientific, technological or design project. The scheme has three levels—Bronze, Silver and Gold—each requiring a different amount of time, knowledge and ingenuity to complete. Rather like the Duke of Edinburgh Awards, but for science!

As examples of what could be achieved, the Bronze Award project could be something like studying the effectiveness of biological detergents or designing and building an l.e.d. array and would take about ten hours. A Silver Award project, such as building a light-seeking robot interfaced with a home computer would take around 40 hours, while for a Gold Award the student would be expected to spend about 100 hours on a project entirely of his own devising.

Gold level students are encouraged to make links with industry for both assistance and advice and already many large firms have helped with individual projects in the pilot scheme.

Financial support for CREST is being provided by the Department of Education and Science and by Philips Electronic and Associated Industries Ltd., the British Petroleum Company plc and the Wellcome Foundation Ltd.

Further information about the CREST scheme may be obtained from ***CREST, Fortress House, 23 Saville Row, London W1X 1AB. Tel: 01-734 6010.***

Try a Little More Solder!

G4XLM, Chairman of the Wimbledon & District ARS, casts a professional eye over the work of Scouts of the 1st and 2nd Chessington Group in "Constructors Corner" at JOTA station GB2BG.

The construction project enouraged each Scout to assemble a simple but useful piece of electronic equipment from kits of parts provided by W&DARS.

Why wait two Years?

That's probably how long you'll wait before another manufacturer can offer you the quality, performance and UNIQUE features available in the FT 767 GX.

If we tell you this radio is magnificent — you wouldn't take **our** word for it. Take the good old-fashioned approach and listen around the bands; in no time at all you'll learn why this transceiver is being described by users in glowing terms. 'Wonderful', 'Unbelievable', etc.
What's in this FT 767 GX that places it **so far ahead** of its rivals? YAESU's total dedication and patience in harnessing of advanced technology to produce literally the finest piece of equipment to appear on the Amateur Market.

Here are 6 features unique in amateur radio which you don't have to wait two years for:

1) **TX Shift** — Enabling custom setting of the transmit IF bandpass in the SSB modes.
2) **Tone Encoder** — To activate the tone-burst or the sub-audible tone generator for FM transmissions.
3) **Twin VFOs** — with auto-tracking.
4) **RF Amplifier** — Cascading pairs of JFETs for both amplifier and balanced first mixer with up-converting triple superhet.
5) **160m-70cm** — First all band (HF VHF & UHF coverage) 6) **Auto SWR/Power Meter** — digitally read out.

These SIX combined items plus:

● Integral Auto antenna tuner, keyer and power supply. ● Four internal CPUs ● Superb general coverage receiver.

You'll note that transceivers currently available with none of **these** 6 features are available at higher prices — which is entirely due to YAESU's new production methods that guarantee lower cost, higher **reliability** and longer life.
By the way, it provides 100 watts at HF (25 watts AM) and 10 watts VHF/UHF (2½ watts AM) — as we asked originally, 'Why wait 2 years?' — its here, **now** from YAESU!

YAESU's super portable twins

FT 290 & FT 690 Mk II —

. . . destined for even greater success — **AVAILABLE NOW!**

- 'New look' front panel
- Completely new rig with optional 25W p.a. for mobile use, and lots, lots more!
- Super new additions and changes to the world's biggest ever selling amateur transceiver.

FL 7000 — The Shape of Things to Come

- 1.2kW P.E.P. HF Solid State QSK Linear
- Weight only 30kg (66lbs)
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- Integral P.S.U.

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Celebrate your buying decision with the money you've saved.

When it comes to getting maximum HF performance for your pound, the choice is clear. Yaesu's FT-757GX.

Nowhere else will you find so many HF features packed into one compact, mobile-ready package. At a price that's got the competition baffled.

For starters, each 757 includes an electronic keyer. 600-Hz CW filter. AM and FM modes. AF speech processor. And a 25-kHz marker generator. All at no extra charge.

And working the DX has never been easier with dual VFOs, single-button VFO/memory swap for split-frequency operation, eight memories, and push-button quick memory and band scan.

The 757 also lets you listen from 500 kHz to 30MHz with its high-performance general coverage receiver. The transmitter covers 160 through 10 meters, including the new WARC bands, with 100 watts output on sideband, FM and CW.

CW buffs will enjoy the delights of full QSK operation. Plus the massive heatsink and duct-flow cooling system allow continuous RTTY operation for up to 30 minutes. Use the FP-757HD heavy-duty power supply option for continuous-duty applications.

And of course, there's the 757's highly attractive price. It's the perfect way to get all the HF performance you desire, whether you're operating mobile or fixed station. A full range of accessories is available custom made for your FT-757 to make it the most famous base/mobile in the U.K.

So ask your dealer today about Yaesu's FT-757GX. The most celebrated HF price/performer on the air.

YAESU

South Midlands Communications
S.M. House, School Close,
Chandlers Ford Industrial Estate,
Eastleigh, Hants SO5 3BY
Tel: (04215) 55111.
Amateur Electronics
504 Alum Rock Road
Birmingham B8 3HX
Tel: 021-327 1497

Prices and specifications subject to change without notice.

British Built General Coverage Receiver

There has been a growing number of short wave listeners willing to trade the frills and gimmicks found on imported models for better performance under the more demanding reception conditions found in Europe.

Lowe Electronics have responded with their new HF125 general coverage receiver which, they tell me, has been conceived, designed and built, by them, in Britain.

Scheduled for production in the early part of 1987, the new receiver is claimed to have the ability to perform on a crowded band with strong adjacent signals, yet still be easy to use with all the controls being simple and sensible.

Coverage is continuous from 30kHz to 30MHz and operating modes are a.m., u.s.b., l.s.b. and c.w. with and optional f.m. and synchronous a.m. board. A comprehensive range of bandwidth filters is fitted as standard—2·5, 4, 7 or 10kHz. A 400Hz audio filter is fitted for c.w. reception.

Controls are very simple and the frequency tuned is displayed on a large back-lit liquid crystal display.

Power requirements are 12V d.c. at around 250mA and internal NiCad batteries give around 10 hours portable operation. The lithium battery gives back-up for the 30 memories for some ten years!

For full details of this exciting new receiver contact ***Lowe Electronics Ltd, Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (0629) 2817.*** I cannot wait to get my hands on a review sample, it looks so good!

Lowe have told me, as we close for press, that the target price for the HF 125 is £350 to £400.

Catalogues

This month I've been inundated with new catalogues. Starting with the component ones ***Maplin*** have produced the 1987 edition of their bumper *Buyer's Guide to Electronic Components*. You can get this 472-page tome, packed with useful information on thousands of components, for £1.50 from larger newsagents or direct from ***Maplin Electronic Supplies Ltd, PO Box 3, Rayleigh, Essex SS6 8LR. Tel: (0702) 554155.***

Cirkit have released the Winter 1986 edition of their catalogue—168 pages of useful components at £1.20 from larger newsagents or direct from ***Cirkit, Park Lane, Broxbourne, Herts. Tel: (0992) 444111.***

Marco Trading have issued the latest edition of their component catalogue and no home constructor should be without a copy. £1.00 sent to ***Marco Trading, The Maltings, High Street, Wem, Salop SY4 5EN. Tel: (0939) 32763*** will see a copy on its way to you.

Electrovalue publish a very useful, component catalogue—if you want Siemens components then this is the catalogue for you. With 56 pages in A5 format this is compact and convenient to use. Obtainable direct from ***Electrovalue Ltd, 28 St. Judes Road, Englefield Green, Egham, Surrey TW20 0HB. Tel: (0784) 33603.***

Now on to the other catalogues. ***West Hyde*** produce a wide range of cases and boxes for electronic equipment and their latest *Enclosures Catalogue* makes interesting reading covering not only cases but "case furniture". Send £2.00 to ***West Hyde Developments Ltd, 9–10 Park Street Industrial Estate, Aylesbury, Bucks HP20 1ET. Tel: (0296) 20441*** for your own copy.

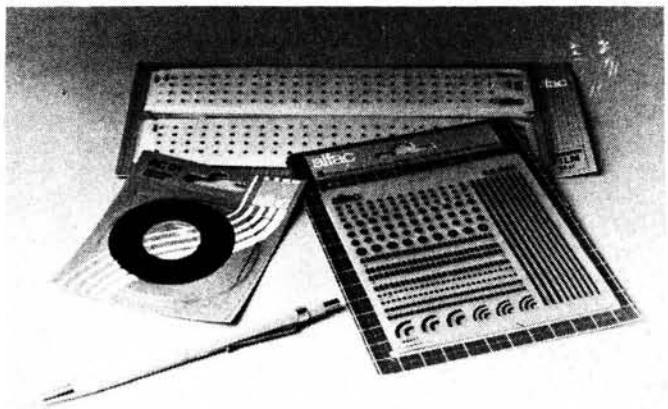
Etch-resist Transfers

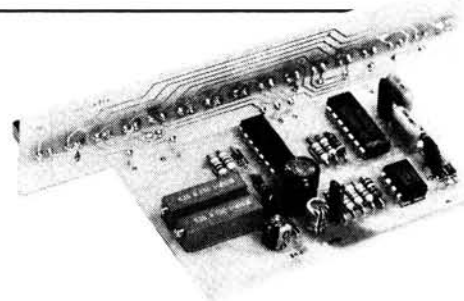
I have just received samples of the Alfac range of dry transfer symbols for the production of p.c.b. masters and etch-resist transfers for direct application onto copper-clad board for one-off p.c.b. production.

Packaged in a new style of blister pack the range is available, not only to professional users, but also to the amateur who wants to design and make his own prototype boards.

Also included in the range are precision black, flexible crepe paper tapes, pads, etc., for the production of p.c.b. photographic artwork.

Further details and catalogue are available from: ***Pelltech Ltd., FREEPOST, Witney, Oxon, OX8 6BR.***





RTTY Tuner Kit

Kimaski is a new name in the world of kits and their first offering is a simple tuning unit for RTTY buffs.

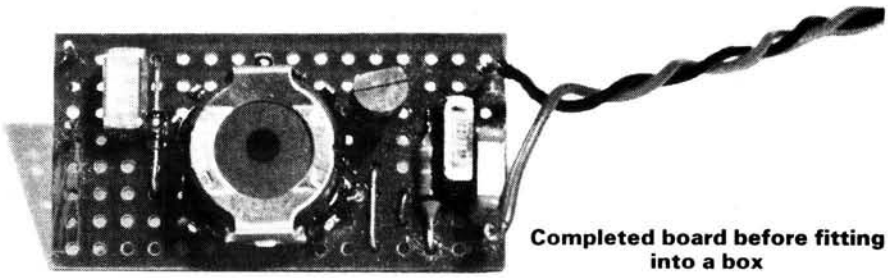
The Tunicator enables you to easily and quickly tune in to RTTY transmissions using a 16 l.e.d. bargraph display. It is adjustable to display most common forms of audio signals and adjustment for the base frequency as well as frequency span allows the Tunicator to operate on narrow (170Hz) as well as wide (850Hz) shifts. Audio signals are accepted straight into the unit and it can therefore be used with any existing RTTY system.

The Tunicator is available in kit form at a cost of £29.95 plus 50p postage from ***Kimaski Technology, 39 Stafford Street, Gillingham, Kent ME7 5EN. Tel: (0634) 570441.***

Small isolated P.S.U.

You may think that with the advent of miniature encapsulated d.c.-to-d.c. converters, the following article by R. K. Milden seems a little "old hat". Not so, read on and find out why.

The author was prompted to design this device after a young friend mentioned a need for a totally isolated supply, to run off an existing d.c. supply rail. Unfortunately very few commercially available converters actually boast full transformer isolation between input and output.



Completed board before fitting into a box

Circuit

The circuit is that of a simple Hartley type oscillator designed around a small ferrite transformer. The number of turns on the secondary will depend on the output voltage needed by the constructor, if a large number of turns are needed on the secondary the gauge of wire will need to be smaller. The prototype, with 30 turns, provided 15 volts at 1mA, this was with the oscillator running from a 12 volt supply rail.

The waveform is a well rounded squarewave on load and, while this is not conducive to maximum efficiency, it does at least help to alleviate some of the problems associated with squarewave oscillators, such as wide-band noise generation.

Construction

The whole device is built on Veroboard, the author's finished prototype measured 55 × 35 × 20 and therefore fits easily in to the space that would normally house a battery, or a miniature mains transformer with its associated components. The tracks on the Veroboard need only be cut where the input and output need to be isolated from each other. The windings of T1 are wound on a two-section bobbin using one section for the primary and the other for the secondary. Both are wound in 33 s.w.g. enamelled copper wire.

A tin-plate box was fabricated from a soup tin to house the project, this material being quite strong enough for this light job. All the connections in and out of the box can be conveniently made with solder-in, feed-through capacitors, which will further decouple the supply lines.

The finished device can be sprayed with cellulose paint giving it a very presentable finish.

Applications

Immediate applications that come to mind are those involving liquid crystal displays. The device could be used in any circuit requiring a low current bias supply. With the addition of another diode and capacitor it could provide a split supply rail for an operational amplifier.

Lastly, this versatile circuit with its truly isolated output and simple construction should find its way into every constructor's collection of useful circuits. ***PW***

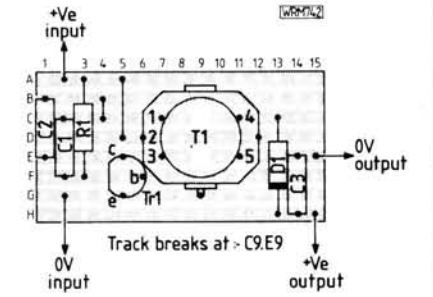


Fig. 1: Component layout on a small piece of Veroboard

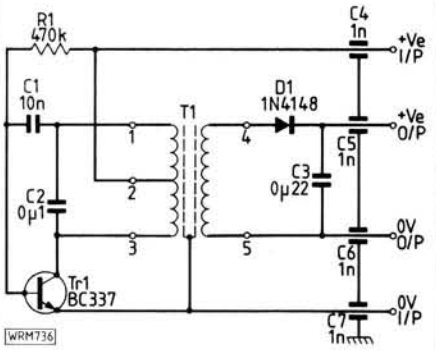


Fig. 2: Circuit diagram of P.S.U.

SHOPPING LIST

Resistors
0·3W 5% Carbon Film

470kΩ	1	R1

Capacitors
Polyester Layer 100V

10nF	1	C1
0·1µF	1	C2
0·22µF	1	C3
Ceramic feedthrough 1nF	1	C4–7

Semiconductors
Diodes

1N4148	1	D1

Transistors

BC337	1	Tr1

Miscellaneous
T1 Core Siemens* B65541 KR30(1); Bobbin B65542 BT2(1); Mount B65545 B10(1); 0·1in Veroboard (15 holes by 8 strips); 33 s.w.g. enamel wire; tin-plated steel.

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

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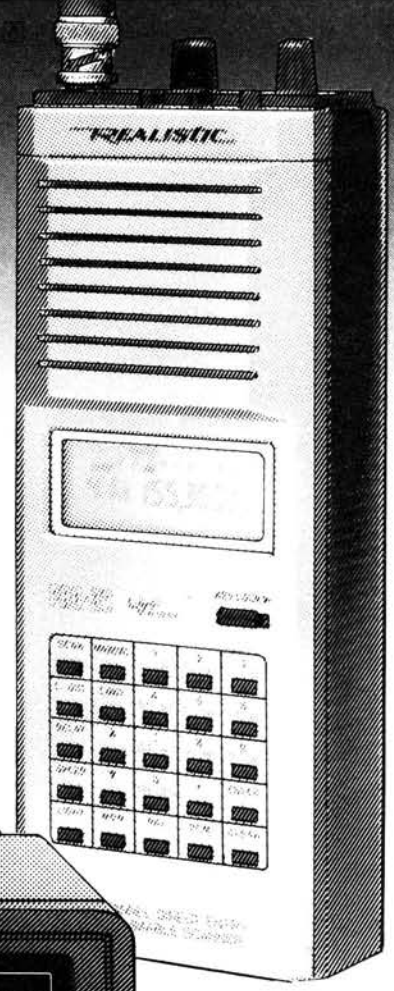
20-9133 ..... **£239.95**



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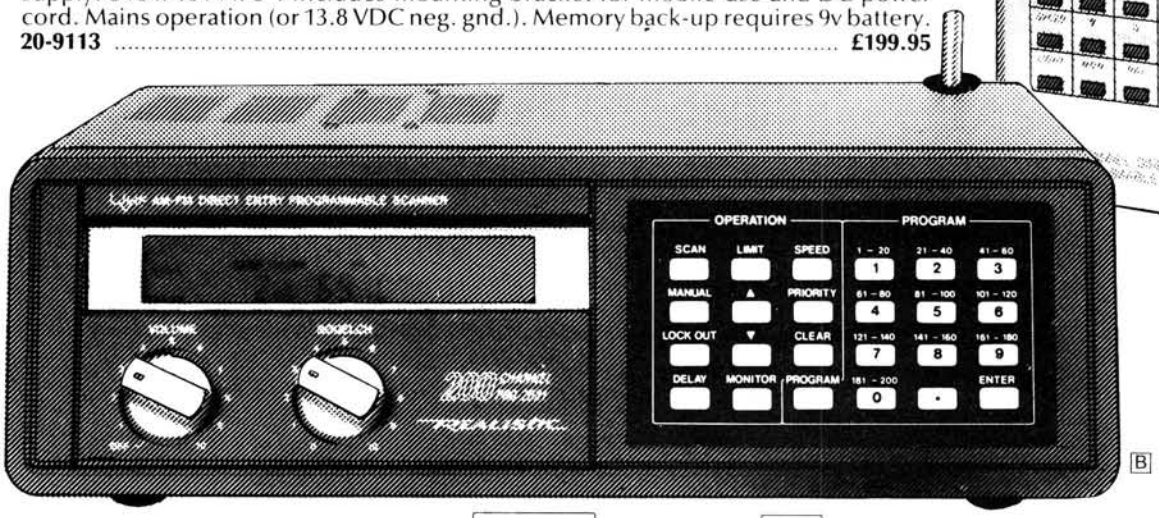
20-9113 ..... **£199.95**



[B]

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Valved Receivers —Further Thoughts

Following recent PW *articles by Chas. E. Miller and R. A. Wilson on restoring valved receivers, Robert B. Kerr GM4FDT offers a few tips from his wide experience of working on these mementoes of a bygone era.*

Power supply failures are a common problem in old valved equipment, often due to loss of emission in the rectifier valve. Exact replacements for the earlier types are naturally difficult to come by, and expensive if you do find them. The solution is either to substitute a more modern type or to replace the valve with a silicon diode or diodes. Both methods can bring you new troubles if certain precautions are not taken.

For example, the GZ34 full-wave rectifier with its 5V 1·9A heater will successfully replace such types as the 5Y3, 5Z4, 5U4 and other pin-compatibles. However, its more modern cathode coating is a much better emitter of electrons, and so the effective series impedance of the valve is lower. The result is that the h.t. voltage produced after substituting a GZ34 can be considerably higher, approaching the peak voltage value of mains transformer h.t. secondary winding. For a 250-0-250V r.m.s. winding, this would be 1·414 × 250 = 350V, or for a 350-0-350V winding some 495V. In either case, this could well exceed the safe working voltage of reservoir and smoothing capacitors, etc., and also cause excessive currents and overheating in valves and resistors.

The solution is to add series resistors in the rectifier circuit to restore its impedance to something like its original value. In a full-wave rectifier, either two resistors can be added (Fig. 1(a)), which has the advantage of balancing the diode currents, or a single resistor can be inserted at the output, as shown in Fig. 1(b). In each case, the values shown are a starting point, and may need to be adjusted on test. The wattage ratings should be on the generous side, as the current flow is of a pulsed nature, which produces a power dissipation far greater than a simple check with a d.c. ammeter would suggest. Wirewound ceramic body resistors of 4W or 11W rating, as widely used in TV receivers, should be adequate for most receivers.

Using silicon diodes to replace valve rectifiers is a favourite ploy, because it's normally a case of "fit and forget". The series impedance of a silicon diode is even lower than that of a GZ34, though, so once again the series resistors are a must. You can use the same values as shown in Fig. 1 as a starting point, and then select on test to achieve the same h.t. voltage as was specified by the set maker. The silicon diodes should have a reverse voltage rating (V_{RRM} or p.i.v.) of at least twice the peak value of the h.t. secondary winding—say three times its r.m.s. value, which is what will be marked on the transformer label. The BY127 (1250V_{RRM} 1·5A) is a well-tried workhorse for this application.

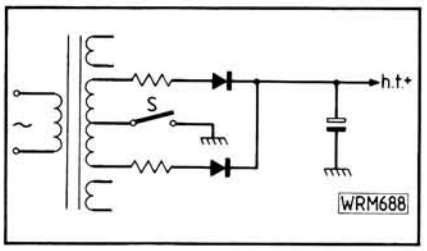

Fig. 2: HT delay switch

Fast Start

Silicon diodes bring one other potential problem in power supplies for valved equipment—they have no warm-up time! This means that at switch-on, the h.t. rail will run straight up to the peak value of the transformer secondary winding and stay there until the valve cathodes in the receiver warm up sufficiently for anode current to flow, so placing a load on the h.t. supply and pulling it down to its normal value. It is not unknown for a receiver with a 300-0-300V h.t. winding and a valve rectifier feeding into a 350V rating electrolytic reservoir capacitor to blow the end off the electrolytic at first switch-on after replacing the rectifier with silicon diodes. When you calculate that the voltage across that poor capacitor would then be 1·414 × 300 = 425V at switch-on, it is not surprising that it should expire. With the added series resistors and an adequate margin on the working voltage rating of the reservoir capacitor, you may get away with it, but the proper solution is an h.t. delay switch (Fig. 2),

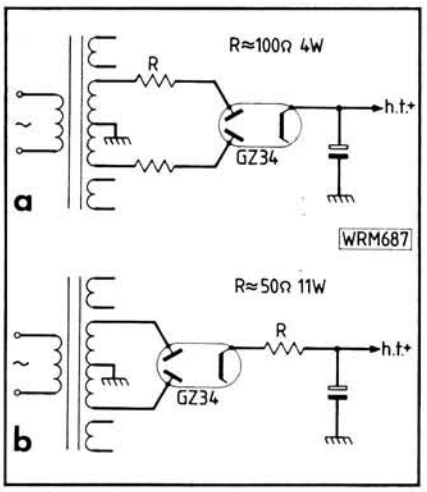

Fig. 1: Adding series resistors

which may be either manually operated about 30 seconds after putting the main switch on, or better still automatic, using some form of delay relay.

In a.c./d.c. radio receivers, or in TV sets (Fig. 3(a)), where all the valve heaters are strung across the mains in series with a wirewound resistor (R_S) to limit the current flow to the correct value, replacing a valve rectifier with a silicon diode leaves a gap in the heater chain. The circuit must be completed by putting in a resistor (R_X) to replace the missing heater. As an example replacing a UY85 which had a 38V 100mA heater, you would require a 38

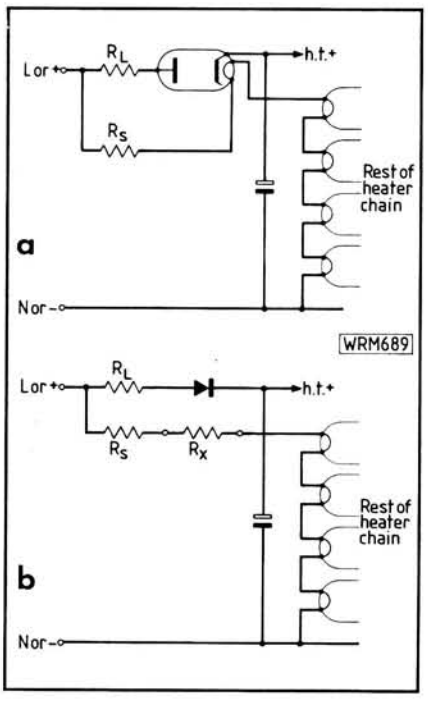

Fig. 3: Coping with a.c./d.c. sets

÷ 0·1 = 380Ω resistor, rated at more than 38 × 0·1 = 3·8W.

These a.c./d.c. receivers take their h.t. direct from the mains, using a half-wave rectifier circuit, with a low-value current limiting resistor (R_L—typically in the range 10–100Ω) in series with the anode. When replacing the valve rectifier with a silicon diode, a good starting point is to treble the value of this resistor. In TV sets, which draw a substantial h.t. current, a 17W wirewound ceramic-body resistor is a suitable choice.

Silicon diodes also make suitable replacements for old metal rectifiers, either of the copper-oxide or the selenium type, which are found in half-wave, full-wave and bridge formations. Once again, series resistors are essential with the silicon diodes, to compensate for their much lower impedance.

Hum-free

If the power supply reservoir capacitor (the one immediately after the rectifier) goes open circuit, the d.c. voltage on the h.t. line will drop to below the r.m.s. value of the h.t. secondary winding in a full-wave rectifier system, or less than half the r.m.s. value in a half-wave system. The set works, but performs poorly, and a typical 250V h.t. line will fall to perhaps 190V. Although you would normally expect the hum level on the audio output of the receiver to increase dramatically, this is not always so when smoothing chokes of large inductance are fitted. Sets using loudspeakers with high-inductance mains-energised fields can be similarly misleading.

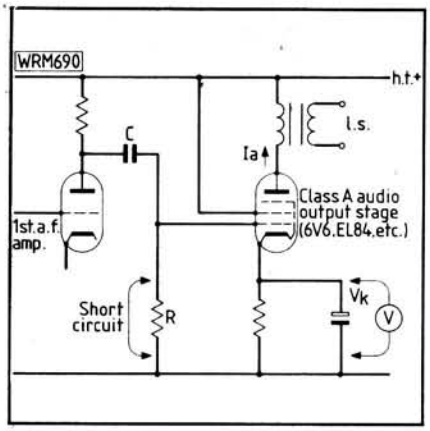

Fig. 4: Checking for a leaky coupling

Leaky Couplings

Finding leaky audio frequency coupling capacitors using a normal multimeter with a resistance scale test-voltage in the range 1·5 to 15V is not easy, as the leak may have quite a high resistance, sufficient to upset the operation of the following amplifier stage but not apparent on the meter. The following test procedure, in conjunction with Fig. 4, will quickly confirm whether it is the capacitor or some other component which is at fault.

1. Note the cathode voltage (V_k) or anode current (I_a), as convenient, of the affected stage, with the volume control at zero.
2. Short out the grid-leak resistor R. V_k or I_a should not change.
3. If they do, then either: the coupling capacitor C is leaky; the grid-leak is open-circuit; the valve is soft.
4. Repeat the test with one end of C disconnected. If the reading still changes, either the grid-leak or the valve is at fault.
5. Disconnect one end of the grid-leak and measure its value. If correct then the valve is soft.

A leakage resistance of 20MΩ or more in a coupling capacitor can be enough to upset the operation of an output valve. The type of capacitors enclosed in waxed paper tubes are always suspect, and should be replaced by modern polyester types rated around 400V working. This applies also in a.g.c. and other circuits using high-value resistors. The leaky ones removed may be quite acceptable as cathode decoupling capacitors, across resistors of 330Ω or so.

Small electrolytic capacitors used for cathode decoupling in audio amplifier stages usually dry out with age, resulting in a very "thin" audio output. A magical restoration of bass response can be achieved by replacing such small electrolytics throughout the audio section. **PW**

SWAP SPOT

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

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

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

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

Have Murphy B40 h.f. receiver, tunes 0·64MHz to 30·5MHz in fair working condition. Weight 100lbs. You collect. Would exchange for low power c.w. TX with key. Mr. Dainty, The Flat, 70 Forest Road, Upton, Torquay TQ1 4JS. *B780*

Have Yaesu FT-480 430MHz handheld with memories, scanning, etc., some extras and as new. Also have lots of options for FT-290R to exchange. Would exchange for IC45E. Can demo South East. Tel: 07914 2823. *B787*

Have 20m, three-section, tower. Would exchange for Trio R1000 RX or 144MHz handheld, w.h.y.? Ray. Tel: 0642 456801. *B795*

Have Sony ICF-2001 synthesised receiver, 150kHz–30MHz a.m./s.s.b., 76–108MHz f.m., with power supply, in as new condition. Would exchange for Icom IC2E in similar condition. T. W. Seddon G6TFC, 1 Armadale Road, Ladybridge, Bolton BL3 4QE. Tel: 0204 651183. *B798*

Have radio hobby magazines, 365 numbers in all. Would exchange for anything electronic. Ferreira, 13 Danehurst Street, London SW6 6SA. *B840*

Have Sprite Alpine 4-berth caravan, 'fridge, stereo, radio/cassette, gas bottle, value £400. Ideal contest shack. Would exchange for 430MHz rig, etc. G6DHY. Tel: Calne 812329. *B858*

Have JVC amplifier with combined graphic equaliser, 80W per channel, Pioneer turntable mc, Wharfdale Laser 90B speakers, speaker stands, Mission Isoplat. Would exchange for any h.f. receiver (modern). Tel: Norwich 745645. *B865*

Have Eddystone 830/9, 0·3–30MHz plus 8 crystals and synthesiser input plus r.i.t. Double superhet, ex-Gov. Establishment Services and full bench manual, worth £130. Also have 770R Mk 2 19–165MHz, 6-band, serviced and full bench manual, worth £110. Space needed, so must go. Would exchange for w.h.y.? Tel: 0706 218290 after 7pm. *B867*

Have Rayburn solid fuel room heater, glass front, v.g.c. Ideal shack heater. Would exchange for h.f. or v.h.f. gear, w.h.y.? Tel: 0202 880194 (Wimborne). *B872*

Have Yaesu FT-709R 430MHz handheld with FNB4 battery pack and charger, plus 2 × 5/8 collinear and Sandpiper 12-element Yagi. Would exchange for good midi hi-fi system or Sinclair computer package. Tel: 0656 61868 weekends only (South Wales). *B887*

Have 1930s speaker, 18in moving reed type, made in USA. Would exchange for signal generator. G4FFO. Tel: Cambridge 860150. *B895*

Have model steam traction engine, beautifully built, about 1in to 1ft, possibly Maxwell Hemmens origin. Value over £200, appreciating asset. Would exchange for best full cover communications receiver offered locally, such as FR-101 or similar, including 144MHz. Tel: Canterbury 458948. *B784*

Have 100 programs for ZX Spectrum. Would exchange for v.h.f. handy. Sumit Kalra, 20 Monteith Road, Egmore, Madras 600 088, India. *B789*

Have valves—QQV 06/40, 03/20, 03/10, 02/6. Electrolytics—65000/30V (2 off), 50000/25V, 30000/25V, 23000/15V, 7/720V, 3/720V all with mounting clips. 3 × 2N3055 on large finned heatsink with holes for 4 stud diodes (2 off). Solartron CD523-S-2 10MHz 'scope. Will split, buyer collects 'scope. Would exchange for a.t.u., rotator, scanner, handheld, w.h.y. v.h.f./u.h.f. Dave. Tel: 0323 644403. *B795*

Have Bresser 4in Catadioptic Newtonian reflector telescope with full equatorial mount, immaculate. Would exchange for 144MHz multimode covering 144–148MHz, except FT-290R. G6HHV. Tel: 051-327 5804. *B804*

Kit Construction—It's Easy

If you've wondered about venturing onto the 430MHz band, but decided the bank manager might not share your enthusiasm or whether there is enough activity in your area, then this kit could be the answer. It is a relatively inexpensive way of listening around the u.h.f. band using your v.h.f. rig.

This month Elaine Richards G4LFM looks at the Cirkit UHF–VHF Converter

The Kit

The kit arrived in good condition and was well packed in a neat cardboard box. The p.c.b. is very good quality glass fibre with silk screen printed component overlay including component outline and number. That made the board very quick and easy to put together.

All components were present and were of good quality, and easy to identify. The kit has been designed for simplicity of construction and alignment. A great help here is the prealigned 430MHz helical filter which reduces the variables somewhat. The notes supplied with the kit are very comprehensive and include more information than usually provided with kits. One point here worth mentioning; make a photocopy of the instructions so that you can look at both sides of the paper at once, you need to be able to see both the alignment instructions and component layout at the same time.

Circuit Description

The 430MHz antenna is capacitively coupled to a *pnp* low noise r.f. amplifier (BFT95). After amplification the 430MHz signal is applied to a prealigned helical filter which has 50Ω input and output impedance. The output of this filter is presented to the signal port of an SBL1 double-balanced Schottky diode mixer, which when mixed with the 288MHz local oscillator signal produces an output in the 144MHz band. The local oscillator chain comprises a 5th overtone crystal oscillator followed by a buffer and a power tripler using a ZTX3866 to provide a clean 288MHz output at +7dBm to drive the balanced mixer.

Construction

The instructions supplied were more than adequate for the enthusiast to complete the kit. Good diagrams were also in the instructions to indicate precisely how to connect components to the ground plane including warnings about lead lengths which are critical as the frequency gets higher. The mounting holes for the helical filter screening can and the trimmer capacitors were too small and needed to be enlarged slightly. This is best done using a very fine drill bit.

Only two coils had to be wound by the constructor and the wire was provided in the kit for this. The oscillator and buffer coils are Toko ready-wound, but the constructor is required to add a tap on the buffer coil. This takes a fair degree of soldering skill, a fine bit on the iron and a steady hand as the coil former is plastic! Other than that fiddley exercise no other particular problems were encountered during construction.

Alignment and Testing

This kit has been designed for alignment using the minimum of test equipment and to aid this, components were supplied in the kit to build an r.f. probe.

The first job is to get the oscillator running which is achieved by monitoring the supply current and adjusting the oscillator coil for maximum current. The next stage is to peak the buffer coil, the method suggested is to monitor the emitter voltage and adjust the coil for a peak. This proved to be difficult on the review kit as the peak was very small. Final adjustment was the tripler output filter, which is set up by monitoring the drive to the balanced mixer using the r.f. probe and adjusting the trimmers for maximum output. While the probe is connected the earlier adjustments can be peaked. The final current consumption with a 13·2V supply was 55mA. All these adjustments are made with the use of a multimeter, such as an Avo 8.

If a frequency counter is available, the oscillator frequency can be trimmed to precisely 288MHz.

On the Air

Well, in our area there aren't always a great number of people on 430MHz and even if there were, we may not hear them as we have a great h.f. site, but a dubious v.h.f. site. But we did manage to test the converter by using another 144MHz rig to provide a 3rd harmonic signal, and all worked very well. The results will no doubt improve even more when the kit is finally boxed.

Conclusion

Overall the kit seems very useful providing an economic way of monitoring activity on 430MHz. Now all we're waiting for is the next "lift" condition. One novel feature of the kit is due to the use of a wideband double balanced mixer which by taking the sum of the local oscillator and incoming signal gives an i.f. of 720–728MHz, i.e. around Ch. 52 on a u.h.f. television—ideal for monitoring amateur TV transmissions. When used for amateur TV, a pre-amplifier will almost certainly be required.

The UHF–VHF Converter costs £23.50 plus 70p P&P and a case for the kit costs £1.65, both available from **Cirkit, Park Lane, Broxbourne, Herts. Tel: 0992 444111** to whom we offer our thanks for the review kit.

Getting Started... The Practical Way

In the final part of this series Rob Mannion GM3XFD describes how to modify your gear to improve its performance and learn more about how it works in the process.

The next "By-word" in the "Getting Started" approach is modifications! Carrying out your own mods is another vital step in the learning process. Be warned however, before attempting to modify any radio receiver you should at least know how it works, by having —at the very least—a circuit diagram of the equipment. **Do not modify a.c./d.c. equipment—to be safe, it is advisable to totally avoid using such receivers.** The rather older receivers are the best to modify, which is, fortunately, very much to our advantage pricewise.

Your local reference library will almost certainly have copies of the relevant servicing manuals for older receivers in book form. If the library cannot help, try the various "Service Sheet" advertisements in the classified section of *PW*. Very rarely have they let me down in the past! Second-hand book shops are also an excellent source of the older complete "Service Manuals". Many of the receivers mentioned within these books will never come your way, but by reading the manuals you will learn which receivers to look out for.

Armed with your circuit diagram, you may now sensibly start working on the receiver. If you cannot obtain a working valved receiver, don't despair! Instead, you can start your experiments with a cheap "oriental" portable. Most enthusiasts collect many of these mass-produced portables in their "scrap" box. Kept mainly for spares, they can still teach us a great deal indeed! Despite the fact that they might have been made in Korea, Taiwan, Hong Kong, Singapore or the Philippines, they mostly utilise Japanese components. The circuits are very standard requiring only a little study. Almost invariably these cheap long and medium wave sets suffer from a variety of faults—even when they are working! You can experiment on a suitable "patient" and gain much valuable experience before starting on something more worthwhile. Using a plastic "knitting needle", suitably filed to a screwdriver point at one end, you can try adjusting the coloured cores on the intermediate frequency (i.f.) transformers.

Improvements

Almost certainly you will be able to improve the signal-to-noise ratio on such receivers, and reduce the annoying "hiss". The long wave performance is usually pretty poor, and by experimenting you will quickly learn how critical the necessary adjustments are. Try moving the antenna coils along the ferrite rod, and then slowly turn the red-cored oscillator transformer. You may be surprised at the results! Most of the receivers costing less than £8 or so, inherently suffer from i.f. instability. You can learn a great deal by trying to cure this problem.

Sometimes, the only way to cure the nuisance is to de-sensitise the receiver by "de-tuning" the i.f.s. Once you have had "hands on" experience, you will not forget very easily! You may even have noted short wave breakthrough from the reciever when you adjusted the oscillator transformer (usually the red-cored screened coil). This is mainly due to image response and can be a nuisance indeed when you are listening to Radio 2 or some other medium wave station.

Once you have finished with your experimenting, you can perhaps modify a more useful receiver. Do not discard the cheaper set, as it will form a very useful source of spares. Attending jumble sales might provide you with an older mains powered long, medium and short wave receiver. With an outdoor antenna about 6 or 7 metres long you can listen to the world. However, you will soon want to try to improve things. Armed with your circuit you will certainly achieve some improvement.

These older receivers were popular for many years, and no doubt your father and older friends will tell you of their happy hours spent listening to Radio Hilversum, Luxembourg, Switzerland, etc. Fortunately these English language services are still broadcast. Once you have filtered out the political propaganda stations, listening can be thoroughly enjoyable. Many countries can operate such services, and in return for a reception report you can often receive splendid booklets and photographs. You can even learn "Dutch-by-Radio" with a free language cassette from Radio Netherlands!

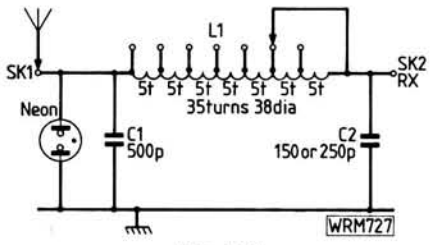

Fig. 5.1

The Woodpecker

The over-crowded nature of the short wave broadcasting allocations, plus the deliberate jamming stations can make reception difficult. However, it must be said that the design of some commercial receivers can make the problem seem worse than it is. Careful antenna choice, as previously mentioned, will greatly assist the receiver. The "trombone" antenna tuner will also help you to select the wanted station. With some problems however, any circuit techniques are hard pressed to minimise nuisance sources! The Russian long-distance over-the-horizon radar, producing the "Woodpecker" effect is but one example. The Woodpecker's ticking and tapping signals can even be heard over telephone circuits at times as its transmissions are so incredibly powerful!

Nuisances like the Woodpecker and over-crowded bands can be partly overcome by the antenna tuning unit shown in Fig. 5.1. The "Pi" circuit will improve the band-pass characteristics greatly, and can be built in conjunction with an amplifier, further improving the band-pass characteristics. Connection is a simple matter with an older valve set, as they rely entirely on an external antenna connection via a suitable socket. Ensure that the unit is connected properly to the receiver antenna and earth connection. **Warning! Avoid "a.c./d.c." receivers if you can, as they are not isolated from the mains.** Isolating transformers are available, but in most cases, these receivers, due

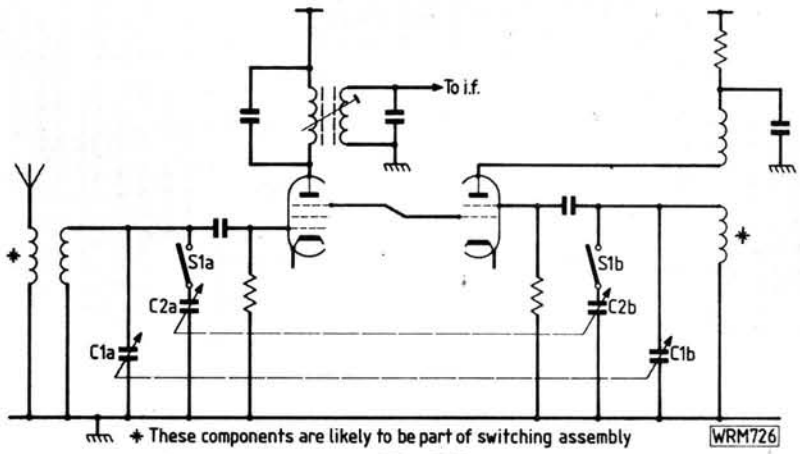

Fig. 5.2

to the very fact that they are economy models, often have a performance matching the economy of the design!

Your grid dipper will provide a suitable b.f.o., and with careful use amateur Morse and single sideband (s.s.b) signals will be resolved. Many of the older short wave sets cover the 7MHz band, and it can—despite overcrowding and illegal broadcast stations in amateur "territory"—provide very good reception from all over Europe and well beyond. The superior cross-modulation characteristics of valves can work to your advantage on this band! Cross-modulation is caused by the offending signal literally saturating the front end. You may be tuned to a frequency a good few megahertz away from the culprit, but it still arrives piggy-back on the wanted signal.

Bandspreading

Almost invariably, you will find the tuning on your old valved short wave receiver very sharp. Bandspread tuning, either mechanical or electrical, can be most helpful in this respect. Unless your receiver has a t.r.f. (tuned radio frequency) amplifier, all you will need is a two-gang variable capacitor of a low value. Such capacitors have two sets of vanes, one pair moving and the other pair fixed. Many of the *PW* advertisers offer them at bargain prices! A suitable unit should have a maximum capacity of somewhere between 30 and 50pF.

The diagram shows how simple it is to modify a valved receiver (Fig. 5.2). Mount the additional unit (C2) as close to the main tuning capacitor as possible. Almost certainly, the extra variable capacitor in circuit will affect the overall tuning and alignment of the receiver. This need not be a problem, because you can arrange switching, so the bandspread can be taken out of the circuit when not needed. The lower value variable capacitor tunes a far narrower range of frequencies over its 180 degree swing. This is equated with the effect of moving the main tuning capacitor very slowly. These are disadvantages to the system, but for the simple modification they are not that significant. One objection had already been mentioned, but this can be overcome by the use of your frequency marker. With the extra bandspread capacitor in circuit, vanes fully meshed, the frequency will be somewhat lower than that shown on the main receiver dial. The 1MHz marker, will soon identify, for example, the lower edge of the 7MHz band. There can be no doubt, once you construct and calibrate a separate bandspread dial that your estimated frequency will be far more precise than before! As for the "top end" of 7MHz, you can easily identify that as it is full of broadcasting stations!

Confidence

You may feel more confident to embark on an old favourite form of bandspreading by the use of gearing. Many of us have pieces of Meccano around the house, if not the gear kits can still be bought in hobby shops. By careful use of the chains and gear wheels, etc, you can construct an infinitely slow, slow-motion drive! If you intend listening over the whole tuning range of the receiver dial, you should incorporate some way of disabling the slow tuning. It can be frustrating having to turn a knob 300 times to listen to something far more interesting "up the band"!

Once you have gained some experience, modifying equipment to your own requirements will become second nature, but we all have to start off in a small way. The diagrams show (Figs. 5.3, 5.4) you how you can try another simple modification to an older receiver, and one which can have dramatic effects! Feedback is commonly used to improve quality and to increase effective gain in amplifier circuits. In this instance, carefully used and adjusted, feedback improves the gain in amplifier circuits, with extra benefits, too.

This modification is equally applicable to valved or transistorised equipment. However, as it seems more likely that an older set, costing less, and being more expandable, will be used, the valved method is illustrated first. The circuit shown in Fig. 5.3 shows a very typical i.f. amplifier stage. Most broadcast band receivers only have one stage of i.f. amplification, and with such an example, the effect can be very beneficial indeed. The incoming signal is fed to the control grid of the valve, and then, much increased in amplitude, appears at the anode. From there it is normally fed into the detector stage and onwards to the speaker. Remembering the "howlback" effect, encountered in public address systems, we know that if enough energy is redirected back to the source it will "chase its own tail". By utilising this effect to our advantage, far higher i.f. signal gain can be obtained from signal stage amplifiers.

Beneficial

To be truly beneficial, feedback has to be controllable. Most of the cheap "oriental" portables in your junk box will have uncontrolled feedback! In this case it's known as i.f. instability, and you can hear it all too plainly as whistling and squealing noise whilst tuning. Some of these faulty receivers develop so much gain whilst oscillating, that they receive short wave signals whilst tuned to medium wave stations!

Control of the feedback is essential for efficient operation, and some sort of adjustment is necessary. There are several methods available to the experimenter, but you are advised to use the variable capacitor method on your first attempt. The circuit shows a variable capacitor of a low value (maximum capacity around 50 picofarads)

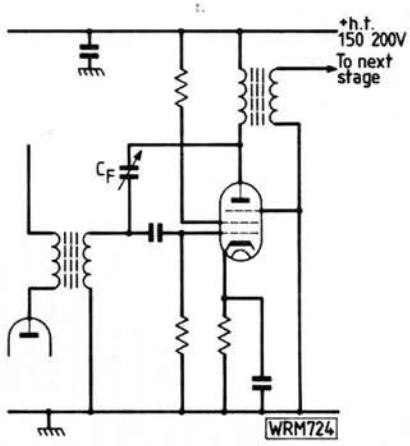

Fig. 5.3

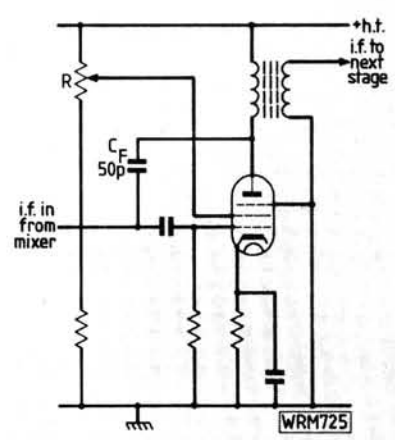

Fig. 5.4

in the anode circuit of the i.f. stage. Energy appearing here is fed back to the input grid. By carefully adjusting the amount of feedback, the increased signal levels can be very significant. You will soon become adept at the practice, and will learn how to "peak" the control for best results.

Q Factor

There are many benefits to such a mod, not the least being the very significant increase in circuit *Q*. This is a term you will come across very frequently, and you can conveniently regard it as referring to the "goodness" of the tuned circuit. The higher the *Q* factor, the better the circuit. You will find that once a certain point is passed, the circuit will oscillate. Morse signals can then be resolved, with the added advantage of the extra selectivity provided by the higher *Q* of the oscillating amplifier stage. It really is a worthwhile mod and can repay the time and effort spent on construction many times over.

Precautions

Please note that with a mains valved receiver you will have to take several precautions. One side of the variable capacitor will be "live" and the unit will have to be "floating" above the chassis. This is a simple operation, and is easily carried out by mounting the variable capacitor on a strip of varnished hardboard, thick plastics or a piece of Paxolin material. An old ballpoint pen case can provide a suitable operating shaft for controlling feedback.

This modification has been tried on the very popular and cheap Russian Vega transistorised receivers, and found to add useful gain and selectivity. However, nothing could stop Radio Moscow on 7·3MHz (41m) suffering from interference originating from the Russian Woodpecker transmissions!

The Vega receivers provide astoundingly good value for money and are available from many sources, including *PW* advertisers. They cover long, medium and all the main short wave broadcast bands. Bandspreading is accomplished by using sturdily built turret tuners. Look out for older Vega models at sales, as they can prove to be a very good buy indeed.

Other receivers can often be found, and one very popular UK made set is the Perdio "Town & Country". Popular in the early 1960s they are often seen in sales. Offering long and medium wavebands as well as the Marine Bands they can introduce you to 1·8MHz (Top Band) operation. Generally speaking, the older the equipment, the larger the cabinet! This is not a hard and fast rule, but it generally applies, and enables modifications to be incorporated far more easily to improve performance.

Eventually, after gaining experience, you may like to try modifying your car radio tuneable i.f. By studying the circuit of your particular receiver, a suitable method can be chosen. Almost certainly it will prove easier to install a potentiometer so that the gain of the appropriate i.f. stage can be controlled. With this method, the feedback capacitor is of a low, fixed value connected between the output and input of the stage and is controllable so that it can be brought to the threshold of oscillation. It can prove easier to operate than the first method, but you must be prepared to spend some time setting it up and finding the right values of feedback components and controls.

Endless Possibilities

The possibilities in our hobby are endless, and you can enjoyably learn a great deal. By referring to your library, circuits such as I have mentioned can always be found. You need never be stuck for a project! Soon, you will start using basic circuits as "building blocks" whilst incorporating them with ones borrowed from other designs. Do not be afraid of using valves, if they are to hand. An EF91 valve for example, can be used in so many configurations that they deserve their very own book!

Valves

An EF91 one-valve receiver can totally out-perform a one-transistor receiver, and can be built for less than £1 provided you already have one or two essential parts in your junk box. The ECL80 valve, often used in older TV sets, is another useful item. Being a double device (triode-pentode) it can efficiently perform as an audio amplifier or as a crystal oscillator and transmitter combination. I've used one on 7MHz, and have communicated with other amateurs as far away as Yugoslavia, using only a simple antenna and less than 4 watts d.c. input!

There will be nothing to stop you using transistors and valves together in later projects. It makes sense to use one of the very simple crystal filter units based on transistors, driving a valved linear amplifier. If you run into matching problems—and who doesn't—your valved p.a. will quite happily dissipate the extra reflected power quite happily. Most transistorised p.a.s would melt!

Bargains

It is also possible to pick up bargain illegal a.m./s.s.b. CB tranceivers fairly cheaply. There are many still to be found and, judging by the occasional Court Reports, still being used! Stripped down, these CB rigs can supply some really useful spares, and complete sub-units. It is possible to convert them to the amateur 28 to 29·7MHz band, but most enthusiasts split the units down for spares. The s.s.b. generator section can easily become the foundation of your own 1·8 to 29MHz s.s.b. transceiver. Whatever is on offer, the versatile enthusiast should be able to utilise such valuable spares to the full!

Mobile-on-a-shoe-string operation is also something to be encouraged. You can easily buy CB equipment, already modified or to modify yourself for local h.f. working. Mind you, it can be rather exciting to have someone joining in your local "ragchew" from South America or Canada! Such things happened to me during the 1960s sunspot activity period! An easily modified and cheap surplus Pye transceiver, bought for £5, provided me with some fascinating hours on 28MHz!

Practical Fun

The "Getting Started" approach has been practical from the start. It should also be practical at the finish! The best advice I can pass on to any prospective enthusiast is the old favourite quoted by many a tailor—"Cut the cloth to suit the pocket"! In other words, adapt your appraoch to what you can afford. Do buy a decent test-meter but don't buy an expensive new communications receiver—unless you can really afford it! If you do, you'll lose more money! You will also lose very valuable experience gained by building your own simple equipment. Do not be ashamed at simple techniques! Use the "breadboard" idea with drawing pins to start with if you have to. It will work! Use valves if you have them, or can get them cheaply. Be prepared to make yourself a little unpopular at home by collecting scrap radios for spares. At least you will eventually be able to repair the family radio! Finally, do have fun and enjoy yourself—getting started the practical way! ***PW***

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 information coming to Elaine Richards G4LFM.

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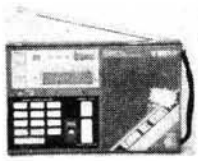

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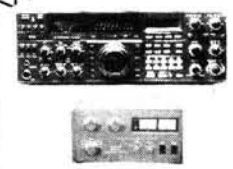

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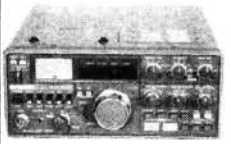

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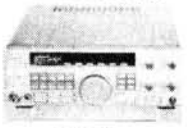

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Feature

It is Better to Give Than to Receive—or is it?

John F. Feeley G4MRB examines this well-known saying

Just before Christmas 85 years ago, Marconi sent the first radio transmission across the Atlantic—or so we are told. The true story is a little different and has a moral for today's radio amateur.

In late November 1901 Marconi, together with his assistants Kemp and Paget, sailed across the Atlantic in the ss *Sardinian*. They took with them two large balloons and six kites. When they arrived in Newfoundland they set-up camp at Signal Hill, St John's, the station being established in an old barrack building. A large pole was erected to carry the wire in from the kite or balloon and arrangements were made to anchor the kites.

After a successful test flight of a kite to six hundred feet, a cable was sent to England to request test transmissions to start at noon on December 12. On the 11th, the weather broke and winds lashed the little hut. Fighting the weather they inflated a 14 foot balloon with a thousand feet of hydrogen. When released, the balloon shot upwards and snapped the cable—never to be seen again. It was clear that kites would have to be used.

The twelfth dawned bleak, cold and stormy. On this early Field Day the wind grew in violence, and rain began to fall, driving across the site in stinging blasts. As noon approached, they flew a kite into the gales. It bucked and tugged, fighting the men as they fed it up into the dark sky. When it reached four hundred feet, Marconi signed over the wind that they should not risk any more height, and they ran for cover in the little tin shed. The rain and wind hammered the building as they enjoyed a cup of cocoa stiffened with a dash of Scotch whisky and awaited the start time.

At noon, Marconi switched on the receiver and held the earphone to his ear. Nothing was heard. Ten past twelve, a quarter past, twenty past —still nothing! Nobody spoke but all eyes were on the receiver. Everything seemed in order. Despite the clatter of the weather outside, the silence inside the room could be felt. And, then at half-past the hour the receiver sprang into life. "Click—click—click"!

Keeping his face straight, Marconi handed the earphone to his assistants and asked if they could hear anything. But there was no doubt the test letter "S" was loud and clear. They had spanned the Atlantic with radio.

So what? Why is it that popular myth has Marconi **sending** the first transmission across the Atlantic. What message has this for us 85 years later?

Marconi had identified the weak link in radio. Any fool can transmit—it takes skill to receive. The name of the engineer who tapped out the letter "S" on that day is lost in the mists of time, but as he had about seventeen horsepower (about 12kW) under his key, his transmission was without doubt strong. For the signal to be received would require good antennas and the best of receiving gear. For this reason, the leading men in radio research were forced to climb hills and fly kites in a gale so that the radio transmission could span the Atlantic. The radio wave was there—they merely had to receive it!

Not so long ago, I was asked for advice by a recently licensed amateur. He was failing to get contacts and having difficulty in resolving single sideband. The latter problem was one of practice and brought back many happy hours of tuning round the bands on an aged HRO (MX), pulled from under the tables at the White Rose Rally. With a b.f.o. and a marked drift it was an art resolving sideband, but that served me in good stead when I took the licence. The other problem was more difficult to tackle. The reason he was not getting contacts on f.m. was clear enough—but how do you tell somebody he's a wally? His operating style was clearly derived from CB, something not too bad in itself but he loved to transmit. He loved the sound of his own voice! Worse still, he tended to attack rigs, technical qualifications and other people. In the course of a QSO you could be sure he could find a way of upsetting his contacts.

My friend is a victim of the recent "buy a QSO" approach to amateur radio. Not for him the long apprenticeship of the s.w.l., the careful logging of DX stations, the thrill of a new prefix and the pleasure of a tidy log. I asked him who the best stations were in his area, which stations did he tail-end, did he have something to say to them? This threw him completely—he had no idea of the band or the people on it.

I remember well the day I passed the RAE. I went to Lowe's and in the shed in the backyard (yes, I can remember that far back!) selected my first piece of v.h.f. gear—a Trio 7200G and v.f.o. 30G. Then I took the microphone to lodge with G8TWT and settled back to learn my band in the long wait before the licence arrived. Using my s.w.l. self-training, I logged times, stations and frequencies. I made notes of the stations I found most interesting and made notes of questions I should have liked to ask them—against the day the licence came.

When that day came, I was ready. I copied the operating procedure from the handbook onto a crib sheet and from the first QSO kept notes on the content of the contact. If I heard a callsign that had been involved in an interesting QSO in my s.w.l. phase, I tail-ended and made comment on the QSO—be it about gardening or electronics. This worked a treat and I was never short of contacts.

Both the DX chasers and the QRP Club members will say much the same. The "licensed listener" fishes the bands. He notes the changes in propagation, the times when his prey operates, the style of his operation. The thrill of "hooking" the DX by being on the band and his frequency as he makes his first call of the day is just incredible. A thrill that spans 85 years to Marconi, Kemp and Paget and a little tin hut on a cold windswept hill.

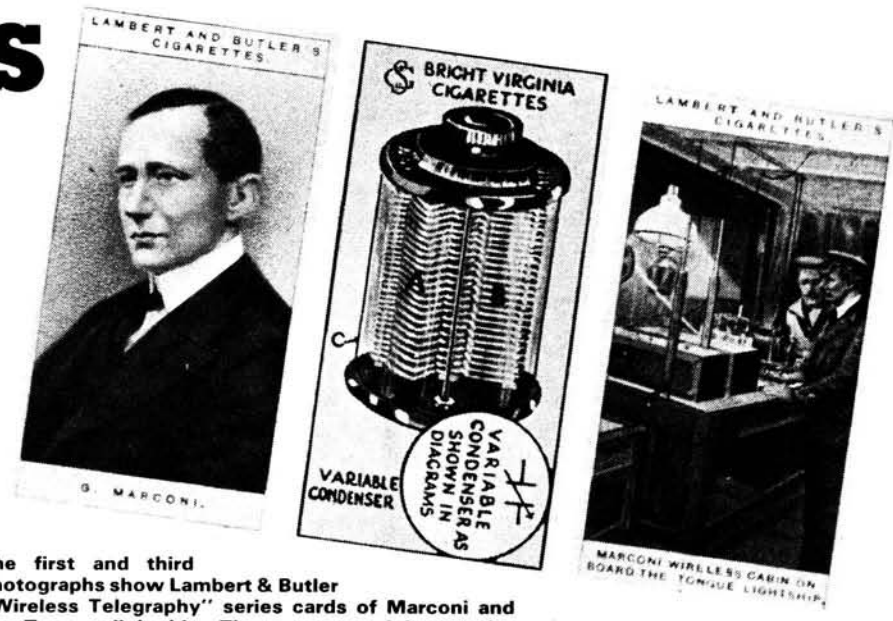
Last year, I was operating in VHF NFD on the 430MHz band. A nearby station was flattening the band for stations all around him by overdriving his linear amplifier. I knew my gear was clean because I was monitoring it. Looking at the monitor receiver I hit on the answer. Moving my frequency clear of him, I called when he called —monitoring his frequency. When he listened, I stopped calling and listened too. In this way we were able to share nearby hills and using an extra receiver added a useful 430MHz score to the Club overall total with only a modest transmit section.

At this time of year we say "It is better to give, than to receive." But is it better to transmit than to receive? If we have nothing of worth to say, or if we are going to splatter the band with power, the exercise is futile. Perhaps for the sake of the hobby, the motto in our cracker this year should read, "It is better to receive than give offence!" or, "It is more skillful to receive than to transmit."

Happy Christmas—and good listening! ***FROM ALL AT PW***

Cigarette Cards and Wireless

John Walton looks back at an interesting story.



The first and third photographs show Lambert & Butler "Wireless Telegraphy" series cards of Marconi and the Tongue lightship. The centre card is one from Salmon & Glucksteins "Wireless Explained"

Just over sixty years ago rival tobacco manufacturers were falling over themselves to impart knowledge on wireless. For the first time, wireless was coming within reach of the working man's pocket. The medium for their information was the cigarette card—in those days to be found in most homes in the land.

Cigarette cards had appeared in Britain some 40 years earlier—the idea having come from the United States. From their early beginnings of advertisements for tobacco products they had graduated through pictures of soldiers and music hall stars to cover practically every subject under the sun, and wireless was to be no exception.

The very first set on the subject had appeared back in 1909 from Lambert & Butler, a member of the mighty Imperial Tobacco combine. Consisting of 25 cards they lauded Marconi's achievements under the title *Wireless Telegraphy*. The nicely coloured little set is still fairly easy to find today, although you might have to pay as much as £50 for one in really good condition. The cards depicted such things as the Marconi Wireless cabin on board the Tongue lightship, the schooner *Volunteer*, chartered by the Newfoundland Government to erect Marconi stations along the coast of Labrador in Arctic weather conditions and Marconi and five assistants outside the freezing High Power Wireless Telegraph Station at Cape Breton, Nova Scotia.

The tropics were also included with a shot of the station at Banana in the Congo Free State. The card loftily observed, "The station was operated by natives—illustrative of the ease with which the Marconi apparatus can be mastered and worked."

Other stations depicted were at Niton, Isle of Wight; Messina, Cape Cod and at Bari in Italy; while the South Goodwin lightship was shown with its antenna.

The first application of the Marconi system to moving stations was illustrated—a steam motor car with a light zinc cylinder serving as an antenna which in 1900 had been able to communicate more than 30km. The card noted, "Moving stations carried by mules or light field carts now provide instant means of communication up to more than 100 miles."

The first wireless hero, John R. Binns, got a card to himself with another showing his cabin equipped with transmitter. Binns was the ship telegraphist on the ss *Republic* and saved 2000 lives by remaining at his post for 50 hours after the ship had been in an Atlantic collision.

More wireless cabins, a receiver, transmitter, magnetic detector and a portable wavemeter were all illustrated—the latter having only been invented the year before. Also shown was the receiving room at the high power station at Clifden in Ireland where an operator was taking a message at 30 w.p.m. from Nova Scotia.

War came and with it resultant leaps in technology. So, when cigarette cards finally re-appeared in 1922 after a five year absence, wireless was rapidly catching the imagination of the public.

Godfrey Phillips Ltd, a large independent tobacco manufacturer, was one of the first to realise this. They brought out a set of cigarette cards which would not only sell cigarettes but educate the man in the street about the new communications sytem. *How to Make Your Own Wireless Set* appeared in 1923 and was a big success. It took the reader through 25 instructions which enabled him to construct his own set. He would begin with the inductance—using a cardboard cylinder and half a pound of 26 s.w.g. copper wire either enamelled or single silk covered—then construct the baseboard and side supports and finally mount the inductance slider and bars.

Next step was to select the crystal detector and the cards warned that good crystal specimens were essential and great care in adjustment, both as regards pressure and actual point of contact, was necessary. There were full instructions on mounting crystals and assembling the detector.

A carborundum detector and a potentiometer were next to be assembled—followed by the telephone condenser using 11 pieces of paraffin waxed paper, ten pieces of tinfoil and two pieces of Ebonite. Making and connecting a variable condenser was followed by circuit diagrams showing how the whole thing was connected up. Headphones were to be wound to not less than 4000Ω and any reputable

These cards are from the Scottish CWS series of "Wireless" and the Godfrey Phillips "How to Make Your Own Wireless Set"

make was recommended. But after all the do-it-yourself assembly work card No. 16 warned: "Don't look inside to see how they work; they have been accurately adjusted by the makers!"

After showing a picture of the completed set the series moved onto the antenna and earth. The antenna was reckoned to be a most efficient lightning conductor so a lightning switch was suggested to stop the set being damaged. All was now ready for reception and the set was said to be able to pick up local broadcasting stations if situated within 40km and providing an outdoor antenna was used!

This series proved immensely popular and the following year Phillips were back with a follow-up series of 25 cards *How to Make a Valve Amplifier for the BDV Crystal Set* (BDV being Phillip's top selling cigarette brand of the time). This followed a similar pattern of simple instructions and readily available parts to construct something which gave much better reception.

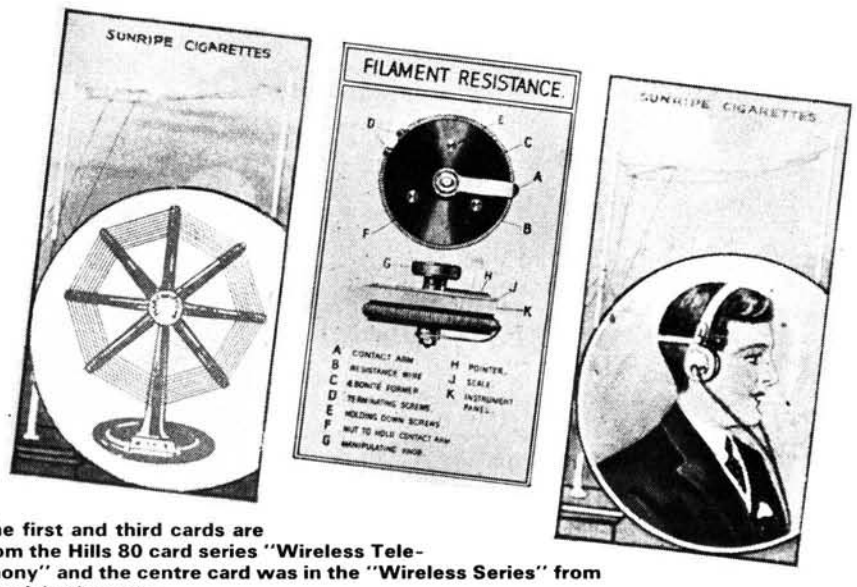
Meanwhile, other makers were rushing to bring out their own sets of cards on the new craze. R & J Hill, another London independent, brought out the largest set ever issued on the subject, no less than 84 cards on *Wireless Telephony*. Individual cards of this series are easy to find but not too many collectors may have gathered a set in the five months of 1923 during which it appeared in the packets.

Issued with "Sunripe" cigarettes the cards went into fine detail describing all the elements that went into radio transmission. Prices are interesting —for instance a 100-foot length of Marconi Scientific antenna wire cost 4/6 (22½p), two antenna insulators 3/- (15p), a leading-in tube 5/- (25p) and an inductance coil 15/- (75p).

The thermionic valve, described on the card as "The Aladdin's Lamp of Wireless" was said to have revolutionised the science of radio communication. It cost just 7/6 (37½p). Accumulator batteries cost £1.15 in those days and it cost a shilling (5p) to get them recharged at an electrical store or garage. Back in the 1940s and 1950s, I well remember my grandfather offering a similar service for his fellow Oxfordshire villagers—and charging one old penny!

The first 24 cards in the series provided full information on how to assemble a special wireless receiver especially designed for R & J Hill by Marconi. The firm obviously wanted to be one up on Phillips—their model was said to pick up local broadcasting stations from 65km away! The next 12 cards covered a crystal receiver which cost £3 6s (£3.30) in all and was capable of receiving station signals over 30km. The series then moved on to the Marconiphone voice amplifier, also shown were a few of the early broadcasting stars including three of the uncles at the London Broadcasting Station—Uncle Caractacus, Uncle Arthur and Uncle Jeff!

The series tailed off with assorted



The first and third cards are from the Hills 80 card series "Wireless Telephony" and the centre card was in the "Wireless Series" from Morris's cigarettes

pictures of transmitters, land stations, BBC and Marconi symbols, Marconi House and various other pieces of equipment. Easily the most comprehensive set on the subject and it can be bought from a London dealer today for about £40.

Hills also issued a series of 20 large cards with the same title but these consisted of more pictures of people like Uncle Jeff and directors of the various regional stations.

London tobacconists, Salmon and Gluckstein, who had been putting out cigarette cards from the early days, issued what was to be their last ever set in *Wireless Explained*. This attempted to describe to the layman just how the new craze worked in 25 cards.

A similar approach was made by another London firm, B Morris & Sons—but their illustrations on a green background were much more clearly defined than those of Salmon and Gluckstein.

Meanwhile in Scotland, the Scottish Co-operative Society put out a set of 50 cards with the title *Wireless*. They made no attempt to get the collector to construct his own set and in fact advised: "For the uninitiated the speediest way of tasting the delights of wireless is to purchase a good, complete set, quite a number of which are on the market. In these the various components are arranged behind a panel, where various indicators and controls are placed, and it becomes merely a matter of revolving handles till one gets clear speech."

Of course, many of the cards depicted the various pieces of equipment but the whole emphasis of the set is to explain all about wireless to the complete layman. Somewhat grandiloquently they said, "Men and women, boys and girls, can now, in their own homes, hear songs sung hundreds of miles away, can pick up, at will, grand harmonies that have been entrusted to the ether by unseen musicians in far-off cities!"

Broadcasting from and to ships and aircraft, radiophones for performers in large halls and "monster antennas" —of which 72 were being erected at Rocky Point near New York—were also included on cigarette cards.

A radio barrel organ was said to have great possibilities for advertising—the one illustrated had been made by Burndept—manufacturers of wireless goods. The final card in the series *Saved* shows sailors in a lifeboat waiting to be picked up and contrasts the lingering death which often awaited them before wireless with their good chance of survival after sending a "Mayday" message.

Almost as suddenly as it began the spate of wireless cigarette cards ended. All of the series I have mentioned appeared over an 18 month period—it was to be five years before Godfrey Phillips returned to the subject with *How to Build a Two Valve Set*.

For this series of 25 cards the firm used a smaller, stiffer card then hitherto and they are easily found in perfect condition (London dealers, price £10 a set). The circuit chosen for the set incorporated the Hartley method of applying reaction which was controlled by a small variable condenser. The cost of the materials used was under £3 not including headphones, valves and batteries. Phillips said that substituting cheaper components the price could be reduced to £2 without seriously reducing efficiency.

This was to the be the last such series. Wireless was moving out of its infancy and by the time the Liverpool firms of Ogden and Hignett issued *Broadcasting* in 1935, the set was devoted almost entirely to pictures of studios, control rooms, outside broadcast huts and the like. Meanwhile, other firms were issuing pictures of "Radio Stars".

Almost immediately after the outbreak of war in the autumn of 1939 cigarette cards disappeared to conserve paper stocks. After the war collectors waited for them to reappear—but apart from a few isolated attempts they never did. Now a new wave of collectors treasure little pieces of pasteboard for their nostalgia value—and among the favourites are those 60-year-old sets which record the early days of wireless. **PW**

PW "Westbury" Basic Wobbulator

Build this Basic Wobbulator, designed by R. A. Penfold for the 450–470kHz range, and add to the ever increasing range of impressive PW test equipment.

While never ranking amongst the most common of test instruments, wobbulators now seem to be almost extinct and are probably unfamiliar to many readers. This is perhaps a little surprising as a simple wobbulator can be a very useful piece of equipment when servicing and designing radio receivers.

The purpose of these units is to draw out the frequency response of a receiver's intermediate frequency passband on the screen of an oscilloscope. Originally they were intended for use when aligning the 10·7MHz i.f. transformers and detectors of broadcast band f.m. receivers, but the almost universal change to ceramic filters and quadrature detectors has resulted in wobbulators of this type being largely unnecessary. Wobbulators working at intermediate frequencies of around 455 to 470kHz are perhaps more useful these days. They can be used for something mundane such as re-aligning the i.f. stages of an old transistor radio (with the i.f. transformers being stagger-tuned to broaden out the passband slightly). There are some more exotic applications such as checking that crystal or ceramic filters have suitable source and termination impedances, with no gross irregularities in their response. A wobbulator can also be used as a straightforward i.f. alignment oscillator.

Wobbulator Operation

A wobbulator is really just a form of sweep generator. The exact way in which it is set up and used depends on the precise nature of the equipment being tested, but a typical arrangement would be as shown in Fig. 1. The output from the unit is coupled to the input of an i.f. amplifier, and the output from an a.m. detector is coupled to the Y input of the oscilloscope. The wobbulator has a trigger output, and this is coupled to the trigger input of the oscilloscope. This output is provided by a built-in saw-tooth generator which repeatedly sweeps the output frequency upwards over the range that is of interest. The trigger output is needed to allow the sweep generator to be syncronised with the oscilloscope's timebase generator. The sweep speed control of the oscilloscope is adjusted so that it matches the time taken by the wobbulator to complete each sweep. This gives the desired result, with the spot being moved across the screen as the output of the wobbulator is swept upwards in frequency. The vertical deflection of the spot depends on the relative gain of the i.f. amplifier, and the frequency response of the i.f. amplifier is drawn out on the screen as a single line, with peak deflection corresponding to maximum gain. If no a.m. detector output is available from the circuit being tested, then the same result can be obtained using the i.f. output signal plus an r.f. probe. Another alternative is to couple the i.f. signal straight into the Y input of the oscilloscope. The trace then takes the form of a bar across the middle of the screen, with the height of the bar being proportional to the gain of the amplifier.

A simple wobbulator has its limitations. Ideally it would be possible to accurately relate the horizontal scale to frequency. Also, a logarithmic amplifier would be included to give logarithmic scaling on the vertical axis, so as to enable a wider dynamic range to be accommodated. However, a unit which provided these features would be quite complex and expensive, as well as being difficult to set up. A basic wobbulator is adequate for most purposes, where it is the overall shape of the response rather than precise measurements that are needed. A dynamic range of around 40dB can be accommodated, and by over-driving the oscilloscope it is possible to examine the skirts of the response well below the –40dB level.

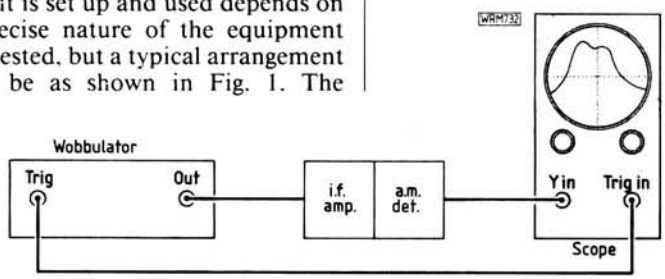


Fig. 1

Linearity

One important aspect of performance is the linearity of the sweep. Although many types of sweep generator use a logarithmic sweep characteristic, in an application such as this where only a very limited frequency range is involved it is much better to have a linear sweep. Generating a saw-tooth waveform having good linearity is very easy, but producing a voltage controlled oscillator having a linear control characteristic is a little more difficult. The obvious starting point is an *LC* oscillator with the control voltage applied to a Varicap tuning diode. Practical tests indicated that most designs of this type gave very poor linearity, and the graph in Fig. 2 shows the control voltage *versus* output frequency characteristic of a typical design based on a BB212 Varicap diode. Although better than some designs that were tried, the linearity is bad enough to give misleading results.

In fact the results would probably be quite usable since allowance could be made for the non-linearity when assessing results, but things are very much easier if good linearity can be obtained. Linear *CR* voltage controlled oscillators (v.c.o.) are easy to design, but they have the disadvantage of sweeping from zero to whatever maximum frequency is required. This is inconvenient in the current application where only a limited sweep range at a fairly high frequency is required. The control voltage would need to cover a very limited voltage range, making the circuit difficult to adjust and prone to severe drifting.

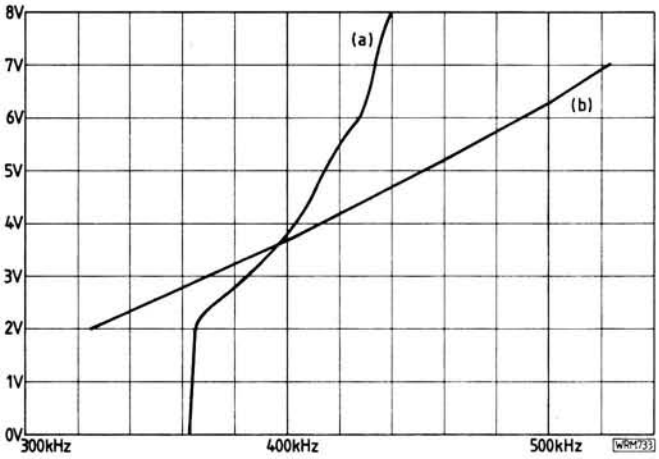
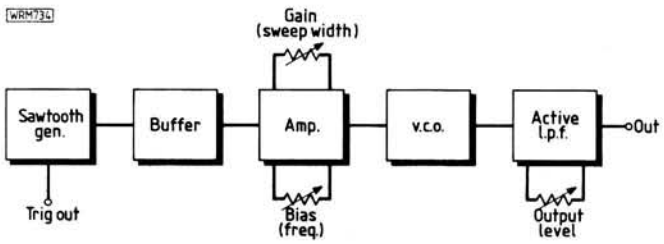


Fig. 2: Trace (a), control characteristic of an *LC* v.c.o. using a BB212 Varicap as the control device. Trace (b), control characteristic of 4046 v.c.o.

Fig. 3: Block diagram for the wobbulator



In the circuit finally adopted the *CR* v.c.o. is built around a c.m.o.s. device, type 4046. This gives good linearity (see Fig. 2) and has the unusual feature of an offset input. This enables the starting frequency to be raised to practically any desired figure within the operating range of the circuit, making it very easy to obtain operation over restricted frequency range with a relatively large sweep voltage. The linearity is less than perfect, but is adequate for excellent results in the current application.

A block diagram of the wobbulator is shown in Fig. 3. The saw-tooth generator produces a rectangular waveform as a by-product, and this acts as a trigger output signal. The saw-tooth signal cannot be coupled direct to the control input of the v.c.o. as this would not permit any control over the sweep width and centre frequency. The high impedance output signal is first coupled to a buffer stage, and then to a variable gain amplifier. The gain control acts as the sweep width control, and there is a bias control which can be used to set the required centre frequency. The output from the v.c.o. is a square-wave signal, and as such it contains strong harmonics over a wide spectrum. The harmonics will often be of no consequence, but under certain circumstances they could result in ambiguous results. An active lowpass filter at the output attenuates the harmonics and gives a reasonable sinewave output. This stage also provides a fairly low output inpedance. A simple volume control-style variable attenuator enables the output level to be varied from zero to about 7 volts peak-to-peak.

Circuit Operation

The full circuit diagram of the wobbulator appears in Fig. 4. The saw-tooth waveform is generated by a 555 timer i.c. configured for astable operation. This circuit is not quite the standard type, the timing resistor that would normally connect between pin 7 and the positive supply rail has been replaced by a constant current generator Tr1. This gives a voltage across timing capacitor C2 which rises at a constant rate. The low value of R3 provides a very rapid discharge of C2 when the appropriate threshold voltage is reached, and the required linear saw-tooth is generated. The normal rectangular output waveform is available at pin 3 of IC1, and goes through a low-to-high transition at the beginning of each saw-tooth cycle. The integrated circuit used for IC1 is a c.m.o.s. version of the 555 known as the ICM7555 or the L7555. The only reason for using this type rather than the standard one is to keep the battery drain down to a reasonable level.

A buffer amplifier is formed by IC2a, while IC2b is used as a variable gain amplifier. In fact IC2b always provides attenuation as potentiometer R8 enables the voltage to be varied from zero to a maximum of –6dB at full value. This gives a maximum output voltage swing of just under 2 volts, which corresponds to a sweep range of about 70kHz. Potentiometer R6 is the frequency control, and it provides a tuning range of very approximately 350 to 550kHz. The signal from IC1 is inverted by IC2a and then passed through variable attenuator IC2b then reinverted by IC3 to the required positive-going saw-tooth waveform.

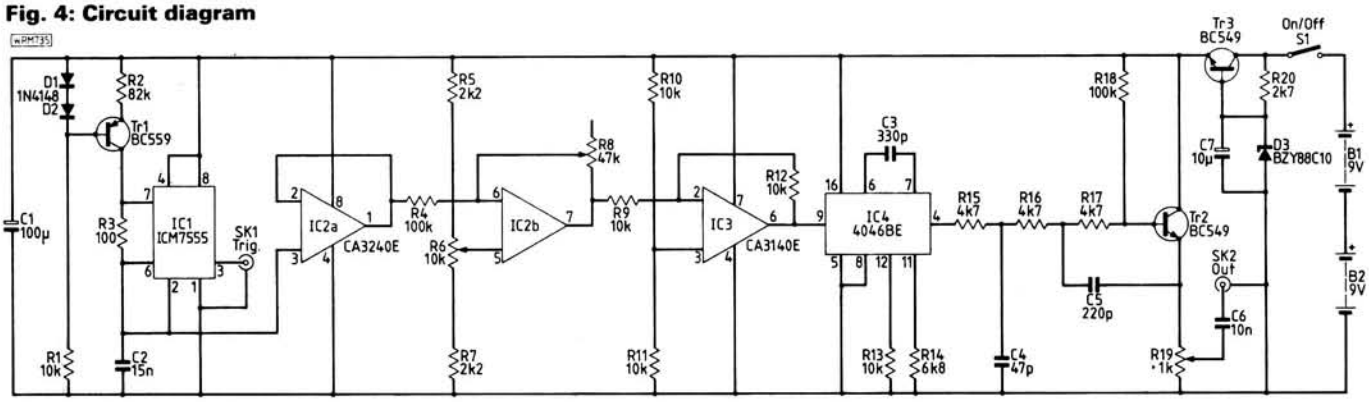
The 4046BE (IC4) is actually a phase locked loop, but only the v.c.o. is required in this circuit and the other stages are just ignored. Capacitor C3 and resistor R14 are the timing components, and R13 is the offset resistor. Transistor Tr2 is a buffer stage in the active low-pass filter which is basically a conventional third-order type. Although one filter capacitor may appear to be absent, it is present in the form of the input capacitance of Tr2. Resistor R18 provides a small positive bias to Tr2 which helps to give a better output waveform. Potentiometer R19 is the output level control.

A supply voltage of about 9 to 10 volts is required, and ideally it should be stabilised as variations would affect the sweep range. Two 9 volt batteries connected in series act as the power source, with Tr3 and its associated components giving a stabilised output of just over 9 volts to the main circuit. The current consumption is about 20 milliamps. Unless the unit is likely to receive a great deal of use a couple of 6-F22 (PP3) size batteries are suitable.

Construction

A metal instrument case having approximate outside dimensions of 205 x 134 x 51mm will take all the components comfortably, and there should be no problem in using a somewhat smaller type if desired. The wiring-up will be easier and less liable to errors if the controls and sockets are arranged on the front panel to broadly match the take-off points from the p.c.b. The layout is not critical and any sensible arrangement can be utilised.

Fig. 4: Circuit diagram



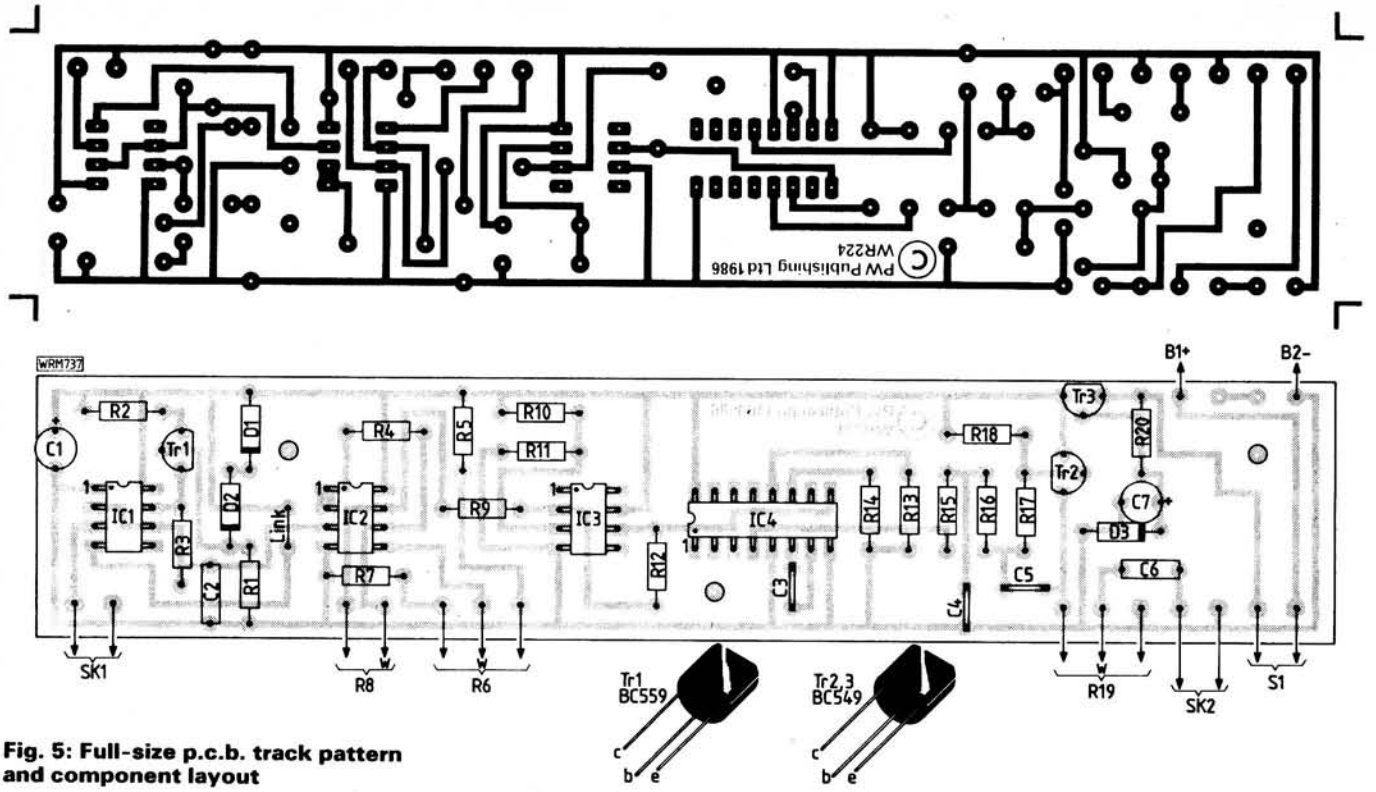
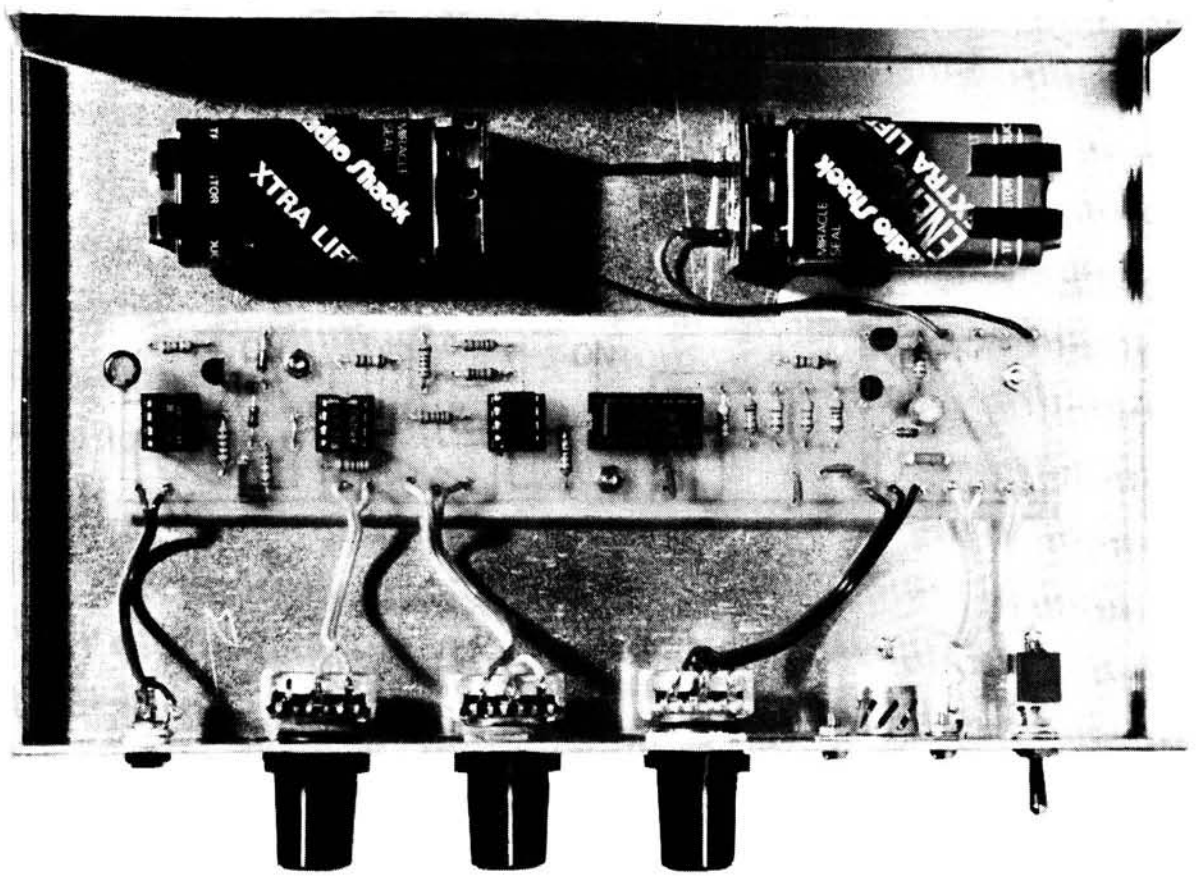


Fig. 5: Full-size p.c.b. track pattern and component layout



In Use

The wobbulator's trigger output is coupled to the oscilloscope's trigger input using screened cable fitted with the appropriate plugs (a 3·5mm jack plug and one to match the trigger input on the oscilloscope). If the oscilloscope has switchable "pos/neg" external triggering then the "pos" setting should be used. However, the flyback time of the wobbulator's saw-tooth generator is very short and if negative trigger has to be used good results should still be obtained. Of course, the external triggering mode must be selected. A sweep rate of around 0·5ms per division will be required, but the sweep speed must be trimmed to precisely match that of the wobbulator's sweep generator. There should be a slight glitch on the trace at the point where the wobbulator's flyback period occurs. It is just a matter of trimming the sweep speed to take this over to the extreme right hand side of the screen.

A set of test leads are needed to carry the sweep output to the equipment under test. Obviously the method of coupling the output of the wobbulator to the test circuit, and the take-off point for the signal to the oscilloscope must be tailored to suit the particular item of equipment concerned. It is not always necessary to couple the output of the unit directly into the i.f. stages of a receiver, and many sets cover frequencies within the output range of the unit. Alternatively, harmonics from

the wobbulator at frequencies of around 1 to 2·5MHz can be used, but if you intend to adopt this method it would be better to take the output signal direct from pin 4 of IC4.

Be careful to avoid overloading the test circuit as this would tend to flatten the in-band section of the display, possibly covering up any irregularities in the response. Automatic gain control (a.g.c.) circuits can have a similar effect, and where possible they should be switched out, disabled, or set to a long time constant. Where none of these options is possible R19 should be backed-off sufficiently to prevent the (a.g.c.) circuit from having any significant effect.

Initially set the sweep width at maximum, and then use the tuning control to centre the part of the trace which shows the passband. The sweep width can then be decreased to spread the passband across the screen. By adjusting the width and frequency controls it is possible to closely examine any desired section of the response with a sweep width of just a few hundred hertz if desired. Setting the sensitivity of the oscilloscope too high will move the peak of the response off the screen, but it will permit a more detailed examination of the skirts to be made. It is important that the circuit being tested should not receive any other signals at a significant strength apart from those generated by the wobbulator as this will produce a "beat" pattern on the trace. ***PW***

SHOPPING LIST

Resistors

0·25W 5% Carbon film

100Ω	1	R3
2·2kΩ	2	R5, 7
2·7kΩ	1	R20
4·7kΩ	3	R15–17
6·8kΩ	1	R14
10kΩ	6	R1, 9–13
82kΩ	1	R2
100kΩ	2	R4, 18

Potentiometers
Linear Carbon

1kΩ	1	R19
10kΩ	1	R6
47kΩ	1	R8

Capacitors

Ceramic Plate

47pF	1	C4
220pF	1	C5
330pF	1	C3

Polyester Layer

10nF	1	C6
15nF	1	C2

Radial Electrolytics 25V

10µF	1	C7
100µF	1	C1

Semiconductors

Diodes

BZY88C10	1	D3
1N4148	2	D1, 2

Transistors

BC549	2	Tr2, 3
BC559	1	Tr1

Integrated Circuits

CA3140E	1	IC3
CA3240E	1	IC2
ICM7555	1	IC1
4046BE	1	IC4

Miscellaneous

Instrument case approx 205 x 134 x 51mm; s.p.s.t. sub-min toggle switch (1); 3·5mm jack socket (1); flush coaxial socket (1); battery connectors (2); control knobs (3); 8-pin d.i.l. socket (3); 16-pin d.i.l. socket (1); p.c.b.; wire; nuts and bolts, etc.

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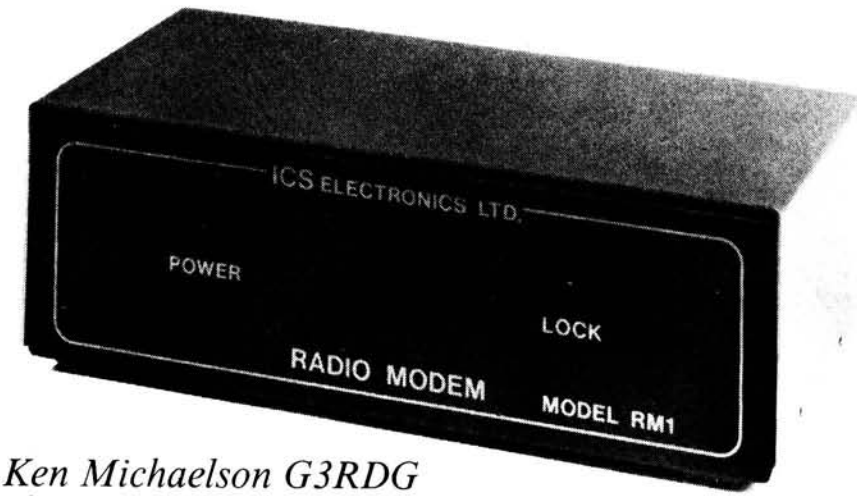
PW REVIEW

A Beginners' Modem for RTTY



Ken Michaelson G3RDG gives us a user's review of a versatile unit from ICS.

I have had the opportunity to review a MODEM made by ICS Electronics Ltd. of Arundel, West Sussex. This unit is suitable for those who already have a BBC, Commodore CBM64 or VIC20 computer, and who do not want to indulge in expensive and complicated apparatus in order to receive and transmit RTTY.

However, don't think that this unit is by any means skimped. In fact, it utilises the purpose designed XR2211 phase locked loop demodulator (as is used in its much more expensive brother the AMT-2), and there are no less than five i.c.s and six transistors used in the circuitry.

The complete circuit is shown in Fig. 1. Let me point out here that, although this review will refer to RTTY only—because the software at present available from ICS for the BBC computer only allows for RTTY transmit and receive and c.w. transmit—if you possess either a CBM64 or VIC20, then the MODEM can, without any modification, receive and transmit AMTOR, c.w. and ASCII in addition to RTTY. This makes the unit comparable to the AMT-2. It will be seen that it is a very versatile piece of equipment.

The unit is assembled on a glass-fibre p.c.b. and is enclosed within a screen-printed steel enclosure measuring 180 × 90 × 50mm. It is attractively styled with the top and sides in battleship grey crackle finish enamel and the front and back panels in matt black with white lettering. There are four push-on/push-off switches on the back panel and four sockets of different types together with a hole to reach the pre-set potentiometer for the adjustment of the audio output. The sockets are: POWER IN, TRANSCEIVER IN, TTL INPUT from computer and RS232 INPUT from computer (a choice).

The front panel only shows two l.e.d.s, a red one indicating POWER ON and a green one, TUNING. Although on the first impression a small green l.e.d. seems very little to use as a tuning indicator, in practice it is relatively simple to tune in most stations by its use. In the RTTY mode, the idea is to get the l.e.d. flashing in sympathy with the incoming signal, and provided that the signal is of reasonable strength this can be done without difficulty.

The unit has to be supplied with 12/15V d.c. at 150mA. The input audio voltage is 50mV peak-to-peak (minimum) and the output audio voltage 0–200mV r.m.s. (adjustable by a pre-set potentiometer accessed through the hole in the centre of the back panel). The tone frequencies are the WARC latest tones for narrow shift, that is: Mark—1445Hz and Space—1275Hz. The wide shift, suitable for commercial stations, uses different frequencies: Mark—1300Hz and Space 2100Hz. Both 425Hz and 850Hz shift transmissions can be received in the WIDE mode. The manufacturers state that other tones are available to special order. The maximum data rates that can be handled by the unit are: 110 baud in NARROW shift and 1200 baud in the WIDE shift.

There was no difficulty in making the necessary connections between the rig, computer and MODEM as clear instructions are given in the *Owners Manual*. There are also precise details, together with the necessary circuitry, for using an f.m. transceiver in the side-band ASCII mode. Information is also given for the tuning adjustment of the RM-1, even to the extent of allowing the user to alter the unit to operate on another tone standard.

The EPROM which contains the program, written by Peter Harris G3WHO, is very sophisticated and has many facilities—there is only space here to mention a few. It has "split screen" operation with "type-ahead", pre-programmed messages (RY, CQ de . . . , AR, PSE K, etc.), six user

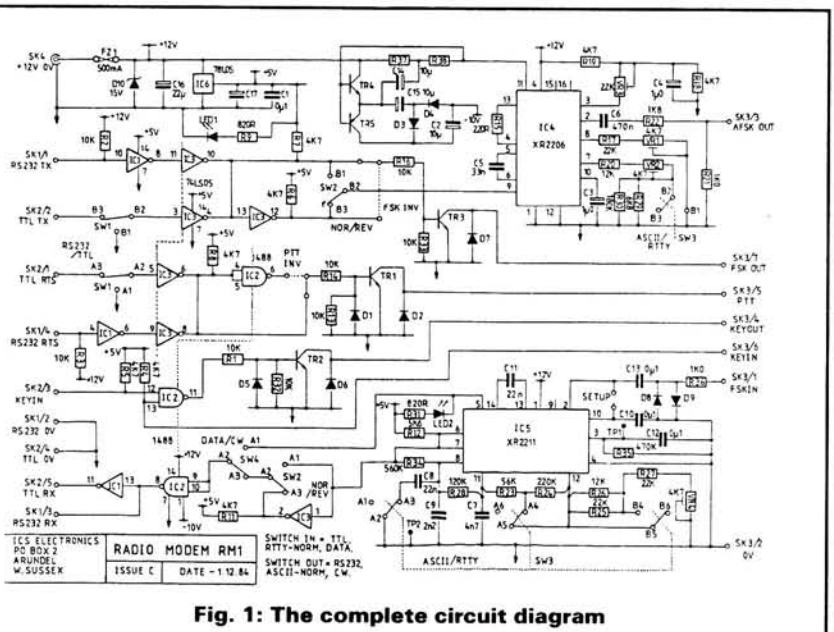


Fig. 1: The complete circuit diagram

programmable message stores which can be edited, saved to and loaded from tape or disc. It also has c.w. ident, U.S.O.S. (unshift on space), printer on/off, a real time clock and serial numbers for the QSOs if you are entering a contest.

The program is initiated by the command *RTTY<return>. It then asks you for your callsign and the time before proceeding. By pressing options 1, 2 or 3, the split screen will appear. Options 1 or 2 allow for 50 or 45·45 baud speed respectively. Option 3 allows you to set any baud speed between 10 and 100 baud.

There are many other facilities available by using special keys, and there is a slip of paper to place under the plastics strip in the Beeb just above the Function Keys, which gives all the information on the use of the Function Keys.

Having given a general picture of the various facilities of the program on the EPROM, the next thing is to insert the EPROM in the Beeb. This should be done with care, first switching off the computer. The EPROM plugs into one of the spare 28-pin sockets at the right-hand side of the computer near the front, making sure that the notch is towards the back of the computer. Once you are satisfied that the EPROM is plugged in correctly, then put everything back and switch on the Beeb. It should emit a "beep". If this does not happen, check all the instructions particularly taking care that the EPROM is firmly seated on its socket. In my case, there was no trouble and typing *HELP<return> listed all the ROMS present including RTTY.

Now, the next step was to commence operation. Typing *RTTY<return> brought the program on the screen and being asked I inserted my callsign followed by the time in hours, minutes and seconds. That complete, the MENU appeared with the 10 choices. As mentioned previously, options 1, 2 and 3 refer to the baud speeds, and since I was going to attempt to have a contact with another amateur I required the 45·45 baud on option 2.

Pressing 2 brought the split screen on the display. This is in the 80 column mode and it should be pointed out that if a normal TV set is being used for a monitor, the text will not be all that clear. This is due to the fact that the resolution of a normal TV set is not really good enough for an 80 column display. I use a monitor, and they can be obtained quite cheaply these days, especially if you don't want a colour one.

I was now ready, having tuned the rig to 14·090MHz, pressing first F7 (RYRYRY), then F8 (CQ de my callsign) and F9 (AR PSE K), the text of these 3 memories appeared on the transmit (lower) part of the screen ready to be sent. The next thing was to press F0 (Shift) which put the rig into transmit. The contents of the buffer is sent and this appears on the top half of the screen, showing just what has been

```
RYRYRYRYRYRYRYRYRY
CQ CQ CQ DE G3RDG G3RDG G3RDG
CQ CQ CQ DE G3RDG G3RDG G3RDG
CQ CQ CQ DE G3RDG G3RDG G3RDG
AR PSE KKK

VPPCBSFDUFXRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYR
YRYRY G3RDG G3RDG G3RDG DE DL9MBZ DL9MBZ DL9MBZ DL9MBZ  DL9MBZ DL9MBZ
DL9MBZ DL9MBZ   PSEK KK K XNDTFE
BJUE

DL9MBZ DL9MBZ  DE G3RDG   DE G3RDG ...THANKS OM FOR COMING
BACK T THE CALL....NAME HERE IS KEN KEN AND QTH LONDON LONDON....
YOUR SIGNAL IS 599 599 HERE VERY GOOD INDEED...WX HERE WARM
AND SUNNY...BTU  DE G3RDG H
 RYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRHR
ALNYRYRY G3RDG G3RDG G3RDG DE DL9MBZ DL9MBZ DL9MBZ DL9MBZ   GOOD AFTERNOON
DEAR KEN IN LONDON ... THANKS FOR THE FINE REPORT .... UR RST RST
  IS ALSO  599 599 599 599 599  PLUS 10 DB .. A VERY GOOD  SIGNAL
HERE IN ERDING ....MY NAME IS JUERGEN ... JUERGEN ... JUERGEN...AND
MY QTH IS ERDING ...ERDING...ERDING ABOUT 36 KM NORTHEAST FROM MUNICH....E
RDING IS 755 YEARS OLD AN HAS ABOUT 27000 PEOBLE.....  SO HOW COPY
?? BACK TO YOU KEN G3RDG DE DL9MBZ PSEK K K


DL9MBZ DL9MBZ  DE G3RDG   DE G3RDG ..I COPY 100 PERCENT...PERFECT
 COULD BE LANDLINE HI...RIG IS TRIO TS820S WITH BBC COMPUTER
AND TU BY I.C.S. OF ARUNDEL ENGLAND..VERY FINE....ANTENNA
IS
INVERTED L
..HALF A 80 METER DIPOLE...WORKS ON 80 40 AND O THIS BAND....OUTP
UT IS ABT 50 WATTS, SO BTU AGAIN  DE G3RDG X?(6464646464646464646464646464646464
6464646464646464
YRYRY G3RDG G3RDG DE DL9MBZ ... FINE COPY DEAR KEN WELL IT IS IN THE
MOMENT A VERY GOOD BAND FOR EUROPE HI BUT NOT FOR DX ... THANKS FOR
YOU INFO .... YOUR RIG AND COMPUTER IS DOING A VERY FINE JOB ....
...EQUIPMENT DE DL9MBZ....YAESU FT 101Z WARC...ANTENNA ..GROUNDPLANE
12==
  THE WX HERE IN BAVARIA IS  VERY  FINE TO DAY .. IEUIPB SUNNY AND
TEMP IS ABOUT 23C 23C ... SO BACK TO YOU DEAR FRIEND KEN ... G3RDG
DE DL9MBZ  PSEK K K DL9MBZ DLM ZFAROFAFOGUHRENF

DL9MBZ  DE G3RDG ..OK FINE JUERGEN...WELL I WISH YOU GOOD
DX WHEN THE BAND GETS BETTER TAKE CARE AND 73 FROM LONDON
TO YOU AL AND ALL YOUR FAMILT....
DL9MBZ DE G3RDG AR SK....AND BY FOR YOUR FINAL...BI BI.....K
YUZAAWN RYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRY
R
YRYRY G3RDG DE DL9MBZ ... RGR RGR  DEAR KEN ALL OK HERE ... I WILL
ALSO SAY MANY THANKS FOR THE NICE QSO ... HAVE  A NICE  DAY AND  ALL
THE BEST WISHES FOR YOU AND YOUR FAMLIY ....  BY E BYE  DEAR KEN ....
G3RDG DE DL9MBZ SK SK SK ZA?(4!0
CSID D
IIBXOYWWCCVAUCLEOZIR
```

Fig. 2: A copy of the QSO with DL9MBZ

transmitted. After one or two calls I got an answer from DL9MBZ, and a copy of that QSO is shown in Fig. 2.

It is admitted that there is a lack of filtering in this MODEM, nevertheless, since DL9MBZ was coming through at a strength of S7/8 it was possible to have a complete QSO as is shown in Fig. 2. I will say that the unit is difficult to use on the crowded h.f. bands without some sort of extra filtering, particularly at weekends.

I was able to have several more QSOs on the h.f. bands, all of which were completely satisfactory, with the aid of a Datong FL2 filter connected in the audio lead. I had a c.w. QSO, also on the 14MHz band, using the c.w. send facility, and reading the incoming signals directly. This was brought into operation by merely typing ESCAPE <return> to the MENU, and then typing 4, which brought up CW TRANSMIT on the screen, and away I went.

The next thing to do was to use the RM-1 on the v.h.f. bands. As I don't have an f.m. transceiver, it was not possible for me to try the unit on 145·300MHz f.m., but the sideband frequency of 144·600MHz could be used through my transverter. The operation on this frequency was much easier than the h.f. bands, and several interesting contacts were made. There was no trouble here to tune the unit, and since the amount of QRM was negligible it was a pleasure to use.

I have some comments to make, only small ones though, but to me they were irritating little things. The first is that I feel there should be an ON/OFF switch on the front panel. I do not think one should have to pull a plug out of a socket in order to switch the unit off. The second comment would be the fragile method of connecting a 20-way cable to the backdrop of the unit by means of cutting away the surplus "ways" on the ribbon, and taping up the five required. It seems to me that a 20-way IDC plug and socket could have been used as is done on the other end of the ribbon making a much neater job. However, these are small points and in no way detract from the versatility of the RM-1.

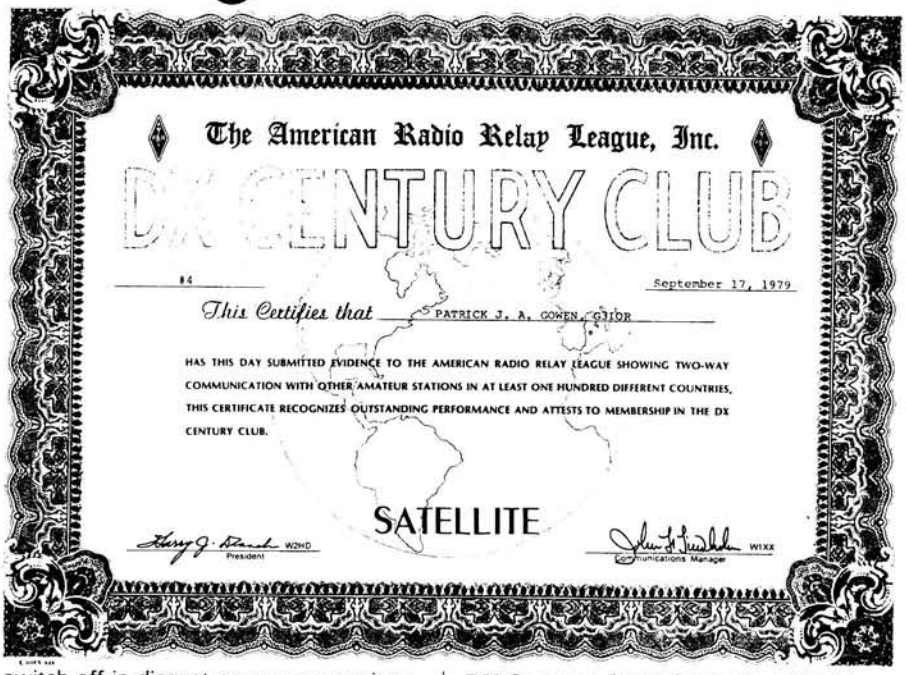
All in all, it is a very satisfactory piece of equipment, and is "plug compatible" with the rest of the range produced by ICS. It therefore offers an easy upgrade path for the beginner.

The RM-1 costs £69.00 inc VAT plus £2.50 p&p. The software for the BBC (RTTY and c.w.) costs £39 plus £1 p&p and includes the cable; RTTY and c.w. software for the CBM64 and VIC20 costs £51.75 plus £1 p&p and includes the cable. If you want AMTOR, RTTY, c.w. and ASCII for the CBM64 or VIC 20, this costs £69 plus £1 p&p and again includes the cable. The BBC software is supplied on EPROM and the CBM64 and VIC20 software is in plug-in cartridge form.

Thanks are due to ***ICS Electronics Ltd., PO Box 2, Arundel, West Sussex BN18 0NX,*** for the loan of the RM-1 and BBC software for the purpose of this review. ***PW***

Award Chasing on Satellites

Pat Gowen G3IOR looks at one aspect of using satellites that is rapidly growing in popularity.



DX Century Award won by G3IOR

OSCAR Awards: Satellite users will be aware that many of the operating awards issued for confirmation of amateur-radio accomplishments do not permit the inclusion of QSOs made via satellite. Indeed, in v.h.f. contests, field days, etc. organised by the RSGB, the use of satellites is specifically prescribed. Many other award issuing authorities positively promote the use and development of these modern and advanced methods of communication by not only including satellites but also offering bonus incentives for contacts made through them.

There are two sides to the story, as whilst one is giving incentive to progress within the field of amateur radio and advanced technology by active encouragement, the result can be that indiscriminate and ruthless competition (as invariably evidenced on the h.f. bands during a contest) is brought to the satellite bands. It is far more serious on satellites, as excess power not only advances the audibility of the user, but severely depresses the signals of his logically powered competitors by placing them below the a.l.c. level cut-off point that the "alligator" has produced by his abuse. Thus, the worst points of competitive behaviour become strongly evidenced in a media where mutual tolerance and fair-sharing of the basic resource is essential for mutually fair and generally good communications. At least the ionisphere is not depleted by grossly excessive powers of indiscriminate users, and the entire band is not ruined for everyone else by QRO h.f. and v.h.f. terrestrial communications.

On the satellites, the effect of just one "alligator" can be catastrophic for every other user, and has caused your scribe to switch off in disgust on many occasions, particularly when the offender cannot even hear the pleas to "QRP" made by those he has eliminated from the transponder.

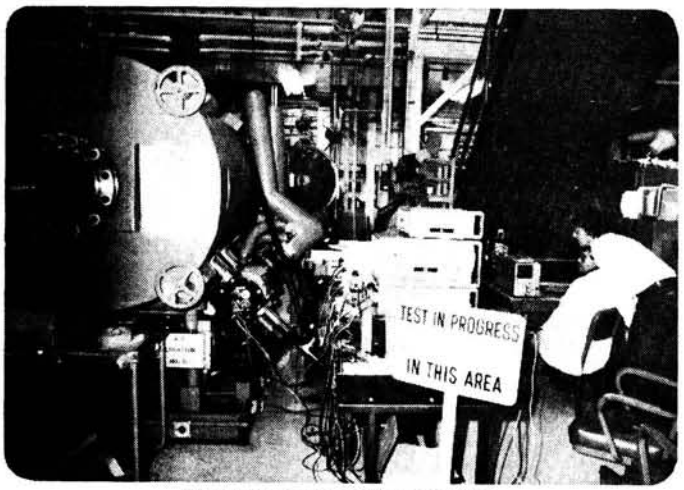
Only one hour before writing this, 8Q7AV was called by an avalanche of stations competing for the strongest signal, continuously calling above each other on an escalating scale, to the extent that 8Q7AV's reply was attenuated well below the readability threshold of all of those who were calling him, thus depriving all of a QSO with him, and many more would be users in other parts of the attenuated passband.

Thus, unless a contest or an award based on using satellites has effective and practical uplink power limitations built into its rule structure, and adequate supervision provided to ensure compliance, it can be argued that any form of competitive behaviour is detrimental to good communications, expected behaviour, and to the limited power capacity of the battery of the satellite itself. It is for this latter reason that the OSCAR-10 transponder has recently had to be switched off at apogee, to give the battery a chance to recover, otherwise the computer, hence the spacecraft, would be lost for all time.

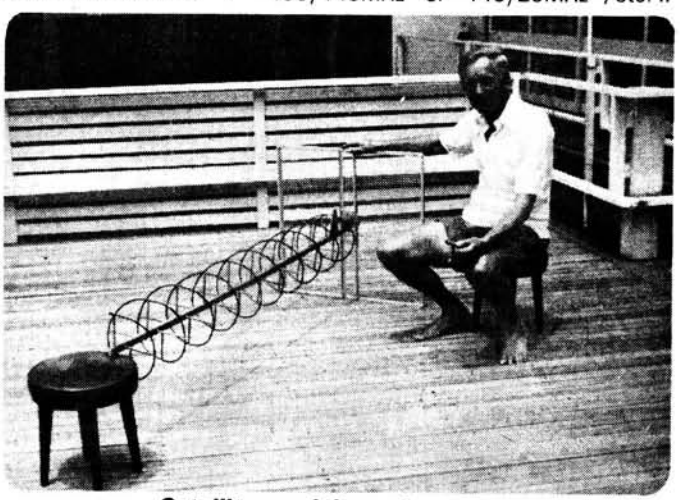
Regrettably, the essentiality of stating power limitations to curb the ruthless competitive element seem to have been ignored by many of the bodies issuing the awards they have made available, and the deterioration due to this is evident.

No known awards are issued for through-satellite QSOs in the UK, but certificates, diplomas, and various "sheepskins" are available to all amateurs from several sources internationally. A list of these follows, with the basic requirements and source, and if any additionals are known by any reader, the information on these would be appreciated to publish later.

The basic rule is that QSL cards must be marked so as to distinguish the fact that the QSO was by satellite. In addition to the time, date, RS/T, etc. each card should clearly state "via OSCAR-10" or "via RS-7" etc. and the frequency should be marked as uplink over downlink, e.g. "435/145MHz" or "145/29MHz", etc. If



Satellite testing in progress



Satellite receiving antenna

possible, the orbit number should be supplied, and the e.r.p. claimed, or the output power and antenna used.

The Soviet RSF hold a twice yearly international contest using the "RS" satellites, and Gold, Silver and Bronze medals are issued to the winners in each continent, with handsome "COSMOS" diplomas (Fig. 1) to all entries marked according to the degree of merit. The "R-15-R" and up awards may be claimed for satellite QSOs, with the details recorded in the various books and magazines devoted to awards, etc. A self-addressed envelope with four IRCs may be sent to the RSF at P.O. Box 88, Moscow, USSR, for the award details.

Perhaps the easiest certificate of all is that to evidence your very first OSCAR-10 QSO, where you merely have to report the details of your two-way satellite contact to the AMSAT S.C.C. Manager, P.O. Box 27, Washington D.C., 20044, USA, enclosing a s.a.e. and $1.00 if you are an AMSAT Member ($2.00 if not). No form is necessary, and the resulting QSL is superfluous.

AMSAT also issues the K2ZRO Memorial Station Engineering Award, to commemorate Kaz Desker, who did so much to advance satellite communications and technology. For this, you must monitor and record down the regular power reducing level transmissions made via OSCAR-10 on Mode "B" or "L", and report the content to AMSAT via WA2LQQ QTH, AMSAT ZRO Test, P.O. Box 177, Warwick, NY 10990, USA, and send $3.30 (members) or $5.00 (non-members) with a s.a.e. Full details are available from the same QTH giving the times and frequencies of the special transmissions that gradually reduce the power of following numeric code-groups as the broadcast continues, the top award being for perfect copy of the lowest power level transmitted in the run and the starting point the reception of the satellite beacon itself. The idea is to provide incentive to stations to improve their downlink reception capability, which in itself is a means to reduce the uplink power excesses, the possessor of a good receiving set-up being fully aware that high power is unnecessary.

The "Ten American Districts Award" with OSCAR endorsement is issued by the Lockheed E.R.C. Amateur Radio Club from W6LS, 2814 Empire Avenue, Burbank, CA 91504, USA. For this you must send $2.00 and a s.a.e. with ten QSL cards each from a different American callsign allocation area, e.g. W (or K etc.) 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0. Note that with the present chaos of having KJ6s in Florida, W5s in New York, and the like, some close inspection is needed to assure that the actual districts are covered rather than the expected callsign allocation!

The ARRL, at 225 Main Street, Newington, CT 06111, USA, produce four awards specifically for satellite QSOs. The "WAC" (Worked All Continents) is issued for proof of contact (i.e. QSL cards) made with each of the six major continents, eg. Africa, Asia, Europe, North America, South America and Oceania. (Antarctica is not required). This award was made to a very few stations who were able to achieve this using the Phase II circular orbit satellites, but is now rather degraded as it is offered for Phase III (OSCAR-10) contacts, and is hence now very easily won. No fee is required outside North America (stations there must be ARRL Members) but return postage must be included to cover the award and the return of the QSL cards ($3.00 should suffice unless registration or insurance is requested). Remember to request "satellite endorsement" with your request.

The Satellite DX Achievement Award (Fig. 2) known as the "DX-1000", also comes from ARRL. For this, you must accumulate 1000 points, made up as 10 points each new station, 50 each DXCC listed country, and 250 each new continent. (Your very first QSO thus merits 310 points, being one of each!). Again, the same rules apply, QSLs, return postage, etc, but no actual fee is needed. If you wish to apply for this certificate, write to ARRL with 2 IRCs and a s.a.e. and ask for form CD-206, to send completed with your QSLs.

ARRL also offer "WAS" or the Worked All States award, and the form and full rules for this should be pre-requested from the American Radio Relay League. Any or all satellites may be used to work a station from each of the 50 American States, which include KL7 and KH6. This was once impossible from Europe, as Hawaii was far out of range, but now many KH6 stations are active via OSCAR-10 and well in range.

If you wish to attest to working one hundred countries via satellite, then ask ARRL for forms CD-164 and 253, with IRCs and a s.a.e. You will need to have 100 cards each from a separate DXCC listed country to qualify for "Satellite DXCC" (Fig. 3). This award is now also devalued from its original, as it was once nigh impossible with the earlier lower orbit satellites without having to resort to rare occurrences of Es and sub-horizon F2 ducting, but is now easily attainable by anyone on OSCAR-10.

The North Alberta UHF Society, via Chairman Ray Nadeau VE6SF, P.O. Box 52, Barrhead, Alberta T0G 0E0, Canada, issue the "VE Satellite Award" (Fig. 4) for contacting just four Canadian call areas, e.g. VE1, 2, 5 and 6, if you are outside North America. If you are inside, then you will need eight areas from the series, VE1, 2, 3, 4, 5, 6, 7, 8, VO1, VO2 and VY1. Just send four IRCs with your QSL cards and request to Ray, but add enough to send them back by registered mail if your cards are valued.

AMSAT itself sponsors three levels of award, viz. the "AMSAT OSCAR Award", "The OSCAR Sexagesimal Award" (Fig. 5) and the "OSCAR Century Award" (Fig. 6). They are for confirmed evidence of having worked 20, 60 or 80 respectively qualifying QSOs via satellite. A qualifying card is either a different American State, Canadian call area, or DXCC country, or a compound of all or any. Thus you have a mixture of geographically defined areas that all make up your score to the number required. Endorsements in steps of ten are available between each level on request. Send $3.50 per award if you are an AMSAT member, or $5.00 if you are not, with your QSL cards, enough IRCs for return postage (or an extra $2.00) to the AMSAT Awards Manager at the Washington QTH given earlier.

CQ Magazine, 76 North Broadway, Hicksville, NY 11801, USA, issue the "CQ CW DX Award" and the "CQ SSB DX Award" with an endorsement for satellite contacts. The basic award is for 100 countries, the endorsement comes for 50 countries confirmed by satellite, specifically on c.w. or s.s.b. The rules, requirements and fee required will be sent by *CQ* for a s.a.e. and 3 IRCs.

These form the basis of the main awards known to be available, but there could be a number of regional awards generally unknown, and any information on these would be appreciated. It is also likely that new awards will come about in time, of which we shall try to keep you informed so that your shack walls are well dressed.

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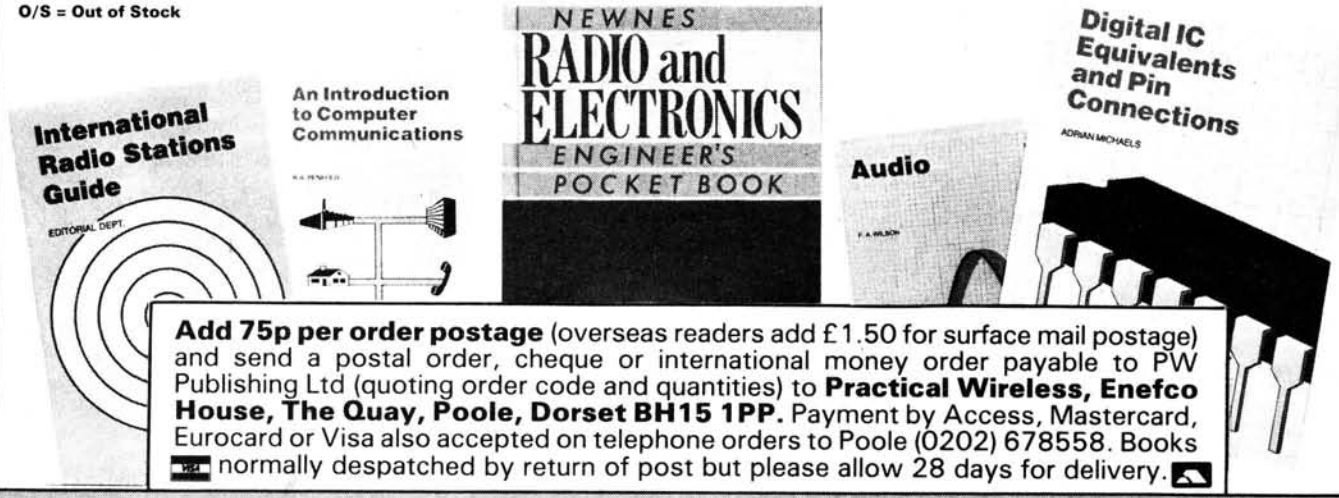

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IC of the Month

Brian Dance reviews the Plessey Semiconductors NJ8820 EXP Frequency Synthesiser

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A crystal oscillator can be employed to generate a single frequency and in the past banks of crystals have been used to enable a range of frequencies to be generated for operating on various channels. Apart from the size and cost of such crystal banks, this procedure enables only a limited number of frequencies to be generated.

Nowadays, a single crystal oscillating at its resonant frequency is employed to generate a stable reference frequency and suitable circuitry is used to synthesise any other required frequency from this stable reference oscillator. The synthesised frequency has the same percentage stability as that of the crystal oscillator, but relatively complex circuitry is needed to enable the user to be able to select a particular frequency by a phase locking process.

Specially dedicated integrated circuits have been developed for use in such synthesiser circuits. The NJ8820 EXP covered in this article is a very versatile device from the Plessey Semiconductors stable; it has been designed for use in both hand-held and cellular radio equipment. Although the use of this device involves more complex concepts than have been involved in most previous IC of The Month articles, this product offers many possibilities to the experienced constructor. Only the synthesiser circuitry will be discussed and not the circuits of the complete radio equipment.

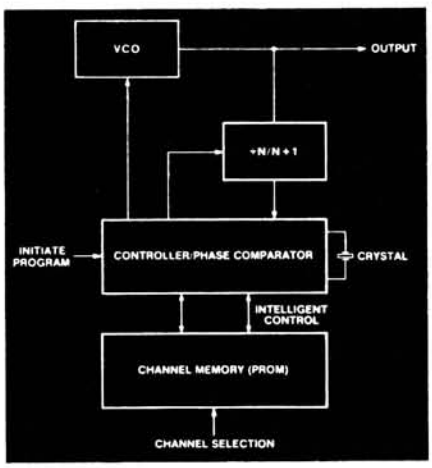

Fig. 1: Simplified block diagram of a synthesiser circuit

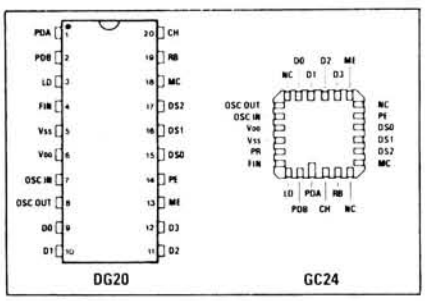

Fig. 2: Pin connections of the NJ8820 EXP

New Features

The NJ8820 EXP has a number of new features which make it especially suitable for synthesiser applications where simple circuitry together with high performance is required. The device is designed for use with a separate external two-modulus pre-scaler operating at up to 1GHz. Note: A two-modulus pre-scaler divides an input frequency by one of two factors, according to the value of a control input signal. The NJ8820 EXP incorporates all of the counter and control circuitry required for pre-scaler division ratios up to 128 and 129. The device is manufactured by an i.s.o.c.m.o.s. process which not only allows it to operate at very high input frequencies, but which also results in a low current consumption compared with earlier synthesiser devices. In addition, microprocessor type control circuitry at 10MHz or more can be employed and some linear functions have been incorporated onto the i.c.

A particularly interesting feature of the NJ8820 EXP is its self-programming system. An individual piece of radio equipment in which the device is to be used will be required to operate on only a relatively small number of channels selected from many hundreds of possible channels. A PROM (programmable read only memory) inside the equipment is programmed so that it contains data for the identification of each of the channels to be used. The manufacturer of the NJ8820 has included a novel self-programming circuit into the device to overcome the problem of interfacing it with the PROM so as to avoid many of the complications associated with earlier frequency synthesiser circuits.

When the device is linked to a PROM containing the necessary channel information the NJ8820 EXP will carry out the following sequential operations.

(i) The PROM will be enabled on power-up

(ii) The PROM will be correctly addressed

(iii) The data from the PROM will be stored in the internal latches of the NJ8820 EXP

(iv) The PROM will be disabled

This operation is carried out whenever power is first applied to the circuit and takes no more than a few milliseconds. Alternatively, the NJ8820 EXP can be interfaced directly with most microprocessors with the option of retaining its unique programming facility.

The sample-and-hold phase comparator circuit is employed in the NJ8820 EXP which provides a superior noise performance with locking times down to a few milliseconds. Conventional digital phase/frequency comparators can take some hundreds of milliseconds to settle when the frequency is changed. Although this is adequate for current radio transmission standards, the NJ8820 EXP is claimed to be ideal for the type of frequency-hopping equipment envisaged for the future and for cellular radio applications. Once the correct frequency has been reached (which requires only a very short time using the conventional digital comparator), the sample-and-hold phase comparator takes over from the digital comparator so as to enable high sideband attenuation to be obtained together with a low-noise performance and a settling time of a few milliseconds.

A much simplified block diagram of a synthesiser circuit showing the voltage controlled oscillator (v.c.o.) and a phase locked loop is shown in Fig. 1. The two modulus scaler can be rapidly switched from a "divide by N" circuit to a "divide by (N+1)" unit.

The NJ8820 EXP

The NJ8820 EXP synthesiser i.c. is available as a 20-pin dual-in-line device with the connections shown in Fig. 2. Note: It is also manufactured in a miniature 24-pin leadless i.c.-carrier package.

The device contains the circuitry for a reference crystal oscillator, a 12-bit (scale of 4096) programmable reference divider, the digital and the sample-and-hold phase comparators already discussed, a 10-bit (scale of 1024) programmable "N" counter, a 7-bit (scale 128) programmable "A"

counter together with the control and latch circuitry required for accepting and latching the input data. Obviously it is a very complex device, but the block diagram of Fig. 3 shows the major internal circuit blocks inside the device.

Input data is presented as eight 4-bit words in one of two modes. The data may be read from an external memory with the necessary timing signals generated internally or under external control from a suitable microprocessor.

The NJ8820 EXP is specified to operate from a supply of 5V ±0·5V between the positive pin 6 and the negative pin 5, the absolute maximum permissible supply voltages being +10V and −0·5V. The input voltage at any pin must never exceed 0·3V above the potential of pin 6, nor must it fall more than 0·3 below that of pin 5. The current consumption will not exceed 5mA when the input and the oscillator frequencies are 10MHz and not more than 3·2mA when the oscillator frequency is 10MHz and the input frequency 6·5MHz.

The device is specified to operate with oscillator and input frequencies of up to at least 10·6MHz and these two inputs should have an amplitude of at least 200mV r.m.s. The NJ8820 EXP is specified to operate over the temperature range −30°C to +70°C.

Programming

The 20-pin dual-in-line version of the NJ8820 EXP is programmed in an internal mode (although the 24-pin i.c. carrier version provides the option of external mode programming).

The part circuit of Fig. 4 illustrated how the NJ8820 EXP may be programmed using a 74S287 PROM device; the latter supplies data to the NJ8820 EXP under control from this synthesiser i.c. Each channel is specified as twenty-eight data bits which are arranged as eight 4-bit words with four redundant bits. Two of these redundant bits are available on the data bus driving the data transfer time slot and may be used for external control purposes.

The 74S287 provides for a 32 channel capability. The *pnp* transistor and the by-pass capacitor used for the 5V supply must enable the 74S287 to become operational in an adequately short time after switching on—for example, in less than 25µs with a 10MHz oscillator frequency.

A positive or negative pulse on the programme enable pin will start the data read cycle which is normally done in the single shot mode. This data read cycle is generated from a programme clock at 1/64th of the reference oscillator frequency. A memory enable signal is supplied to allow power-down of the memory when it is not in use. The data select outputs stay in a high-impedance state when the program cycle is completed so as to allow the address bus to be used for other functions if required.

The data map is shown in Table 1 and the data read cycles and timing diagrams in Figs. 5 and 6. Data is latched internally during the shaded parts of the programme cycle and all data is transferred to the counters for latching during the data transfer time slot.

Alternatively, the program enable pin 14 may be connected to the negative supply pin 5, in which case the data read cycle will repeat itself in a cyclic manner so as to allow continuous updating of the program information. Operation in this mode results in the memory i.c. being enabled continuously with pin 13 of the NJ8820 EXP low and the data and read cycle will be repeated every sixteen cycles of the internal program clock, namely each 1024/fosc seconds.

Switch On

When the power is first applied to the circuit of Fig. 4, the data read cycle is automatically initiated so as to make it unnecessary to provide a pulse enable signal to pin 14. As the power supply voltage rises above a threshold value of about 1·5V, there is an internally generated delay to allow the supply voltage to rise to its normal value, and the circuit is then programmed in the normal way. The delay is obtained by the counting of oscillator pulses and therefore its value depends on the resonant frequency of the crystal employed. The delay is equal to the time taken by 53 248 cycles of the reference oscillator corresponding to about 5ms at 10MHz.

WORD	DS2	DS1	DS0	D3	D2	D1	D0
1	0	0	0	N1	N0	-	-
2	0	0	1	N5	N4	N3	N2
3	0	1	0	N9	N8	N7	N6
4	0	1	1	A3	A2	A1	A0
5	1	0	0	-	A6	A5	A4
6	1	0	1	R3	R2	R1	R0
7	1	1	0	R7	R6	R5	R4
8	1	1	1	-	R10	R9	R8

Table 1

Practical Circuit

The circuit of Fig. 7 shows how the NJ8820 EXP can be employed for operation at the frequencies of up to 520MHz, it can be seen that this circuit incorporates the circuit of Fig. 4. It can be used in equipment requiring up to 32 channels of operation, the supply current required being typically 12mA (maximum 17mA) at the maximum frequency of 520MHz excluding the current required by the v.c.o.

Plessey Semiconductors state that, with careful construction, the Fig. 7

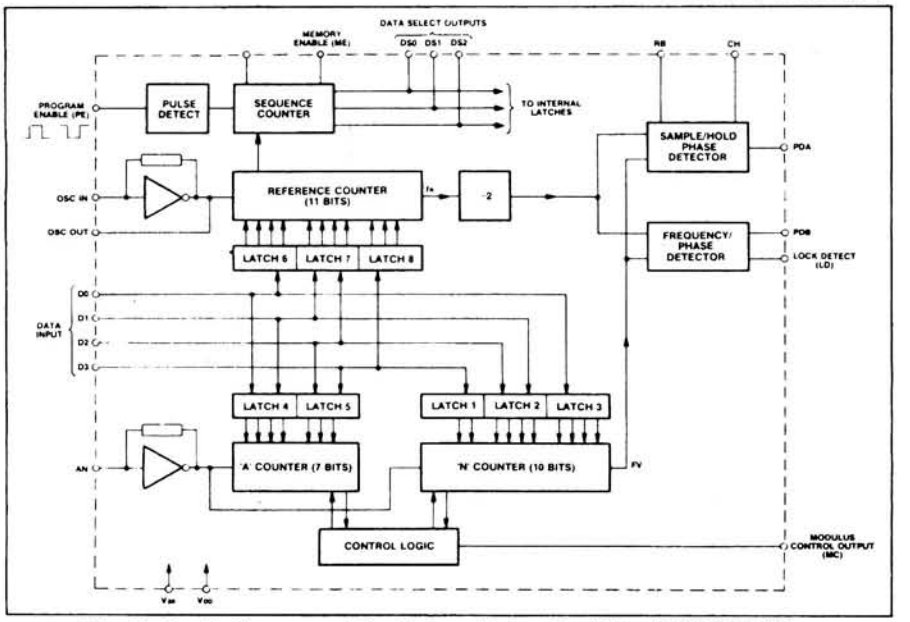

Fig. 3: Block diagram of the internal circuit of the NJ8820 EXP

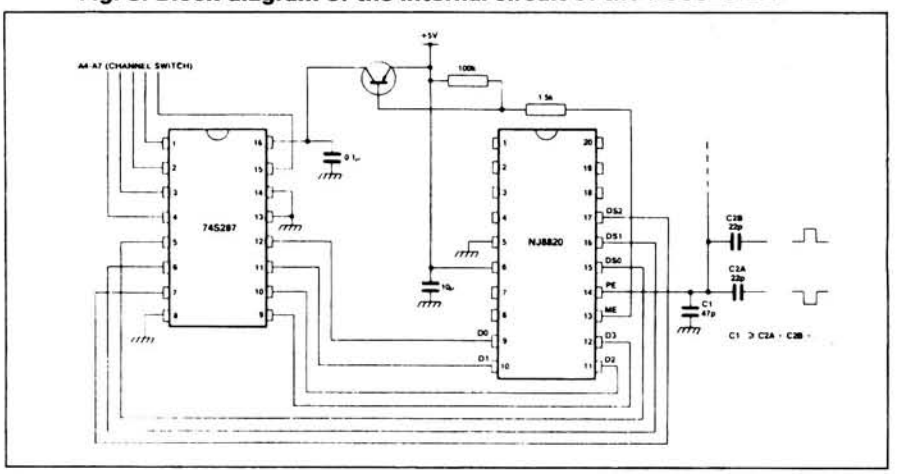

Fig. 4: Part circuit showing connections to a 74S287 for programming the NJ8820 EXP

circuit is capable of providing sideband attenuation in excess of 90dB with lock times of only a few milliseconds for a 1MHz frequency step.

The SP8719

The SP8719 device used in the circuit of Fig. 7 is a 720MHz ultra low current two-modulus divider manufactured by Plessey Semiconductors. The connections to this 8–pin dual-in-line device are shown in Fig. 8.

This SP8719 device operates from a supply of 5·2V ±0·25V, the absolute maximum supply voltage being quoted as 8V. Typical supply current is 10mA. The signal clock inputs are internally biased by the internal circuitry, so the inputs must be capacitively coupled to prevent the bias voltage from being affected. The absolute maximum clock input voltage is 2·5V peak-to-peak.

The SP8719 divides the input frequency applied to pin 6 by a factor of either 80 or 81. When the control input voltage to pin 1 is "high" (typically 8V), the factor is 80, whereas when the pin 1 voltage is "low" (typically 1·8V), the factor is 81. The control input current is under 0·5mA.

The SP8716 is a device with similar specifications, but with division factors of 40 and 41. Similarly the SP8718 provides factors of 64 and 65.

All three devices are specified for operation up to 520MHz with input voltages in the range 100 to 280mV peak-to-peak. Although the devices are able to function down to zero frequency, the input slew rate must be at least 100V/µs. A minimum sinewave frequency of 30MHz with input voltages of 400mV to 800mV is therefore specified.

If no input signal is present, the devices will self-oscillate, but this may be prevented by connecting a 15kΩ resistor from one input to ground (pin 4). However, this will reduce the sensitivity.

The output stage of these devices has been optimised for driving c.m.o.s. devices and is not suitable for driving t.t.l. i.c.s. External pull-up resistors must not be used, nor circuitry other than the connection to the input of the c.m.o.s. device to be fed.

The set up and release times of these devices are quoted as 10ns minimum with a 10pF load. The set up time is the minimum time which can elapse between a change from "low" to "high" clock pulse transition to ensure that the lower division factor is obtained. The release time is the minimum time for a change in the opposite direction defined in a similar way to produce the higher division factor.

Component Selection

The phase comparator gain of the NJ8820 EXP is programmable with an external resistor, R_S, connected between pin 19 and ground. The value of this resistor should be selected so as to provide the gain required for the particular reference frequency employed.

Typically:

$$\text{Gain} = \frac{10\,(V_{DD} - V_{SS} - 0{\cdot}65)}{2 \times 50 \times 10^{-12} \times R_B \times f_r} \text{ V/radian}$$

where f_r is the reference oscillator frequency. Thus, as indicated in Fig. 9, R_B may have a value of 47kΩ to provide a gain of 250V/radian at 10kHz.

Certain frequency limitations must be observed, namely:

(i) The maximum frequency divided by the division factor of the pre-scaler must be less than 10·6MHz. For example, if the Fig. 7 circuit is operated at the maximum frequency of 520MHz with the SP8719, 520/80 = 6·5MHz. However, a SP8716 should not be substituted for the SP8719, since 520/40 = 13MHz.

(ii) The minimum frequency is equal to the square of the pre-scaler division factor multiplied by the reference oscillator frequency.

(iii) If the clock to modulus control

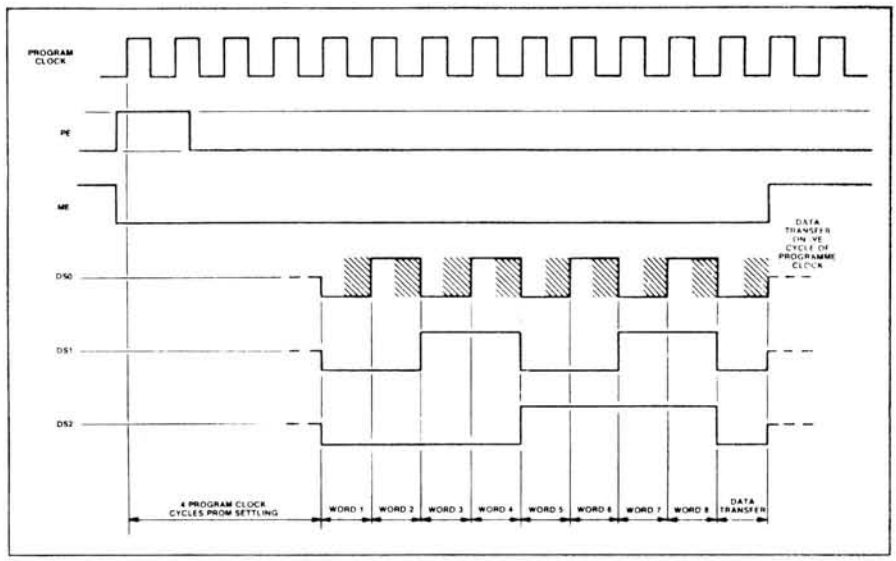

Fig. 5: Data selection pulses

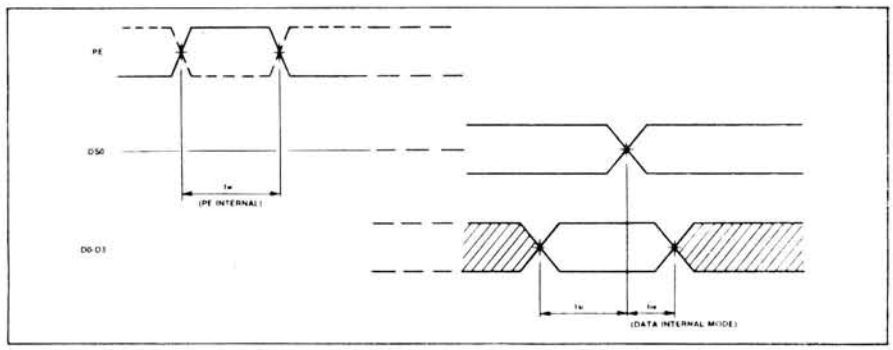

Fig. 6: Timing diagram

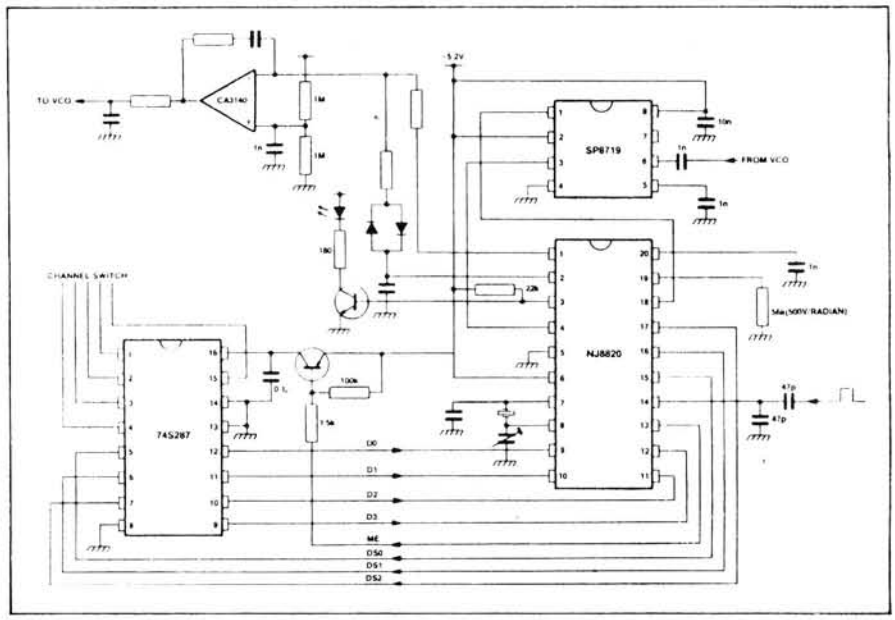

Fig. 7: A synthesiser circuit for use at frequencies up to 520MHz

propagation delay is t_{cm},

$t_{cm} + t_r + t_B$ must exceed 95ns

where t_r is the release time and t_s the set-up time of the pre-scaler, as defined previously.

If the pre-scaler factor is 80 and the maximum frequency 520MHz,

$t_{CM} = 80/520\mu s = 154ns$

Thus $t_{CM} + t_r + t_s$

$= 154 + 10 + 10$

$= 174ns$

Conclusion

The NJ8820 EXP obviously offers many facilities to the serious experimenter who is able to develop circuits of moderate complexity. It should simplify equipment for use in the 430MHz band.

Device Pinning

Pin 1 Phase Detector A. Analogue output from the sample and hold phase comparator. This output is employed as a "fine" error signal, but is linear only over a narrow phase window determined by the gain programmed by R_B.

Pin 2 Phase Detector B. This ouput provides a "coarse" error signal with three output states which are determined by the reference and signal frequency phase relationships.

Pin 3 Lock Detect Output. This output has a low level when phase detector A is in lock.

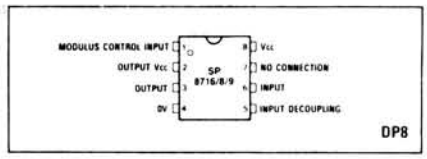

Fig. 8: Pin connections for the SP8716, SP8718 and SP8719

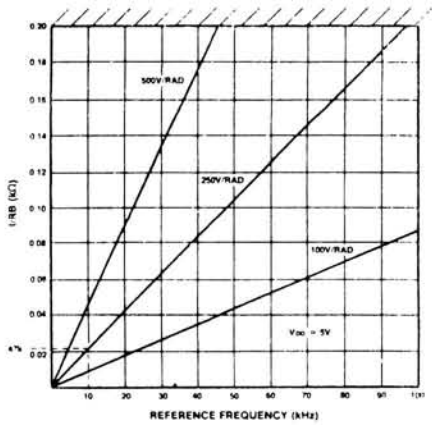

Fig. 9: Reciprocal of R_B plotted against reference frequency for three gain values

Pin 4 Input to the main counters (normally obtained from a pre-scaler circuit).

Pin 5 V_{SS} Negative supply (normally ground).

Pin 6 V_{DD} Positive supply.

Pins 7 and 8 Crystal oscillator connections. A parallel resonant crystal connected between these pins forms the reference oscillator, but suitable capacitors are also required to provide phase shift. Alternatively an externally generated crystal reference signal may be applied to pin 7.

Pins 9 to 12 Data inputs to the internal latches.

Pin 13 Memory enable for controlling the power supply to an external ROM or PROM.

Pin 14 Program enable. A positive or negative pulse applied to this pin will initiate a single-shot data read procedure. This pin may be grounded for cyclic data reading. In the external mode this pin is used for data strobing.

Pins 15 to 17 Data Select Outputs. These three-state outputs may be employed to address the external memory. (In the external mode these pins become inputs to control the addressing of the data latches.)

Pin 18 Modulus Control. The output signal from this pin can control an external dual modulus scaler. The output voltage is low at the start of the count cycle, but goes high when the "A" counter completes its cycles and stays high until the "N" counter completes its cycle.

Pin 19 R_B. The sample and hold phase comparator gain programming resistor is externally connected to this pin.

Pin 20 C_H. The external hold capacitor is connected to this pin. **PW**

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ON THE AIR

AMATEUR BANDS

Reports to: John Fell G0APJ, 14 Rectory Avenue, Corfe Mullen, Wimborne, Dorset BH21 3EZ

by John Fell G0APJ

During the last few months a considerable amount of time has been spent by members of the RSGB committees involved with amateur band licensing, investigating the implications for our hobby if the DTI adopts the CENELEC proposals for "receiving" apparatus immunity. In broad terms CENELEC specifies in its draft form a series of tests to be performed upon domestic equipment based on a local transmitter producing a radiated field strength of 1·8V/m at the item under test. To adequately conform to the proposed standard the receiving equipment and "associated items" of the installation must demonstrate no deterioration in performance as a result of this level of r.f. being introduced to its circuitry via the supply leads, both inner and outer of any antenna cable and all other peripheral connecting leads, such as speaker leads in a hi-fi system. The proposals define the types of apparatus that will have to comply with the specification and conversely items not in compliance will fall outside of any protection afforded under current DTI RIS investigations.

The DTI have said that the introduction of CENELEC or similar EEC specifications will lead to a considerable reduction in their RIS departmental workload and in practical terms, strict implementation, coupled to equipment type approval before mass production starts, would be, in the main, good news.

Set against this, however, and the reason for the current detailed investigations by the RSGB, is the DTI's stated intention to introduce measures that ensure radiated r.f. field strengths are held at the 1·8V/m level if interference is still present.

Whilst interference is something that all users of the radio spectrum seek to avoid, the question must be asked, why choose 1·8V/m? Should the amateur service, which currently provides less than 1 per cent of all investigated causes of interference, be subject to the same constraints as large scale commercial broadcasters, p.m.r., etc. It is becoming increasingly difficult for the typical town or city based amateur to obtain access to his chosen pastime—most have no choice and must make do with the space dictated by the modern housing plot size. In such circumstances it is not always possible to run the full legal power specified in the licence schedule and a commonsense compromise must be reached. Siting the radiating antenna as far away from neighbouring equipment as possible will obviously help—in this respect the Town and Country Planning Authorities must adopt policies which acknowledge the requirement for elevated antenna systems.

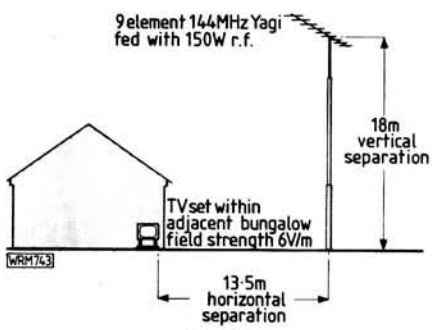

Fig. 1

To give you some idea of the implications of the proposed radiated maximum field strength Fig. 1 shows the layout of a 144MHz band installation recently evaluated. A 9-element Yagi, on top of a 20m mast, fed with 150W of r.f. produced an indicated 6V/m field strength alongside a TV receiver in an adjacent property when beamed at that property. To reduce the reading on a calibrated field strength meter back to 1·8V/m would require the applied r.f. power to be reduced to approximately 10W.

As the field strength is directly influenced by the gain of the antenna, and in this instance would only hold true within approximately ±20 degree of the peak forward beam lobe, would the DTI adopt an approach which allowed the original level on other beam headings? Field strength measurements can only be near predictable in ideal non-cluttered environments—introduce the effects of domestic wiring, pipework, even knives and forks on the kitchen table and the reading obtained would be anyone's guess. Is this a good basis for legally enforceable variations to the amateur licence? An issue of such fundamental importance deserves maximum attention and I believe that *all* licensed amateurs and s.w.l.s in the UK should support the RSGB in their efforts to have the amateur service considered outside of these proposals.

Round the Bands

With winter now well on the way in the Northern hemisphere and the exotic Sporadic-E DX of the summer months now well in decline it is at least encouraging to note reports of sunspots and the hope that we will soon begin the long five years' trek towards the next solar cycle maxima.

Up until early November the amount of v.h.f. tropo has been below average but there is plenty of time yet to encounter those low loss ducts and the DX they carry. Starting at the low frequency end of the bands this month, top band (1·8MHz) is now a feature in the shack of s.w.l. **Angie Sitton,** Stevenage. A B28 receiver coupled to an endfire loop antenna running round the "pocket sized" garden has produced the first log entries in the form of G0CJN in c.w. QSO with G0FRX engaged in "ragchew" mode! Thanks go to G1PAB and G0ETA for lugging the RX from the local ARS.

Not much of note on 3·8MHz except for an s.w.l. report from newcomer **Matt Probert,** Basingstoke, who logged some "real" US stations during the contest of 4 October which included KSZD/1 portable. An expedition to Andorra, run by a group of Finnish amateurs using the callsign C30BBE (QSL manager OH6XY), caused quite a stir on 23 October, even tempting TG9VT to join the pile up at 0450UTC. Matt has been s.w.l.ing in a serious way for some four years and currently runs a DX1000 fed by a 10m long ground mounted vertical and FRT-7700 a.t.u. combination—the latter needed to reduce the overloading found with the DX1000. Further pointers that things are looking up with a reminder from Matt that the solar Flux is back to levels last seen in September 1985 and improving rapidly.

On to 7MHz and another comprehensive log from **Brian Fields G4XDJ** of Billingham, Cleveland, who is a confirmed QRPer and home-brewer to boot (see photograph). A 579 report from Kris SP2HGW, Bydgoszcz, was the result obtained from the 1W output *PW* Severn/Sommerkamp FR-100B + Delta loop on 19 September. Further QSOs followed during the month with OZ, UB, UY, LZ, F, SK and KS all mentioned. Highlighted were 2-way QRP contacts on 21 September with OH2NMV near Helsinki and on 23rd with OE9SLH at Bregenz—all on c.w. of course! Angie Sitton mentions the callsign 33L4Y heard sending good c.w. at the bottom of 7MHz on 9 October and asks of the origin—most probably commercial, but useful for the c.w. practice if nothing else. Galapagos Island Station HC8GRC was logged by Matt Probert on 4 October.

The bulk of this month's reports concern 14MHz activity and there seems to have been plenty of it. **Robert Watters,** St. Austell, sends his first s.w.l. report for some months which includes D44BC on the Cape Verde Islands in QSO with OX3DZ and OX3LX on 18 October, 1910UTC. Also on the same day PJ1KV, PJ8DFS, V44KL with special event station VE6QRT. Falkland Islands stations VP8BKK and VP8BKT, by Mount Pleasant Airport, were heard together with SP6BBS and 9Y4VU—both JOTA (Jamboree On The Air) stations, all good work for the FRG-7700, a.t.u. and 20m inverted long wire system. **Tony Woodsford,** Poole, is also a keen h.f. bands s.w.l. of some years and reports plenty of W4, 6 and 8 activity during the month plus VE3KH, PY5ZBU, V85GA (Brunei) and 5X5GK in Uganda—an FRG-7, KX3 a.t.u. and Hygain 18V being used at the moment. Angie Sitton logged HB9YC, UR1RWX (Oblast 83) and HL9MM in Korea with CE2AKG in QSO with a G-based JOTA special event station on 21MHz. Something of a mystery with HM3JLT heard by Angie on 18 October giving QTH on phone as New Jersey. Anyone else log this allegedly Korean prefix? However, the band was well open with K8BVY at 59 working many G/PA/I/LA and YU stations, together with many US first, second and third call areas

Brian Fields G4XDJ, in his shack with all his home-brew equipment

also 59-plus whilst running 1–1·5kW. I can vouch for the 21MHz activity on 12 October whilst operating G2KV/A from the Flight Refuelling ARS HQ station near Poole. Whilst the number of contacts was well down on previous years the RSGB 21/28MHz phone contest seemed popular with 49 countries worked across the two bands. Matt Probert was well pleased with Indonesian stations YB3DYR (100W) YC0TNX and YC0km at 1500UTC on 22 October, but would like to see all US "Broadcast" stations limited to 500W—revolutionary stuff this OM!

Finally for the h.f. bands **Phil Dykes G4XYX**, Poole, again shows 28MHz is far from dead—given patience, and the where with all to make the most of those frequent but short-lived openings. Phil notes sporadic events to be lower than last year but balanced by some good tropo, the effects, however, having been largely ignored by many! C30ANN (QSL via DL8OH) was an Es contact on 16 September with EA8TE worked on the 23rd. A 45-min QSO with **Pete G4JBR** in N. Devon via tropo on 7 October followed a similar event on 21 September which produced GW4HSH in Swansea for a full 30 mins at 5/7. With LU6FN worked with 10W p.e.p. to a 2-el quad on 13 September things can't be all bad.

Moving upwards towards the v.h.f. bands, 50MHz has continued to provide contacts with plenty of newcomers to the band but few abnormal propagation effects noted. It is a great pity that activity on 70MHz is so low, except for contest activity at which times the full potential of the band is often realised. During the 70MHz fixed contest, 26 October, I helped to work the 54 QSOs recorded by the Flight Refuelling ARS, operating from just north of Poole, IO90. Best DX was GM0FRT at 699km which made the effort of erecting a pair of 12-element home brewed NBS Yagis well worthwhile.

Hopefully by next month you will have activity on the higher amateur bands to report—I look forward to hearing from you.

Reports to arrive by December 24

RTTY

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

by Ron Ham BRS15744

One of the advantages of joining a specific technical organisation is the amount of knowledge which can be gained by direct contact with fellow members or from that organisation's regular journal. The British Amateur Radio Teleprinter Group is one such organisation that is well established and has proved itself to be of great help to all radio enthusiasts who are interested in data communication. I, for one, always learn something new from their quarterly journal, *DATACOM*.

BARTG have a news service, using the callsign GB2ATG, which can be copied on 45 baud RTTY, on 3·590, 14·090 and 144·600MHz, at various times on the first and third Sundays in each month, as shown in Fig. 3. Reception reports and items for inclusion in the bulletins are always welcomed by Edward Batts G8LWY, 27 Cranmer Court, Richmond Rd., Kingston upon Thames, Surrey, KT2 5PY. These news transmissions provide an ideal opportunity for testing a new receiving set-up, learning more about data activity and to give assistance to BARTG.

"The 14MHz band, this past month, has been a mixture of excitement and despair," wrote **Len Fennelow G4ODH** from Wisbech on October 19. On many evenings he found only the most prominent Italian and Spanish stations in evidence and at times the band was full of static noises. "Some really good openings did occur and gave me five new RTTY prefixes, Corsica TK5, Djibouti J28, Galapagos Is. HD8, New Zealand ZL and Salvador YS9, out of a total log of 54 this time," said Len. His datawatch catalogue now stands at 131 countries.

A contest usually puts more life into the bands and during the afternoon of October 18 I had a good haul, A22BW Botswana, PJ8UQ Netherlands Antilles, St. Maarten, VE1ASJ Canada and W0YTL USA, on 21MHz and all at good strength. I also copied RTTY signals from the Bulgarian students' station LZ2KIM on the 7, 14 and 21MHz bands and I2OLW Italy on 28MHz during the event.

"Weird propagation on October 15, no Euro data, but signals from Djibouti, Colombia and Salvador," said Len. He copied all the AMTOR prefixes listed in Fig. 2 and RTTY traffic from 3 countries on 3·5MHz, 1 on 7MHz, 45 on 14MHz and 10 on 21MHz. My own RTTY log of 7 countries on 3·5, 9 on 7, 30 on 14, 10 on 21 and 1 on 28MHz has been included with Len's, in Fig. 1.

Fig. 1 ▼

Country (Prefix)	Frequency (MHz) 3·5	7	14	21	28
Argentina (LU)				X	
Austria (OE)		X	X		
Belgium (ON)			X		
Botswana (A2)			X	X	
Brazil (PT, PY)			X		
Bulgaria (LZ)		X	X	X	
Canada (VE)			X	X	
Canary Is (EA8)			X	X	
Ceuta & Melilla (EA9)			X		
Chile (CE)			X	X	
Colombia (HK)			X		
Corsica (TK)			X		
Czechoslovakia (OK)		X	X		
Denmark (OZ)	X		X		
Djibouti (J2)			X		
Eire (EI)			X		
England (G)	X	X	X	X	
Finland (OH)			X	X	
France (F, FE)	X		X	X	
Galapagos Is (HC8)			X		
Gozo & Comino (9H4)			X		
Greece (SV)			X		
Guatemala (TG)				X	
Hungary (HA)			X		
Israel (4X)			X		
Italy (I, IK, IT)	X	X	X	X	X
Japan (JA)			X		
Kuwait (9K)			X		

Country (Prefix)	Frequency (in MHz) 3·5	7	14	21
Austria (OE)			X	
Canada (VE)			X	
Chile (CE)			X	X
England (G)	X		X	
Finland (OH)			X	
France (F, FE)			X	
Greece (SV)				
Italy (I, IK, IT)			X	X
South Africa (ZS)			X	
Spain (EA)			X	
Sweden (SK, SM)			X	
Switzerland (HB)			X	
Tanzania (5H)			X	
USA (W)			X	
West Germany (DF, DJ, DL)	X	X	X	X

Fig. 2 ▲

Country (Prefix)	Frequency (MHz) 3·5	7	14	21	28
Lebanon (OD)			X		
Malta (9H)			X		
Netherlands (PA)	X				
New Zealand (ZL2)			X		
Nigeria (5N)			X		
Norway (LA)	X		X		
Oman (A4X)				X	
Poland (SP)			X		
Rhodes (SV5)			X		
Rumania (YO)			X		
Salvador (YS)			X		
Sardinia (IS)			X		
Scotland (GM)		X	X		
Sicily (IT9)			X		
South Africa (ZS)			X		
Spain (EA)		X	X	X	
Sudan (ST)			X		
Sweden (SK, SM)	X		X		
Switzerland (HB)		X	X	X	
Turkey (TA)			X		
Ukraine (UT)			X		
USA (W)			X	X	
USSR (UA, UB)			X		
Vatican (HV)			X		
Wales (GW)	X				
West Germany (DF, DJ, DL)	X	X	X		
Yugoslavia (YU)		X	X		

Do remember that when searching for exotic stations it is worth waiting and listening carefully, in the noise, for a possible weak reply after a station has typed "CQ DX", or more specifically, "CQ DX PACIFIC".

Time	Speed	Station	Location
1200	45	G4MMQ	Leicester
1230	45	G3VYV	Preston
1900	45	G4RSA	Fleetwood
3-590MHz (Time in UTC)			

Time	Speed	Station	Beam Heading
1200	45	G4ZRG	110
1230	45	G4ZRG	180
1400	45	GI4TSK	
1500	45	G4ZRG	145
1700	45	G4ZRG	75
1800	45	G4ZRG	300
1900	45	GOCPR	
14·090MHz (Time in UTC)			

Fig. 3

Time	Speed	Mode	Station	Location
1000	45	AFSK	GW6MOK	Llandeilo
1000	45	AFSK	G6KDK	Norwich
1000	50	FSK	G4VFT	Portsmouth
1100	45	AFSK	G6OQB	Torbay
1100	45	AFSK	G6MKK	Oxford
1100	50	AFSK	GW4HCO	Glasgow
1130	45 & 50	FSK	G8BBI or G8GEZ	Brighton
1200	50	FSK	G6AGK	Canterbury
1200	50	FSK	G6KHW	Biggleswade
1200	45 & 50	AFSK	G3LEO	Knutsford
1230	50	AFSK & FSK	G8GOJ	Croydon
1300	45 & 50	AFSK	G8STO	Gillingham
1800	50	AFSK	G6FGO	Gloucester
1830	45	AFSK & FSK	G6IVD	Cleveland
1830	50	FSK	G4KUG	Bristol
1900	50	AFSK & FSK	G8PYD	Maldon
1900	50	AFSK	GW8ZWD	Newbridge
1900	45	AFSK	G14SJB/G14SSF	Holywood/Belfast
2000	50	AFSK & FSK	G8MFP	Rugby

Make sure your RTTY reports reach Ron by December 24

SPACE & SATELLITES

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

by Pat Gowen G3IOR

OSCAR-10

The future of OSCAR-10 appears very bleak indeed now, and unless the slim chance of the battery discharge/recharge hope of resetting the memory succeeds over the period of the eclipse, we are now bound to lose the satellite long before its planned lifetime. After a period of transmitting garbled telemetry from both the engineering and general beacons, OSCAR-10 went totally silent on October 12. DJ4ZC and DB2OS report that in the first twelve days of October over 2000 errors occurred in the memory of the IHU, and that the chances of recovery and reloading the memory were almost nil. W0PN recently tried several thousand IHU reset commands without any success whatsoever, and just ten bytes put in on a pass were invariably missing by the time the satellite came round again. Control of the satellite attitude for solar panel orientation, transponder schedule, telemetry reading etc. became impossible, with the result that on October 12, Dr. Karl Meinzer announced that OSCAR-10 was officially abandoned.

This does not mean that further efforts will not be made, as miracles have been wrought before now, particularly during the first few critical weeks of this satellite. The latest eclipse peaked thirty per cent of orbit time during November, and the attitude and sunlight should be optimum around December 21, when a few more attempts at resurrection will be made. It will not enter a further eclipse until January 6, 1987, so do try having a look for it when you receive your issue, and around Christmas and the days following, when you may be in for an unexpected surprise.

Despite its many problems, OSCAR-10 can be said to have been a success, as following the near catastrophe of the impact with the Ariane launch vehicle third stage, then the resulting zero sun-angle, followed by the injection into the wrong inclination and the high perigee due to the one-off firing of the kick motor, we still ended up with a very useable and effective communications satellite, thanks to enormous efforts made by the dedicated international command and control team. If only a fraction of their care and consideration had been shown by some of the users, then we might still have the satellite alive today. It can be clearly evidenced that indiscriminate use and heavy loading imposed by high powered stations, frequently at times when either low powered or zero use was requested, was a major contributing factor to the early demise of OSCAR-10. It is also apparent that the majority of those who have been observed to regularly abuse the requirements are not those who have contributed towards its construction and running costs, as they are not AMSAT members, and thus are additionally probably ignorant of the limitations and standards of operating expected.

Although this is fundamentally a philosophical problem, engendered by educational limitations, unrestricted competitive behaviour and social non-awareness, the only long term answer seems to lie in overcoming the difficulties by technical means, and it would appear that a passband scanning a.l.c. system which attenuates individual signals by a proportion greater than the detected input level is the long term answer. Such a system is quite feasible, and has already been demonstrated in practice by the AMSAT-Italy group, who incorporated separately a.l.c. controlled split passbands in their transponder balloons. The AMSAT-F ARSENE satellite Mode "B" linear transponder is planned to have four separate 25kHz segments making up the 100kHz total passband, each with its own a.l.c. control system. (More about ARSENE next month). This technical innovation now needs to be implemented by the designers and builders of all forthcoming shared passband satellite transponder systems, otherwise amateur radio satellite operation will further become the prerogative of the most powerful and most arrogant only.

RS-5 and 7

Our old faithful pair are still going strong, and are suffering the outrages of a long eclipse as this column is being written, with each satellite having its transponder on for just four hours daily each morning. They return to full orbit sunlight and full time operation on December 10, and later in this column we give a complete list of orbits for one of the continuous activity days.

Phase III-c

A "declaration of intent", i.e. the document of the intention of AMSAT to fly the next Phase III satellite on Ariane, was signed by DJ4ZC and ESA to put what should be OSCAR-13 into a 1987 mission. The exact date, due to hold ups with the problematical third stage, is as yet unsure, but it could be as early as April, or as late as October, according to schedule variables.

JAS-1, JO-12, FO-12 . . . etc

A multi-plethora of names are now in use for our latest satellite, according to the source. Include OSCAR-12, and the flower name given in last month's column, and we have the basis for assured confusion. In operation, it matters not an iota, as to quote the immortal bard "A rose" (or in this case a 'Fuji' alias Wysteria) "by any other name smells just as sweet".

RS-9 and 10

Command station RS3A reports that the long awaited 1500–1800km orbit launch for the new pair is still unspecified, but that an earlier opportunity may arise toward the end of December to place them into a lower circular orbit of some 1000km, giving a 105 minute period, rather like OSCAR-8. Thus, they may accompany a forthcoming Meteor launch. Already the Geneva based International Frequency Registration Board has received notice of a pair of satellites utilising 75cm, 2m, 15m and 10m, so readers should carefully monitor the exact frequencies given in our earlier columns from the time when your copy arrives. Exact telemetry details are still awaited, but they are confidentially expected to be very similar to the previous RS series.

ISKRA-4

RW3DZ met PA0DLO recently, and reported that ISKRA-4 is complete, and ready to fly, but due to a heavy MIR schedule, might go up on a conventional rocket launch. If this is so, it will certainly be welcomed by communications fans, as the satellite would be active for many years instead of a few months maximum before providing meteor scatter as would be the case if launched from MIR or Salyut-7 like its predecessors.

Possibly some confusion may have arisen with another "ISKRA", as UA3CR checked the situation out, and found that ISKRA-4 is far from complete, the frequencies still remaining to be changed. "In fact" said Leo "it is unlikely to be finished for probably a year yet."

MIR & Salyut-7

RW3DZ also said that it has now been decided to use Salyut-7 for manned missions and space activities once again, and consequently it has been boosted to a higher orbit (as will be seen by the new set of Keplerian elements). MIR also has an impressive list of programmes awaiting later missions, but the planned USSR "Ham-in-Space" may be a little delayed, not due to work overload, lack of opportunity or of equipment, but merely because at this particular moment in time there are no licensed radio amateurs among the current cosmonaut crew.

UoSATs

UoSAT-OSCAR-11 has been in the same orbit as the scientific *Viking* spacecraft recently, and has been co-operating on an intensive series of experiments involving particle wave surveys.

Due to the prior urgency of the requirements, time has not been available to correct the libration (wobble) that has built up in the past few weeks, resulting in the satellite coming out of gravity gradient lock and not pointing to earth. An interesting series of experiments was planned to put COSPAS/SARSAT information onto the digitalker, and to organise a series of DCE tests with UA3CR and the 4K1KP Antarctic expedition that was to have arrived at the Drushniya base on the Antarctic iceshelf on Christmas day. On October 2 satellite photographs revealed that a massive piece of the ice shelf measuring 300 x 100km had become detached from the continent, and had broken into three pieces. On one of these is Drushniya, and it cannot be found, thus at least postponing the planned venture and experiments.

Higher, Higher Frequencies

This month, **John Branegan GM4IHJ**, sends some hints and tips for those equipped with the new microwave receivers, to help them find some satellite signals and interesting results.

GM4IHJ initially set up his microwave listening using the family of RSGB beacons around 1296·9MHz to first check coverage at the low end of the band. At the high end, the NOAA-9 Weather Satellite is a very useful signal, and serves as a good introduction to microwave orbiters. NOAA-9 flies a polar orbit coming down from the North Pole every 100 minutes or so in the mornings between 0100 and 0800UTC, then in the period up to noon it flies between UK and the North pole, changing in the afternoon to fly from the South up to the Pole, the last orbit of the day being around 1630UTC. Overhead orbits are to be found coming South at about 0500 and going North at about 1330, with all times given varying by up to plus or minus 50 minutes.

To find NOAA-9, first tune to 137·62MHz on its v.h.f. frequency, pointing your antenna North East in the mornings, but South in the afternoons. When you first hear the familiar "swish-swish" of the satellite weather picture transmission, retune to about 1707·020MHz and listen for a carrier which is rapidly moving lower due to Doppler shift. NOAA signals at 1·7GHz exhibit some 50–60kHz of

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0107	330	-1	71	79	4236kms
0109	338	2	77	68	3873kms
0111	348	5	81	46	3575kms
0113	358	8	82	2	3359kms
0115	10	9	79	327	3242kms
0117	23	9	75	311	3236kms
0119	34	8	69	303	3342kms
0121	45	6	63	299	3548kms
0123	55	3	57	296	3840kms
0125	64	-1	52	294	4200kms

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0310	344	-1	80	84	4195kms
0312	350	4	82	46	3660kms
0314	358	10	81	4	3160kms
0316	8	15	76	344	2715kms
0318	20	21	71	335	2357kms
0320	37	24	65	330	2130kms
0322	55	25	59	327	2080kms
0324	73	23	53	325	2219kms
0326	87	18	47	323	2516kms
0328	99	13	41	322	2924kms
0330	108	7	35	322	3404kms
0332	114	2	30	321	3930kms
0334	120	-3	24	321	4485kms

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0511	348	-1	82	89	4227kms
0513	349	5	81	43	3568kms
0515	350	13	77	18	2910kms
0517	352	22	72	7	2252kms
0519	356	35	66	1	1597kms
0521	2	52	61	357	950kms
0523	31	74	55	355	359kms
0525	135	70	49	354	460kms
0527	155	48	43	353	1099kms
0529	160	32	37	352	1750kms
0531	163	20	31	351	2408kms
0533	165	11	25	351	3068kms
0535	166	4	19	350	3729kms
0537	167	-2	13	350	4391kms

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0712	347	0	82	65	4169kms
0714	343	5	79	53	3573kms
0716	336	12	74	39	3006kms
0718	327	19	68	32	2496kms
0720	314	25	62	28	2075kms
0722	296	30	56	26	1809kms
0724	275	31	51	24	1771kms
0726	255	27	45	23	1972kms
0728	240	21	39	22	2352kms
0730	229	14	33	21	2839kms
0732	222	7	27	21	3387kms
0734	217	2	21	20	3970kms
0736	213	-4	15	20	4575kms

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0913	344	-1	80	89	4269kms
0915	335	2	75	72	3984kms
0917	326	4	70	64	3728kms
0919	315	5	64	59	3598kms
0921	304	5	58	56	3586kms
0923	293	4	52	54	3691kms
0925	283	2	46	53	3905kms
0927	274	-1	40	52	4209kms

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
1455	76	0	45	301	4101kms
1457	67	2	51	300	3864kms
1459	56	4	57	298	3728kms
1501	45	4	63	296	3703kms
1503	35	3	69	291	3794kms
1505	25	1	74	284	3992kms
1507	16	-1	79	266	4262kms

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
1646	139	0	20	334	4166kms
1648	134	5	26	333	3588kms
1650	127	11	32	333	3045kms
1652	117	18	38	332	2560kms
1654	104	24	44	331	2173kms
1656	86	28	50	330	1945kms
1658	66	28	56	329	1934kms
1700	48	24	61	326	2142kms
1702	34	18	67	323	2516kms
1704	24	12	73	316	2996kms
1706	17	6	78	304	3537kms
1708	12	0	82	276	4116kms

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
1844	189	0	15	4	4141kms
1846	189	6	21	4	3475kms
1848	190	14	27	3	2810kms
1850	191	24	33	3	2145kms
1852	193	38	39	2	1480kms
1854	196	57	45	1	818kms
1856	227	82	51	0	177kms
1858	359	67	57	358	525kms
1900	5	45	63	356	1184kms
1902	8	29	69	352	1846kms
1904	9	18	74	344	2509kms
1906	10	10	79	330	3171kms
1908	11	3	82	296	3832kms
1910	12	-3	81	251	4493kms

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
2047	238	0	26	33	4157kms
2049	244	5	32	33	3602kms
2051	251	11	38	32	3082kms
2053	261	17	43	31	2616kms
2055	275	23	49	30	2240kms
2057	292	27	55	29	2003kms
2059	312	27	61	27	1956kms
2101	330	25	67	23	2111kms
2103	345	19	73	17	2429kms
2105	356	14	78	5	2855kms
2107	5	8	82	338	3347kms
2109	12	2	82	292	3880kms
2111	17	-3	78	262	4437kms

RS5 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
2255	293	0	51	60	4114kms
2257	302	4	57	58	3756kms
2259	312	6	62	56	3469kms
2301	323	9	68	52	3271kms
2303	335	10	74	45	3179kms
2305	348	9	79	31	3201kms
2307	359	8	82	358	3335kms
2309	10	5	81	313	3567kms
2311	20	2	77	288	3880kms
2313	28	-1	72	277	4256kms

RS7 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0015	326	0	69	75	4179kms
0017	334	3	75	68	3845kms
0019	344	5	79	52	3560kms
0021	355	7	82	16	3401kms
0023	7	8	81	332	3323kms
0025	19	8	77	310	3351kms
0027	30	6	71	300	3485kms
0029	41	4	66	294	3712kms
0031	50	1	60	291	4017kms
0033	58	-2	54	289	4383kms

RS7 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0218	342	-1	79	84	4199kms
0220	349	4	82	50	3702kms
0222	357	9	81	5	3247kms
0224	8	14	77	341	2857kms
0226	21	18	72	330	2561kms
0228	36	20	66	325	2395kms
0230	52	20	60	321	2388kms
0232	67	18	55	319	2542kms
0234	81	14	49	318	2830kms
0236	91	9	43	317	3218kms
0238	100	4	37	316	3674kms
0240	107	0	31	315	4176kms

RS7 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0419	347	0	82	84	4169kms
0421	350	6	82	39	3524kms
0423	353	13	78	13	2882kms
0425	357	22	72	1	2248kms
0427	4	34	67	355	1630kms
0429	19	49	61	351	1059kms
0431	55	62	55	349	669kms
0433	108	58	49	348	798kms
0435	134	42	43	347	1301kms
0437	144	29	37	346	1902kms
0439	150	18	31	345	2532kms
0441	153	10	26	345	3175kms
0443	156	3	20	344	3824kms
0445	158	-3	14	344	4477kms

RS7 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0619	348	-2	82	95	4312kms
0621	345	4	80	56	3683kms
0623	341	11	76	37	3071kms
0625	334	19	70	28	2489kms
0627	323	27	64	23	1962kms
0629	306	36	59	20	1549kms
0631	281	41	53	18	1356kms
0633	254	38	47	17	1474kms
0635	234	30	41	16	1843kms
0637	222	21	35	16	2347kms
0639	214	13	29	15	2918kms
0641	209	6	23	15	3522kms
0643	205	0	17	14	4145kms

RS7 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
0820	345	-1	81	88	4253kms
0822	337	3	76	68	3858kms
0824	327	6	71	59	3543kms
0826	317	8	65	54	3331kms
0828	305	9	59	51	3241kms
0830	292	9	53	49	3284kms
0832	281	7	47	47	3454kms
0834	271	4	42	46	3732kms
0836	262	0	36	46	4097kms

RS7 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
1553	128	0	23	327	4170kms
1555	122	5	29	327	3638kms
1557	113	10	35	326	3156kms
1559	103	15	41	325	2752kms
1601	89	19	47	324	2463kms
1603	73	21	53	323	2334kms
1605	57	20	59	321	2391kms
1607	42	17	65	318	2622kms
1609	30	12	70	313	2987kms
1611	21	7	76	304	3444kms
1613	15	2	80	285	3961kms
1615	9	-3	82	244	4517kms

RS7 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
1749	178	-2	14	357	4297kms
1751	178	5	20	357	3630kms
1753	176	12	26	357	2965kms
1755	175	22	32	356	2303kms
1757	171	34	38	356	1645kms
1759	164	51	43	355	1001kms
1801	131	71	49	354	438kms
1803	44	67	55	352	521kms
1805	22	47	61	350	1113kms
1807	16	31	67	346	1759kms
1809	13	20	73	340	2415kms
1811	12	11	78	328	3075kms
1813	11	4	82	301	3736kms
1815	11	-2	82	256	4398kms

RS7 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
1951	227	0	22	27	4149kms
1953	232	5	28	26	3555kms
1955	238	12	34	26	2988kms
1957	247	19	40	25	2457kms
1959	260	27	46	24	2003kms
2001	278	33	52	23	1680kms
2003	302	35	58	21	1572kms
2005	325	32	64	19	1719kms
2007	342	25	69	14	2066kms
2009	354	18	75	6	2531kms
2011	3	11	80	350	3061kms
2013	9	5	82	314	3625kms
2015	14	-1	81	270	4210kms

RS7 ON 21/12/86

UTC	AZ	EL	LAT	LONG	GndRange
2157	278	-1	42	55	4260kms
2159	286	3	48	54	3645kms
2201	295	6	54	52	3469kms
2203	306	9	60	50	3214kms
2205	318	11	66	47	3039kms
2207	331	12	71	42	2983kms
2209	344	11	77	31	3050kms
2211	357	9	81	3	3234kms
2213	[illegible]	5	82	324	3315kms
2215	16	2	79	289	3871kms
2217	24	-1	74	274	4283kms

Fig. 1(a): Top. A complete list of orbits for December 21 on RS-5. (b): Above. The list of orbits for RS-7, also on December 21

Doppler shift in an overhead orbital pass, starting between 1707·02 and 1707·03MHz, and finishing up down near 1706·955 to 1706·965MHz. Naturally, overhead orbits have by far the biggest Doppler swing, and the strongest signals, but even orbits which scrape the horizon between the UK and the pole, with elevations as low as 4 degrees give quite clear signals.

All the previous assumes that you have some sort of effective antenna. Unfortunately, there is no such thing as a useful wideband commercial antenna for these weak non-local signals, so one cannot expect good results on a discone. Equally sad, whilst Yagis and corner reflector antennas work well, they only do so over a very restricted frequency bandwidth, thus one would need dozens of them to match the wide coverage of a receiver such as the R7000. The solution to the problem at the GM4IHJ QTH was to employ a helical antenna, as these have very wide bandwidth, and a sufficiency of gain. Thus, a helix designed for 1296MHz, such as that made to the design in Table 13.13 of the RSGB *Radio Communications Handbook,* Vol. 2, will pick up an excellent signal from NOAA at 1707MHz.

A real test of capability is to listen on 1694·503MHz, and point your antenna to the geostationary Meteosat, which has an azimuth bearing of about 174 degrees in Western UK, and some 180 degrees in Eastern England. Elevate your antenna at 28 degrees for Scotland, and about 34 degrees if you are in central England. Once detected, finally peak your antenna. The signal can be heard on a helix built to the RSGB specification made from $\frac{1}{2}$in copper heater pipe first wound in a tight spiral on a milk bottle, then removed and gently stretched to the right pitch. It should just pick up Meteosat indoors if you point it to the satellite through a glass window, but not through a wall, as such an attenuator reduces microwave signals dramatically.

There is no real substitute for a dedicated Yagi, QLY or dish with a GaAs-f.e.t. pre-amplifier, but these are not always suitable in all circumstances. Equipped readers are urged to try these microwave sources, the Doppler experiments of which alone will be found to be very interesting. Very soon now we shall be looking even higher in frequency when the first of the Direct Broadcast Satellites starts to beam TV programmes at Europe.

Sub-Horizon Paths

Readers will recall that in the August 1985 issue of *Practical Wireless* (pages 64 and 65) we discussed the fascinating topic of the sub-horizon propagation demonstrated by Sputnik 1 on 20MHz, UoSAT-1/OSCAR-9 on 21 MHz, and the 29MHz downlinks from both the RS series and ISKRA satellites. The relationship between source height (thus the incidence angle to the E and F layers of the ionosphere) and the effect of the change of MUF and Sunspot number on the path was demonstrated. ISKRA, at only 340km, was well in the F2 layer, and the readings from this satellite were only made possible during its short life around solar maximum. Since then, we have had a continuous ionospheric orbiting source as a signal from the Cosmos-1686 beacon attached to Salyut-7, and have earlier indicated the sub-horizon capability of this even during the present quiet sun years. John Branegan GM4IHJ, has been deeply studying the phenomena, which has changed considerably since the high solar flux times, with the overhead passes now being rarely attenuated as they frequently were previously.

John has written a comprehensive paper on his findings and considerations, which whilst far too detailed for full and adequate presentation within the space limitations of our column, allows us to present the main factors of apparent dependency.

By accurately scaling the signal path to the E and F layers, by calculating solar illumination on the points of incidence and also the absorption of the path between the signal scatter points, and then interposing the path and the orbital height of the source, he integrated the points of beacon audibility as shown on Fig. 1. The result was quite revealing, inasmuch as it clearly showed that secondary ground reflection, hitherto assumed to be a major constituent in accounting for signals propagated beyond a single "skip" distance, are an artefact produced by using the wrong scale relationship of ionospheric height to earth radius.

John took his data records during solar minimum on days when the temperate zone critical frequency averaged 6 to 6·6MHz, thus to afford a maximum usable frequency for oblique incidence propagation of about 20MHz, in other words almost optimum for this 19·955MHz spacecraft signal. Given this situation, he finds that the general rules for sub horizon propagation (to Scotland at least) appear to be as follows:

1. Overhead transmissions are invariably heard strongly without fading.
2. Above horizon low elevation signals are strongly attenuated.
3. Sub horizon signals are infrequent in the dead zone just beyond the station horizon, but, beyond that zone, single refraction signals are quite common both to East and West, except at local noon to early afternoon, allowing the spacecraft to be heard both approaching and receding out to 6000km.
4. Extended dual refraction propagation is a feature of the sunset zone only at least as far as this survey is concerned, but checks of the sunrise zone must be made when the spacecraft orbit permits this. In the sunset zone propagation from 10 000km is possible.
5. Only two examples of near antipodeal propagation were heard during the period of the survey, and more data is necessary before any further evidence can be given on this effect.

The value of satellite signals, coming at varying angles through, off, and via the ionosphere, cannot be over estimated, and offers a unique avenue of propagational evidence on the behaviour of the ionised zones that we depend upon for our communications.

The Keplerian Elements, kindly supplied via AMSAT (KA9Q and WA2LQQ)

Satellite	NOAA-9	NOAA-10	MIR	Ajisai
Cat. No	15427	16969	16609	16908
Epoch Time	86 275·07090707	86 263·37924062	86 282·00347298	86 266·91943289
Element Set	123	4	333	8
Inclination	99·0110°	98·7478°	51·6157°	50·0065°
RAAN	234·0599°	291·3653°	9·5266°	123·8119°
Eccentricity	0·0014951	0·0012639	0·0025359	0·0011599
Arg of Perigee	210·9008°	267·3148°	308·2140°	329·3953°
Mean Anomaly	149·1284°	92·6585°	51·5731°	30·6692°
Mean Motion (r.p.d.)	14·11450398	14·22468364	15·76191246	12·44367112
Decay Rate (r/d²)	$1{\cdot}62e^{-06}$	$-1{\cdot}9e^{-07}$	0·00017764	$1{\cdot}7e^{-07}$
Epoch Rev (Orbit No)	9290	38	3646	524
SMA (km)	7229·734	7192·311	6719·898	7866·956
Amon. Period (min)	102·022714	101·232480	91·359472	115·721477
Apogee (km)	867·900	844·101	366·906	1501·189
Perigee (km)	846·282	825·920	332·824	1482·939
Ref. Perigee	3196·04155814	3184·36114639	3202·99438407	3187·91258666
Beacon Freq (MHz)	136·77		143·625	

Satellite	Salyut-7	OSCAR-9	OSCAR 10	OSCAR-11	OSCAR-12	RS-5	RS-7
Cat. No	13138	12888	14129	14781	16909	12999	13001
Epoch Time	86 281·93556610	86 279·20114499	86 271·18990212	86 271·24844203	86 258·16422278	86 277·32000434	86 276·77394535
Element Set	353	942	267	172	11	352	276
Inclination	51·6161°	97·6555°	26·7942°	98·1350°	50·0157°	82·9538°	82·9549°
RAAN	24·7271°	284·2612°	57·7437°	336·7085°	150·7252°	47·3270°	40·8216°
Eccentricity	0·0001577	0·0003789	0·6030315	0·0012793	0·0010929	0·0008653	0·0022938
Arg of Perigee	69·4037°	52·1908°	147·4818°	194·8318°	304·3322°	179·5237°	98·8071°
Mean Anomaly	290·7174°	307·9660°	271·1833°	165·2505°	55·6478°	180·5920°	261·5590°
Mean Motion (r.p.d.)	15·30644453	15·28741574	2·05878541	14·62072098	12·44393027	12·05055654	12·08700001
Decay Rate (r/d²)	$2{\cdot}399e^{-05}$	$-1{\cdot}462e^{-05}$	$-3e^{-08}$	$6e^{-07}$	$-2{\cdot}5e^{-07}$	$1{\cdot}2e^{-07}$	$1{\cdot}3e^{-07}$
Epoch Rev (Orbit No)	25749	27792	2476	13742	414	21101	21158
SMA (km)	6852·533	6854·675	26103·566	7061·703	7866·846	8033·830	8017·663
Amon. Period (min)	94·078020	94·195123	699·441522	98·490355	115·719067	119·496556	119·136262
Apogee (km)	486·983	492·239	35467·949	693·965	1505·860	1662·638	1678·479
Perigee (km)	484·821	487·044	3985·404	675·897	1488·665	1648·735	1641·697
Ref. Perigee	3202·94813934	3200·21059975	3192·30973639	3192·21704623	3179·15180088		3197·7985686
Beacon Freq (MHz)	19·955 (COSMOS)	145·8250	145·809	145·826	435·7970	29·331 & 29·459	29·341 & 29·502

Whole-day Passes

Our list of all orbits given for OSCAR-12 in the November column proved to be extremely popular, and brought a lot of first time activity for many readers, who found the satellite easy to follow, and enough to awaken their interest to take the steps to get on regularly. Even veteran satellite operators such as G3POX managed to hear FO-12 for the first time, and many who were already active were grateful for tracking confirmation.

For these reasons we have repeated the idea, but this time giving all the passes of the UTC day for both the RS-5 and RS-7 satellites. We have chosen Sunday December 21, as the satellites will then be out of eclipse, interspersed, and have their transponders and even Robot's on continuously. Readers will have their magazine, and hopefully should have a free day over the weekend.

The print-outs come from GM4IHJ's "redstar" program for the Sinclair 48K Spectrum Computer, and will perform for all of the existing and forthcoming "RS" satellites. It is available from SARUG, the Sinclair Amateur Radio Users Club, G4INP QTHR.

RS-5 and RS-7 have separate blocks under Fig. 1, and the columns read vertically the UTC (GMT) time in two minute steps from the time that the satellite appears over the UK horizon (AOS) until it drops below (LOS). From left to right we have the time, the satellite azimuth degrees true from the UK, the elevation in degrees above level horizon, the latitude, followed by the longitude of the point of earth over which the satellite is at the time, and finally the distance to that in kilometres. Stations situated in the corners of the UK may find the timings and bearings are out by a very small amount, as these passes are based on your writer's QTH in East Anglia.

The first passes of the day are going from NNW to E, and are good for those who are unable to elevate their antennas, as they are low-angle polar passes to us. W's, VE's and KL7's should be on at the start, and UA9's and 0's at the end. This, and the next two passes will be little used, and modestly powered stations should get good returns. The third pass is almost overhead, and will work well for those with high-angle antennas such as turnstiles and crossed dipoles, a few watts working well. By the fourth pass, lots of Europeans will be up and active, so the passband may be crowded with many stations. The following pass from our NNW to W is excellent for the USA and Canada, and should provide lots of transatlantic activity, again with no need to elevate one's antenna. We then have a gap, as the next two orbits take the passes behind the pole, subhorizon to the UK, and we start again in the afternoon with passes going from E to NNE, good for the USSR DX. This is followed by high angle passes over Europe, whilst our last pass of the day is the best of all for the USA and Canada, coming from our W to NNE, up the Atlantic seaboard of the USA to give optimum American DX to Europe.

It would be interesting to compare some of the stations heard on what will otherwise be a very dead 28MHz band, and logs would be appreciated. Remember to listen between 29·410 and 450MHz for RS-5, 29·460 to 500 for RS-7, with the beacons on 29·450 and 501MHz respectively. RS-7 may have its Robot on 29·340MHz, too! On each successive day, passes will be a few minutes earlier.

Reports to arrive by December 24

VHF BANDS

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

by Ron Ham BRS15744

While observing the sun with his spectrohelioscope on September 20, 21, 22, 25, 26 and 28, **Cmdr Henry Hatfield** in Sevenoaks, found an average of 2 or 3 filaments and a few quiescent prominences on each occasion.

"Active areas were recorded again on the 29th and 30th when a small single spot came around the east limb on the 29th," wrote Bruce Hardie, in the October issue of *Solar News*. Bruce included in his column two drawings of the prominences seen, on both limbs, at 0944 on the 30th.

"Radio aurora was reported by a GM in Fraserburgh at about 2200 on the 24th and the continuously recording magnetometer, operated by Karl Lewis in Saltash, recorded storms at 2145 on the 24th and at times on the 25th," said **Ron Livesey** from Glasgow. He is the auroral co-ordinator for the British Astronomical Association. Ron's own magnetometer indicated storm conditions on days 20, 22 and 23 and the Observatory at Boulder, Colorado, reported a minor storm between days 23 and 27.

Unfortunately for **Bob Anderson** in Johannesburg, the skies were overcast from the 26th to the 30th. However in Selsey, **Patrick Moore** observed a single sunspot on October 2. Boulder reported a minor storm between the 2nd and 5th and quiet homogeneous glows were observed from 2145 on the 2nd to 0040 on the 3rd by Maurice Scollay in Kirkwall and the Met. office at Wick.

"There was the odd aurora during this period, but none at this location came to any great intensity or duration," wrote **Lawrence Morgan GM0ATQ** in Greenock. He continued, "I managed to catch EI6GF and a few GMs on the 13th, but the odd thing was how westerly the Aurora manifested. I could hear the German 144MHz beacon DL0PR, beaming about 340° only and while I was beaming around 5°, I heard a station that was located to the south-west of me via a mixture of tone-A and tropo, but when I beamed to 350°, his signal went 100 per cent auroral. I then checked the beacons and found DL0PR again and GB3LER, which is usually inaudible at this QTH".

At 1540 on October 20, Patrick Moore observed the sunspot group seen in Fig. 1.

Information about *Solar News* and the supply of solar blanks for sunspot drawing is available from the Editor, Bert Chapman, Brindles, Mill Lane, Hooe, Battle, E. Sussex TN33 9HT.

The 28MHz Band

"Who says ten is dead?" asked **Dave Lingard G0CLH**, Birmingham. During the opening on October 13 he received signals, at good strengths, from stations in CX, LU and PY. "The 14th and 15th were quiet, except for Europeans, the 16th turned up YC2CTW and listening around at 1000 on the 17th, VK2JY and VK4WB popped up and so did my blood pressure," said Dave. That's not all, on the 18th he heard signals from CT, EA, F, HA, I, IT9 OK, PA, UA3, UA6, UA9, UM8, ZC, ZS and 4X6 on 29MHz f.m., followed on the 19th with CE, EA, LU1AJP, LU3XQB and Z21EV and on the 20th, HC4, YB0, YC0 and 7X3 were heard. This lot elevated Dave's score to 87 countries logged since 1 January 1986. Not bad in a quiet year.

Fred Pallant G3RNM in Storrington, heard several ZS stations working Italians on the 14th and at 1225 on the 21st, he logged signals from GM, LA and OE at various strengths. "There seems to be more DX around now, but not having a beam here I can't always work it," wrote **Don Hodgkinson G0EZL**, Hanworth. However, between October 6 and 18, he exchanged reports with C53CR, F6BZA/P/7X, LU1ASP, LU3AJW, UA9MR and YC1EHR and heard stations in CE, CX, J28, PY, VP8, ZP5, ZS6 and Z21.

Propagation Beacons

My thanks to **Chris van den Berg** in The Hague, **Len Fennelow G4ODH** in Wisbech, Henry Hatfield, Don Hodgkinson, Norman Hyde, **Bill Kelly** in Belfast, Dave Lingard, Lawrence Morgan, **Ted Owen** in Maldon, Fred Pallant, **Gordon Pheasant G4BPY** in Walsall and **Ted Waring** in Bristol, for their detailed logs and comments, helping me to prepare Fig. 2, and 28MHz beacon chart.

"Some European beacons are still coming through and since October 13, when I first heard 3B8MS, the African beacons have been heard more frequently," wrote Don Hodgkinson on October 21.

In addition to a good haul of African, European and South American beacons, Gordon Pheasant received signals from the Adelaide Is beacon VP8ADE on the 18th and 19th. Gordon uses a Sinclair computer to control his receiver for beacon observation and wrote, "One of the great features of the QL is the possibility of extending the BASIC keyword list with specialised procedures and functions. Now that I have got into the QL machine code programming, I have been able to write a complete set of keywords, RX-ON, RX-OFF, RX-MODE and TUNE, which are purely for commanding the FRG-8800." He also has a function RXMD, which returns his receiver to the mode he was currently in, i.e., "If the computer has set a mode via RX-MODE and has switched the receiver on, I can simply type RX-MODE 'FM' and TUNE 29·6 to put the receiver on the f.m. calling channel." What about it readers, are any more of you using computers like this?

"The 14MHz beacons to the west and south have been very consistent," wrote Len Fennelow. He looked for their signals daily from September 12 to October 11, as can be seen from Fig. 3. He commented, "OH2B has been quite erratic, however at the time of writing, it was appearing again at 599."

Both Norman Hyde and I logged signals from the 50MHz beacon at Potters Bar GB3NHQ, on most days during this period and Norman copied the Anglesey beacon GB3SIX, via meteor scatter, on each day that he observed.

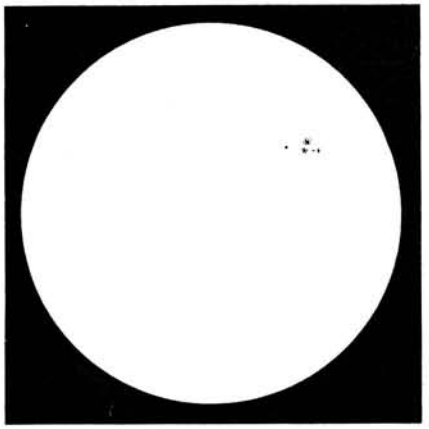

Fig. 1

The predominantly high atmospheric pressure between September 20 and October 19 enabled Don Hodgkinson to receive signals on September 22 and 23 and October 4, 8 and 9 from the v.h.f. beacon in Angus GB3ANG—144·975 MHz and daily from the beacons in Cornwall GB3CTC—144·915MHz and Wrotham GB3VHF—144·925MHz. He also received FX3THF—144·905, on most days and ON4VHF—144·985MHz on September 22.

From The Hague, Chris van den Berg logged GB3CTC on September 20, 21, 25, 26 and 30 and October 11 and 17, FX3THF on days 22 and 26, ON4VHF consistently from September 24 to October 5 and GB3VHF every day.

Tropospheric

The atmospheric pressure (Fig. 4), measured at noon and midnight at my QTH was predominantly high and above 30·0in (1015mb) from September 26 to October 17. It was below this "magic" line from the 18th to the 25th as rain and gales swept across many parts of the UK. Similar barometer readings were taken by Ted Owen in Maldon. As usual, the high pressure period was good for v.h.f and u.h.f. communications.

"I heard GB3CTC for the first time on September 29 and worked a few stations down the west coast, which is normally a difficult path for me," wrote Lawrence Morgan. On October 6, Lawrence heard a GW station on 144MHz while his antenna was facing north-east and by turning his beam he was able to work GW4VEQ and GW4WJO. "I was very lucky to be around as the band opened, because after about 5 minutes their signals sank back into the noise," said Lawrence. He told me that GM0EWX and GM1JAY are active from Skye, in WR square, on 144MHz s.s.b. and are looking for contacts in the south.

Toward the end of September, Bill Kelly received signals through the 144MHz repeaters in Ayr GB3AY on R2, Berwick upon Tweed GB3BT on R4, Burnley GB3RF on R7, Buxton GB3HH on R4, Dublin EI1DK on R0, Duns GB3SB on R2, Elgin GB3SS on R0, Longbridge GB3AM on R6, Moel-Y-Parc GB3MP on R6, Perth GB3PR on R3, Powys GB3PW on R3, Sligo EI7CS on R4 and Stockport GB3MN on R2.

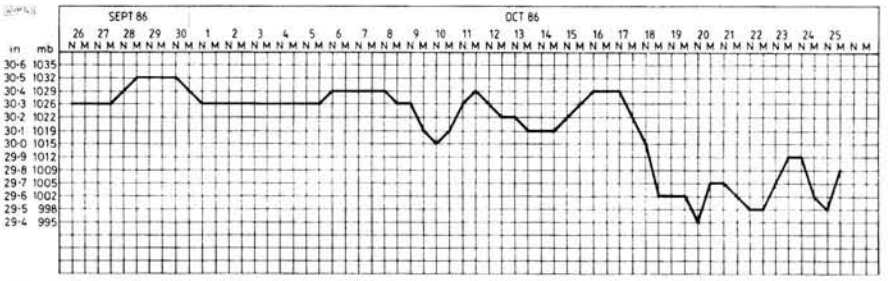

Fig. 2 ▲

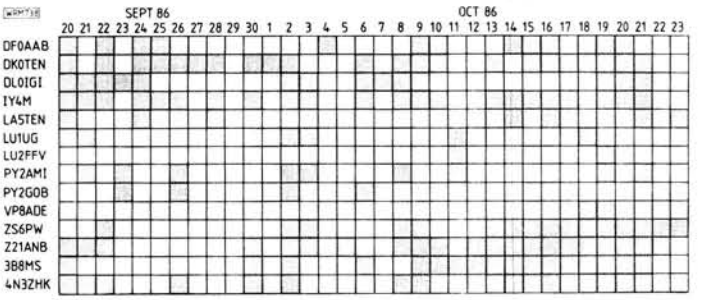

Fig. 3 ▶

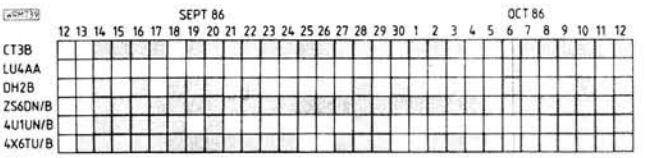

Fig. 4 ▶

◀ Fig. 5

During the openings on September 30 and October 4, 5 and 10, **Ross Neilson G4ZNZ** in Filey, worked stations in Austria, Czechoslovakia, East and West Germany and Poland thus bringing his confirmed totals to 65 QTH squares and 15 countries on 144MHz, since September 1984. He uses an FT-726R or FT-480R, plus a 100W Microwave-Modules Linear into a 14-element Yagi.

934MHz CB

In Caerphilly, **Noel Smythe CD 01**, is active on the 934MHz Citizens Band and while conditions were good he had QSOs with fellow enthusiasts in Devon, Middlesex and Sussex. I would be pleased to hear from other readers who use this band.

Band II

At 1857 on September 21, **Andrew Lomas** in Barnsley, heard the Independent Local Radios Broadlands, Chiltern and Wyvern, around 97MHz. For the first time and on the 24th he added Hereward Radio to his log. "There was intense activity on the 30th with many French, German and possibly Belgian stations throughout the range from 97 to 106MHz," said Andrew. He logged more DX at various times between October 1 and 6 and asks, "Did anyone else record similar happenings?"

Chris Wood in Co. Durham did! He received BBC Radios Lanchashire and Shropshire and ILRs Leicester Sound, Signal Radio, Radio Aire and Red Rose.

Bill Kelly logged BBC Radios Cumbria, Essex, Manchester and WM, ILRs Downtown Radio, Piccadilly Radio and Radio Trent, Manx Radio and RTE-3. Bill also received a QSL card from BBC Radio Essex, Fig. 5, acknowledging his reception of their signals on September 30.

In Glasgow, **Alexander Little** also heard Downtown and Manx Radios in addition to BBC Radios Cleveland and Newcastle and ILRs Metro Radio and Radio Tay. During the Sporadic-E opening on September 20, he heard an Italian station giving traffic news for Milan and a strong signal from Spain, around 88MHz, which he thinks was Radio Cadena Compass.

Around mid-day on the 20th, **Ian Smith** in Paisley, logged signals from Italy-RAI 1 and Radio Roma, Spain and Radio Telelefis Eireann.

At St. Leonards-on-Sea, **Harold Brodribb** also heard the DX and reports that during the summer months he received stations, on almost every channel between 87·6 and 108MHz and, with the aid of the Radio France list, he identified and heard 24 stations carrying Culture, Inter and Musique programmes, seven Radio France "locales" stations, which make individual calls and 17 "libre" stations, with all but four identified by their calls.

TELEVISION

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

by Ron Ham BRS15744

Detailed logs this month have been received from **Mike Bennett** (Slough), **Frank Brisley** (Leyland), **Harold Brodribb** (St. Leonards-on-Sea), **Len Eastman** (Bristol), **George Garden** (Edinburgh), **Simon Hamer** (New Radnor), **Edwina and Tony Mancini** (Belper), **David Meredith** (Dudley), **Lawrence Morgan** (Greenock), **Ron Shaw** (Telford), **Ian Smith** (Paisley) and **Noel Smythe** (Caerphilly).

I learnt with regret that Frank Brisley passed away recently. So this month I have given his Band I report pride of place. We extend our sympathy to Frank's family and to his many friends.

Between May 26 and August 14, Frank logged various television adverts, captions, clocks, logos, programmes and test cards, via Sporadic-E. These were from stations in Austria—ORF FS1; Czechoslovakia—CST 01 and RS-KH; Finland—YLE TV1; Iceland—RUV Island; Italy—RAI 1; Norwegian Regionals Norge—Bagn, Hemnes, Melhus and Stengen; Portugal—RTP1 and LISB-1; Spain—RTVE and Barcelona; Sweden—TV1 Sverige; USSR and Yugoslavia—JRT.

Among the highlights in Frank's log were seeing World Cup football and the Royal Wedding from Spain, and a chess demonstration from the USSR.

It is this type of report that encourages readers like **Bob Attride** in Windsor to enquire about adding DXTV equipment to their stations. My quick advice is, get yourself a 625-line television receiver which has separate rotary or sliding scale type tuners for the v.h.f. Bands I—Chs. E2–4 and III—Chs. E5–12 and the u.h.f. Bands IV—Chs. 21–38 and V—Chs. 39–69. Then, be patient, because in general DX will only appear in Band I while Sporadic-E is present and in Bands III, IV and V during a tropospheric opening.

Although, as readers have shown many times, a few Sporadic-E disturbances do occur during the winter months, the main season for sudden out-breaks of Sporadic-E lies between April and September, peaking in June and July. A tropospheric opening is most likely to occur when a prevailing high pressure system is on the move (watch the TV weather charts) and your barometer is indicating a fall. A copy of the *World Radio TV Handbook*, is an excellent source of information about the channel numbers and frequencies used by overseas networks.

Band I

Reference to Fig. 14 shows that out of season DX does happen in the lower v.h.f. range, especially around Chs. E2 (48·25) and R1 (49·75MHz). This is a most sensitive area to even the mildest form of Sporadic-E and these are frequencies where rapid snips of pictures are often received via meteor trail reflection. The chart covers the period September 20 to October 23, and "really good" appears to be the general opinion of the Sporadic-E disturbance on the 20th which, for a while, extended to the 144MHz band.

Back in July, the Mancinis sent a reception report to DDR and in September they received that station's QSL card, Fig. 2, and a transmitter frequency list in reply. They also received a list of frequencies and a QSL card from Portugal-RTP and Radio Moscow, respectively, acknowledging their television reports. Many TV enthusiasts have a camera ready to record that bit of special DX and this time I have pictures from Estonia and Poland (Figs. 3 and 4) received by Len Eastman, Spain (Fig. 5) by Noel Smythe and the Russian programme

Country	DXer 1	2	3	4	5	6	7
Belgium	X	X	X	X	X	X	X
France	X	X		X	X		X
Germany	X	X		X	X	X	X
Ireland			X	X	X		X
Luxembourg	X	X					X
Netherlands	X		X	X	X		

DXers ▲ **Fig. 1**

1 Mike Bennett
2 Harold Brodribb
3 Len Eastman
4 Simon Hamer
5 The Mancinis
6 David Meredith
7 Noel Smythe

1 Mike Bennett
2 Len Eastman
3 Simon Hamer
4 E & T Mancini
5 David Meredith
6 Lawrence Morgan
7 Ian Smith
▼ 8 Noel Smythe

Country	DXer 1	2	3	4	5	6	7	8
Austria	X	X	X	X		X		X
Czechoslovakia		X	X	X				X
Denmark				X				
East Germany				X				
Hungary		X	X			X		
Iceland		X	X					
Italy		X		X			X	X
Norway			X	X				
Poland	X	X	X	X				
Portugal			X	X	X			X
Spain	X		X	X	X	X	X	X
Sweden			X	X				X
Switzerland			X	X			X	
USSR	X	X	X	X			X	X
West Germany			X	X	X			
Yugoslavia	X	X	X	X	X		X	X

Fig. 14 ▲

Fig. 2: QSL from DDR

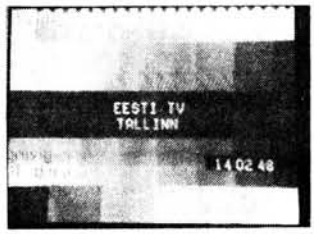

Fig. 3: Estonia testcard with clock

Fig. 4: Excerpt from Polish programme

Fig. 5: TVE Spain

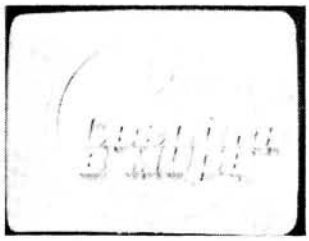

Fig. 6: World affairs caption from USSR

Fig. 7: RTL Luxembourg via Band III tropo

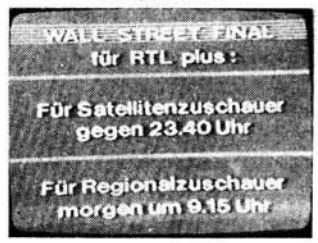

Fig. 8: RTL on Band III

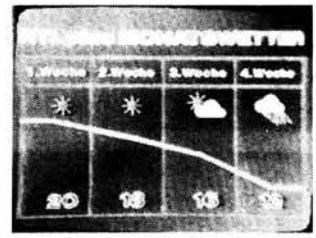

Fig. 9: RTL weather on Band III

Fig. 10: RTL cine club caption

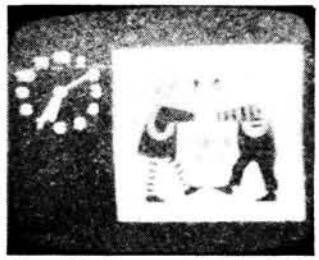

Fig. 11: Denmark clock interlude on Band III

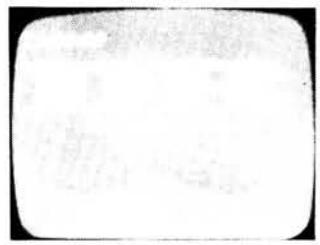

Fig. 12: Denmark close down sequence on Band III

Fig. 13: Scottish TV caption on Band V

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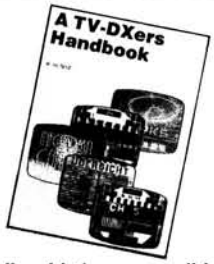

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caption *Today in the World* (Fig. 6) by the Mancinis.

Tropospheric

"The tropo excelled itself this month," wrote Mike Bennett. He found that the period October 4 to 10 was exceptional, with signals on all Band III channels from early morning until late at night.

"Conditions were really good on the 4th," said Simon Hamer, adding, :'I received pictures from Denmark on Ch. E10, while mobile. My set was on the passenger seat of my car and using its own rod antenna".

Noel Smythe received strong colour pictures on Ch. E7, from Luxembourg—RTL (Figs. 7, 8 and 9) on several occasions and at 1930 on the 3rd, he saw a Cine Club programme (Fig. 10) from a West German station on Ch. E8.

Both Simon Hamer and the Mancinis reported watching *Yes Minister*, with subtitles, from Danish Television DR, on Ch. 7. Furthermore, they received signals from Denmark on all of their Band III channels. Among the many pictures recorded by the Mancini's camera, during this period, was a clock interlude (Fig. 11) and the close down sequence (Fig. 12) from DR Radioavisen.

From his QTH in Telford, Ron Shaw received good colour pictures in the u.h.f. band from the IBA networks, Anglia, Thames, HTV and TVS and after the BBC-1 news at 2100 on September 29 he identified programmes with a local flavour from the South and Wales.

Strong signals, often in colour, were received at various times in Bands III, IV and V, from many parts of Europe by readers listed in Fig. 1. The reports include such idents as BRT TV1 and RTBF-1 from Belgium; TDF A2/RES-2, Canal Plus, FR3/RES-3 and TF1 from France; ARD/ZDF, BR-1, DDR, HR-1, NDR-1 and 3, SWF and WDR from Germany; PTT-NED-1 and 2 from Holland; RTE-1 and 2 from Ireland and RTI Plus from Luxembourg. All Ireland football, basketball, various popular films and music, and news features, *Akuelle Kamera, Taggesschau* and *Nos Journal* and a variety of adverts, cartoons and children's programmes were also mentioned in the letters.

Unlike Sporadic-E disturbances, which usually last for a few hours, tropospheric openings can, depending on the weather, ebb and flow for several days and conditions were no doubt right again for Brian Buckley, in Dungannon, to receive pictures from the BBC and/or the IBA in Scotland, Fig. 13, as he did during similar circumstances in August 1985.

George Garden took his set and amplified loop antenna up on Cairn O' Mount and feels sure that he identified signals from a new, vertically polarised, transmitter at Gartly Moor, around the Huntley direction, in Aberdeenshire, on Ch. 61. "I saw an advert for Inverurie, so this signal was definitely coming from the Grampian transmitter region," said George. Then he climbed to the summit, some 450m a.s.l. and received strong pictures, in colour, from Border Television's Selkirk transmitter on Ch. 59.

Amateur (Fast Scan) Television

"A proposed 24cm repeater is awaiting the licence and should be on the air in north Bristol during 1987," wrote Len Eastman G8UUE, of the Bristol FM TV Group. "There is a very great interest in 23 and 24cm in Bristol," said Len, who told me that G0DRX, G1IXE, G1IXF, G4BVK, G4YQR, G4ZQF, G8GLQ, G8VPG and G8UUE are among those already active in the area.

Reports must arrive by December 24

MW BROADCAST BAND DX

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

by Brian Oddy G3FEX

Due to an agreement between the BBC and the Monserrat based Antilles Radio Corporation, the BBC World Service news and current affairs programmes are now rebroadcast to the Caribbean area three times a day via its powerful 200kW transmitter on 930kHz.

During daylight hours, their signals reached as far south as Guyana and to the US Virgin Islands in the north. At night they reach Cuba and Nicaragua. However, as all dedicated DXers will realise, night-time propagation conditions may well permit reception in other areas. Now that the winter period has brought the long hours of darkness needed by DXers on this side of the Atlantic, it is well worth looking out for these signals. Radio Antilles was founded in 1963 and already rebroadcasts programmes from the Voice of America, Radio Canada International and the German External Broadcasting Service, Deutschwelle.

The BBC has also reached an agreement with the American Public Radio system. Now, over three hundred stations across the US can carry the BBC World Service news bulletins, Radio Newsreel and current affairs output. This includes *The World Today, Twenty-four Hours* and *Outlook* along with financial and sports news. These reach APR via the Atlantic Ocean satellite and are then distributed to their affiliated stations. So, when tuning across the m.w. band in a search for DX, don't just dismiss the BBC World Service as a local signal, for it could be arriving from the Caribbean or the USA!

DX Report

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

Transatlantic DX: With the advent of the longer nights and steadily improving conditions, many transatlantic signals have been heard in the UK. Some of the signals have been arriving here much earlier than hitherto, for example **George Morley** of Redhill has heard CJYQ, located in St. John's, Newfoundland, as early as 2225 on 930! CJYQ makes a very good guide to band conditions and for anyone trying their hand at transatlantic DXing for the first time it is likely to provide the indescribable thrill of hearing medium wave signals from across the Atlantic without staying up well into the small hours of the night!

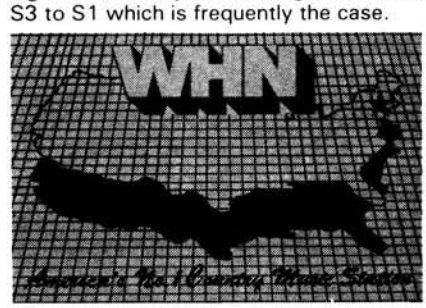
Using a Trio R2000 receiver, George has heard both VOCM 590 from St. John's and CBGY 750 located at Bonavista Bay, Newfoundland, around 0100. From the USA he heard WBZ 1030 and WMRE 1510 both in Boston, but found their signals were only fair. Those from WCAU in Philadelphia on 1210 were distinctly poor. The most consistent signal from the USA was WINS 1010 in New York.

Tim Shirley, who has been checking the transatlantic DX scene in Bristol, heard WINS at 0130 followed by WHN 1050, also in New York, at 0230 using his Trio R600.

Signals from the Caribbean area have been good and Tim says his best DX so far was the Caribbean Beacon, Anguilla on 1610—he is now awaiting their QSL. He also logged ZDK in Antigua on 1100 at 0330, which has not been reported recently. A QSL card and pennant have been received after only three weeks following his reception of Radio Globo from Rio de Janeiro, Brazil on 1220 at 2300. This station is frequently a very good signal in the UK quite early on and no doubt Tim's news about the QSL prospects will encourage other DXers to listen out for this one!

In Pontypridd, **Graham Powell** has been checking the band with a Trio R2000 receiver between 0005 and 0530UTC and logged three stations from S. America—Radio Rumbos in Venezuela 570; Radio Globo in Sao Paulo, Brazil 1100; Radio Globo in Rio 1220. From Anguilla he noted the Caribbean Beacon broadcasting Evangelical programmes on 1610. Turning to the USA, he logged WINS 1010; KDKA in Pittsburgh 1020; WBZ 1030; WHN 1050; WBAL in Baltimore 1090; WNEW in New York 1130; WCAU 1210; WMRE 1510 and WQXR in New York on 1560. From Newfoundland he picked up VOCM 590; CKYQ in Grand Bank 610; CKVO Clarenville 710 and CJYQ 930—altogether a most impressive list!

In an interesting report from Bolton, **Michael Sargeant** says that until he decided to stay up and really check the band one night, the only transatlantic DX signal he had ever received was the Caribbean Beacon on 1610. That night, after finding the Caribbean Beacon to be audible at 0130, he carefully tuned around the band and heard his first ever signal from the USA, namely WCAU in Philadelphia on 1210 at 0220! WBAL on 1090 was next at 0230, followed by Boston's "memory station" WMRE at 0246. At 0253 he came upon his first Canadian station, namely CHUM 1050 in Toronto and by 0305 had added New York's WINS on 1010 and CJYQ from St. John's, Newfoundland, on 930. Michael found that the signals were subject to fading, from about S3 to S1 which is frequently the case.



QSL card from WHN sent to Roy Spencer

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

Freq (kHz)	Station	ILR/ BBC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1161	R. Tay	I			D											N
1161	GWR	I											X			
1161	R. Bedfordshire	B						D					X			N
1170	Swansea Sound	I								N						
1170	R. Orwell	I						D								
1170	Ocean Sound	I														N
1170	Signal R.	I											X			
1242	Invicta Sound	I						D								
1251	Saxon Radio	I		X				D								
1260	GWR	I				X										
1260	Leicester Sound	I						D					X			
1278	Pennine R.	I									X					
1305	Red Dragon	I				X			D							
1323	R. Bristol	B			D											
1332	Hereward R	I						D					X			
1359	Essex R.	I						D								
1359	Red Dragon	I				X										
1359	Mercia Sound	I											X			
1368	R. Lincolnshire	B						D								
1431	Essex R.	I						D								
1449	R. Cambridgeshire	B						D								
1458	R. London	B						D								
1476	County Sound	I						D								
1485	R. Merseyside	B									X	D				
1521	R. Mercury	I						D								
1530	Pennine R.	I			D											
1530	R. Essex	B					D	D								
1530	R. Wyvern	I			D									N		
1548	Capital R.	I						D		N						
1548	R. Bristol	B								N						
1548	R. Forth	I			D											N
1548	R. City	I	X										D			
1548	R. Hallam	I		X												
1557	Hereward R.	I			D			D								
1557	R. Lancashire	B					D									
1557	Ocean Sound	I														N
1584	R. Tay	I													X	
1602	R. Kent	B						D								

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

Fig. 1 ▲

1 Roy Degg, Stoke-on-Trent
2 Bill Eyre, Stockport
3 Rab Freeman, Port Glasgow
4 Alan Jarvis, Cardiff
5 Bill Kelly, Belfast
6 Mike Kitchener, Hitchin
7 Martyn Lindars, Wallington
8 Eileen & Wyn Mainwaring, Cowes
9 David Middlemiss, Eyemouth
10 John Parry, Northwich
11 Roy Spencer, Nuneaton
12 Darren Taplin, Tunbridge Wells
13 Robert Taylor, Edinburgh
14 Steven Woods, Bramcote Moor

Over in Belfast, "old timer" Billy Kelly not only searches for the transatlantic DX, but actually spends quite a while listening to their programmes! A talk on economics attracted his attention to WCAU on 1210 one night at 0415. Bill listened to a 'phone-in on WMRE in Boston on 1510 at 0430. This station is mainly concerned with memories of past events and musical hits and no doubt has a lot to interest the listener. A number of stations from New York can often be heard on this side of the Atlantic and the news, topical items and talks broadcast on 1050 by WHN around 0425, keep Bill well informed about events in that area.

The programmes in French mentioned in Bill's report, are broadcast from CKLM in Lavel, Quebec on 1570—noted at 0355, while those in Spanish stem mainly from XEBBC in Tijuana, Mexico on 1470, heard at 2325; Radio Vision, Venezuela, noted at 0245 on 1470 and Radio Globo in Rio, Brazil on 1220, which is sometimes audible at 2215. Although the Caribbean Beacon, Anguilla on 1610 is usually a good signal much earlier, by 0500 their closing announcements are fairly weak.

With European broadcast stations on 9kHz channel spacing starting at 531kHz, and N & S American stations using 10kHz spacing starting at 530kHz, some interference is guaranteed. Now, many broadcasters are extending their transmission times well into the small hours which is making the problem ever greater for the DXer.

The use of a good loop antenna may help considerably and suitable designs appeared in the November '85 and July '86 *PW*. By waiting until after some of the European stations have closed down, **Jim Willett** of Grimsby has been able to hear Newfoundland's CJYQ 930 quite regularly with just a wire antenna attached to his Yaesu FRG-7 receiver. CKLM 1570; WNEW 1130; WTOP 1500 in Washington, D.C. and Radio Globo 1100 in Sao Paulo, Brazil, have also been received.

A Grundig 1400SL receiver is used with a loop antenna by **Ian Smith** when looking for DX in Paisley, Scotland. His impressive log includes Newfoundland's CHCM 560 in Marystown at 0357; VOCM 590 at 0128; CBNA 600 in St. Anthony at 0245; CKYQ 610 at 0143; CBN 460 in St. John's at 0212 and CKVO 710 at 0332. From other areas of Canada he heard CJBC in Toronto on 860 at 0335; CFBC 930 in St. John, NB at 0129; CJRP 1060 in Quebec, PQ at 0059; CKCW 1220 in Moncton, NB at 0159 and CKLM 1570 at 0227. Signals noted from the USA were New York's WABC 770 at 0115; WINS 1010 at 0223; WHN 1050 at 0222; WNEW 1130 at 0343 and WQXR 1560 at 0326, also Boston's WHDH 850 at 0255; WBZ 1030 at 0135 and WMRE 1510 at 0239 while those from other areas were WTIC 1080 in Hartford, Conn. at 0158; WBAL 1090 at 0228; WCAU 1210 at 0154; WTOP 1500 at 0210. From S. America Ian picked-up Radio Rumbos 570 at 0251; Radio Gaucha, Porto Alegre, Brazil 600 at 0416; Radio Nacional Cordoba, Argentina 750 at 0309; Radio Nacional Buenos Aires, Argentina 870 at 0350; Radio Jornal do Brasil, Rio 940 at 0347; Radio Capital Sao Paulo, Brazil 1040 at 0316; Radio Globo, Sao Paulo, 1100 at 2316; Radio Globo, Rio, 1220 at 2355. Others were, Tijuana, Mexico XEBBC 1470 at 0230 and TWR Bonaire, Neth. Antilles 800 at 0339.

Other DX: The long wave band tends to be rather neglected by DXers these days despite the fact that it has been in use since the earliest days of broadcasting. Tim Shirley has been taking another look there and found Lvov, Ukraine on 173 at 2200—he has now received their QSL along with two pennants and six first day covers, however Tim says three IRCs are required. Very high powers are used on this band by some broadcasters these days—Kaliningrad, USSR, heard by Tim on 173 at 0130, runs one million watts (1MW) and Junglinster, Luxembourg, noted in his log at 2100, runs 2MW on 236kHz! Tim also listened to a broadcast from Tipaza, Algeria at 0024 on 254 and awaits their QSL.

Up in Edinburgh, **Robert Taylor** took a quick look at the long wave band at 1100 and picked-up Allouis, France on 162 at SINPO 43334 with his Toshiba RP F-11L receiver plus whip antenna—this station also runs 2MW! Tuning across the medium wave band at night, Robert listened to a number of interesting European stations between 2100 and 2200 including Radio Bremen, W. Germany on 936 with Jazz; Solvesborg, Sweden 1179 at SINPO 55555; Radio Prague, Czechoslovakia on 1287 with a DX programme at 2130; BBC Radio Ulster on 1341 at SINPO 44344; RBI Berlin, Germany 1359; Manx Radio, Isle of Man 1368 with a good Jazz programme and BRT Brussels, Belgium 1512 at SINPO 55555.

Manx Radio on 1368 was also mentioned by **Darren Taplin** who received them for the first time in Tunbridge Wells at 2130 and by **Rab Freeman** who listened to an interesting talk about the Isle of Man one morning at 1030. Rab's 137m a.s.l. location in Port Glasgow provides good daytime groundwave reception from Ireland and some areas of Scotland and Wales. Using a Trio R2000 receiver with a wire antenna in the loft space he can hear the 1kW BBC transmitter in Enniskillen on 873 around 0730 at SINPO 33323, whereas the BBC Lisnagarvey 100kW transmitter on 1341 is SINPO 23333 for most of the time. RTE-1 on 567 and RTE-2

on 612 are both excellent signals, but their transmissions on 729 and 1278 are weaker. The 2kW BBC transmitters in Dumfries 585, Newcastle 603 and Wrexham 657 have all been logged during the daytime. Being a football and baseball fan, Rab listens every night to AFN in Frankfurt, W. Germany on 873.

Another listener who enjoys the sports programmes, music and local news from AFN 873 is **Roy Degg** of Stoke-on-Trent. During the evening Roy logged RNE-1 Madrid, Spain 585; RTE-1 Tullamore 567; RTE-2 Athlone 612; Lopik, Nederlands 675; Marseille, France 675; BBC Radio Scotland via Westerglen 810; Radio Bremen, W. Germany 936; Solvesborg, Sweden 1179; Kvitsoy, Norway 1314; BBC Radio Ulster via Lisnagarvey 1341; RBI Berlin, E. Germany 1359; Manx Radio, I.O.M. 1368; Kaunas, USSR 1386; Marnach, Luxembourg 1440; TWR Monte-Carlo, Monaco 1467 and Wien-Bisamberg, Austria 1476.

The 20dB increase in strength of the BRT Brussels 1512 signal observed in Evesham by **John Greenwood** when dusk arrives in Brussels (see last month's text) has also been noted in Bristol by Tim Shirley. Deep fades have been noticed on this signal during the evening in Cowes, I.O.W. by **Eileen** and **Wyn Mainwaring** which seem to precede a generally lower and more stable level of signal under night time conditions—it would be interesting to receive more reports on this effect from other areas of the UK.

Tim Shirley has been keeping a regular check on the band and logged a few of the less often mentioned stations such as Ain Beida, Algeria 531 at 2100; Tantan, Morocco 657 at 2000; Murmansk, USSR 657 at 0100; Sofia, Bulgaria 774 at 1850; Jitomar, Ukraine 1530 at 2000 and Cyclops, Malta 1557 at 2010. Bill Kelly has been busy during the small hours of the night trying to identify some of the stations broadcasting in foreign languages—he logged Oradea, Romania 603 at 0445; Batra, Egypt 620 at 0320; Tunis-Djedeida, Tunisia 630 at 1800; Beograd, Yugoslavia 684 at 0335; Tetuan 2, Morocco 1053 at 0325; Riga, USSR 1071 at 0340; Strasbourg, France 1161 at 0330; TWR Monte-Carlo 1467 at 2255 and Sochi 2, USSR 1512 at 0330.

According to Ian Smith, by far the strongest daytime continental signal in Paisley stems from the 1200kW transmitter in Kvitsoy, Norway on 1314—it is a full scale reading on his S-meter! His impressive list of DX heard between 1200 and 1400 includes BRT-2 Belgium 540; DLF Bayreuth, W. Germany 549; SDR Stuttgart, W. Germany and DDR-1 Schwerin, E. Germany 576; HR Frankfurt, W. Germany 594; RTBF-1 Wavre-Overijse, Belgium 621; Vigra, Norway 630; Liblice, Czechoslovakia 639; Lopik, Nederlands 675; Rennes, France 711; Lopik, Nederlands 747; DDR-1 Burg, E. Germany 783; AFN Frankfurt, W. Germany 873; BRT-1 Wolvertem, Belgium 927; Bremen, W. Germany 936; Turku, Finland 963; NDR Hamburg, W. Germany 972; Lopik, Nederlands 1003; SWF Wolfsheim, W. Germany 1017; Kalundborg, Denmark 1062; Solvesborg, Sweden 1179; DLF Neumunster, W. Germany 1269; Stargard, Poland 1503; BRT-2 Beltem, Belgium 1512 and DLF Mainflingen, W. Germany 1539.

Although DXers seldom mention Italian stations in their reports, Jim Willett logged Radio-1 in Milan at 0003—this station runs 600kW on 900kHz.

I have received a request from **Steve Griffen** in Washington, USA, who would like to exchange cassette tape recordings of stations heard by DXers in the UK for tapes of stations heard in the USA—please write via me for details.

Local Radio DX: Once again there has been a lot of interest in this aspect of DXing as can be seen from Fig. 1. Using a Trio R2000 receiver plus 35m wire antenna **Bill Eyre** of Stockport added a few more to his list. **Alan Jarvis** has tested his Sooper Loop in Cardiff and says ". . . it does nicely separate 2CR and Chiltern, both on 828". From Eyemouth, **David Middlemiss** says his little grandson who stayed with him recently was so keen on the controls of his FRG-7 that he had to put it away for safety! "I am able to report that at 1350 I heard the Red Dragon on 1305kHz—this was with the Eddystone 730/1A newly aligned," wrote **Martyn Lindars** of Wallington, Surrey. While driving his car, John Parry of Northwich, Cheshire, found the acceptable range of Liverpool's Radio City 1548 is only 24km compared with the 42km of Radio Merseyside 1485. Mike Kitchener said that his list is of "Armchair copy" stations in Hitchin. "I listened to Red Dragon on 1305 announcing himself quite clearly above a noisy background," wrote Wyn Mainwaring. "I look forward to reading how Alan Jarvis gets on with his Hoola-Loop . . .," wrote Gareth Jones of Abergavenny.

Medium Wave Circle

The Medium Wave Circle is the only Club in the UK devoted to medium wave radio DXing. The Club's publication "Medium Wave News" is sent to members eight times a year. For full details of membership, which is open to anyone interested, write to Edward Baker, 69 Alderley Way, Cramlington, Northumberland NE23 9UQ.

QSL addresses

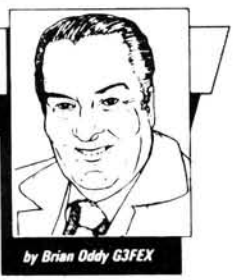
ILR Red Rose Radio, PO Box 301, St. Paul's Square, Preston PR1 1YE.

ILR Radio Trent, 29–31 Castle Gate, Nottingham NG1 7AP.

ILR Downtown Radio, PO Box 96, Kiltonga Industrial Estate, Newtownards, Co Down BT23 4ES.

SW BROADCAST BANDS

Reports: as for Medium Wave DX, but please keep separate



by Brian Oddy G3FEX

For the Newcomer SWL

Since the earliest days of radio, when transmissions were largely of an experimental nature, listeners have sent along reception reports to the station concerned. The early short wave broadcasters found that reports from listeners were of great value to them, since little was known about short wave propagation in those days, so they usually sent back to the listener written confirmation of reception—this verification sometimes took the form of a letter, but more often was a colourful card or QSL. The term QSL is part of the International Q code used by commercial and amateur c.w. operators and means "I give you confirmation of receipt".

Collecting these colourful QSL cards is a highly prized activity.

Unlike the early days of uncertainty and experiment in s.w. broadcasting, these days a considerable amount of engineering expertise will have gone into choosing the operating frequency and time of the broadcast, so as to take advantage of prevailing propagation conditions between the site of a high power transmitter and a chosen target area. It is worth remembering however, that the transmitter concerned may not be located in the country originating the programmes, since modern technology enables them to be sent via satellite to a s.w. relay transmitter in some distant country! Other frequencies and transmitter locations may also be employed to beam the same programme to other areas of the world. Because reception conditions on the higher frequencies tend to be rather unpredictable just now, transmissions on a lower frequency band (or even on several bands) may also take place in an attempt to provide a reliable service–this can be very confusing to the unwary listener!

Since a directional beam antenna is normally employed at a transmitting station to provide the maximum signal in a given target area, as far as the broadcaster is concerned the listener reports emanating from that area are of primary interest and reports from countries outside it will be of less significance unless a service is not provided to that region.

How then should one prepare a report? First of all, it is advisable to obtain either a copy of the current operating schedule for the station concerned, or subscribe to an up to date station guide, for example *The International Listening Guide* from Germany. It should then be possible to ascertain the origin of the signals and some of the other details required to compile a meaningful report. While it is possible to send a postcard with a single reception report covering a period during one day only, this is of little value to the average broadcaster these days, although they may still send along their QSL!

A report giving details of reception on several days will be appreciated and could be written out on a form(s) prepared by you, using a typewriter or computer if available—see Fig. 1(a). However, these tend to be rather impersonal and do not stand out in a pile of mail! If you have the artistic skill needed, you could design an eye catching personalised form and then get it photocopied. Having one specially printed could prove expensive, although some DX Clubs can provide members with suitable printed forms.

The report should contain the information shown in Fig. 1(a):

Instead of using the full SINPO Code, a simpler form of Code which broadcasters understand may be employed, see Fig. 1(b). The ratings 1 and 5 used in the SINPO Code have also been dropped in practical reports.

If possible, send along your report by airmail as soon as it is completed, for out of date reports are of little use from the technical viewpoint, although your comments about the programmes may still be valid. It is important to give an honest report about all aspects of their broadcast

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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**

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73 from Dave G4KQH, Technical Manager.

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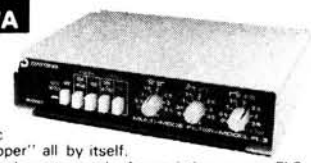

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RECEPTION REPORT

To:—Radio XYZ
10965 Main Street
Anytown
USA, 099672

Receiver: DX399L
by Tomson, Portable
Communications Type
Antenna: Fullwave
wire cut for 11MHz
PLEASE QSL—THANKS

From:—Bill Bloggs
Aerial Farm
Smalltown, Kent
PQ1 2TP, ENGLAND

Date	Time UTC Frequency	SIO	Adjacent Channel Notes
(1) 12 January '87	1100–1200 11·590MHz	443	PJQ on 11·595
(1) 14 January '87	1100–1200 11·590MHz	433	TV Interference
(1) 14 January '87	1600–1625 9·640MHz	433	Severe Splatter from WBZ

Programme Details

(1) I listened to your programme about wild life preservation in the USA with interest. Could you have a programme about bird migration?

(2) Your sport news came over well. I do not like rock music, however your jazz music was very . . .

Fig. 1(a)

Symbol	Meaning of Symbol	1	2	3	4	5
S	Signal Strength	Just Audible	Poor	Fair	Good	Excellent
I	Interference	Extreme	Heavy	Moderate	Nil/ Slight	None
O	Overall Merit	Unusable	Unusable	Fair	Good	Excellent

Fig. 1(b): The SIO Code Table. Note: Ratings 1 and 5 are usually omitted

—if you didn't enjoy their programmes, be sure to say so and assess correctly the SINPO or SIO rating too, for a poor report will not affect their QSL response. Every report infers a listener to their programmes—an important aspect when it comes to producing audience research figures and obtaining budgets for future programmes!

Some of the stations may take a long time to QSL and others do not QSL at all, so don't expect a one hundred per cent return. Many of those that do QSL may also include pennants, book markers, pamphlets or their latest broadcast schedule with their card. Some DXers send in so many valid reports to a station that eventually they may be asked if they would like to become an official monitor or join their DX Club, which may entitle them to claim special awards or lead to a special personal mention on their programmes!

Conditions on 25 and 21MHz

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

According to my information, the only broadcaster using the 25MHz (11m) band on a regular basis is VOA, who beam programmes in English to Australia between 2359 and 0200 via their relay station in Poro, Philippines, on 26·000. However, there have been no reports reaching me from "down under" to confirm that this signal reaches its target area. Test transmissions beamed to S. Africa from Norway may take place between 1300 and 1345 on 25·730, but so far there have been no reports to confirm their existence—in fact the band has remained very silent here in the UK.

The 21MHz (13m) band conditions seem to have improved a little and transmissions beamed towards the UK have usually been well received. One of the most potent signals on this band was mentioned by **John Berridge** of Cardiff, namely UAE Radio Dubai, which broadcasts in Arabic and English to Europe on 21·605 between 0615 and 1500. Some idea of their signal can be ascertained from two listeners' reports—**Robert Taylor**, who has been hearing them on his Toshiba RP F-11L receiver plus whip antenna in Edinburgh at SINPO 44444 and **John Nash** of Brighton, who picked them up at 1445 on his Sony ICF 7600D plus AN1 antenna at SIO 555.

Another good signal, which has travelled over 9000km to reach the UK, stems from Radio RSA in Johannesburg, who beam their programmes to Europe on 21·590. Their broadcasts commence in Portuguese at 1000, but change to English and French from 1100 until 1556. Using a Vega 206 receiver in Morden, **Sheila Hughes** logged their signal at 1535 as SINPO 44333 and very much enjoyed a most interesting programme about bird migration, insects and wildlife management in Natal.

The signal from Radio Japan's relay in Moyabi, Gabon on 21·700 was mentioned by **Tim Shirley** of Bristol. This station can be heard at 1500 with programmes in English and Japanese until 1700. Also noted in his log was the World Service from Radio Moscow on 21·725 directed towards Africa from 0700–1500 and on 21·545 from 0700–1600. They also beam to the Midle East on 21·530 from 1200–1500. Their programmes for the Far East are on three frequencies—21·515, in Russian at 0500 which changes to Chinese from 0800 until 1100; 21·585 in Vietnamese, Burmese, Indonesian and Thai from 0900–1230 and 21·615, in Russian, Burmese and Indonesian from 0800–1200. Russian programmes are beamed to Africa on 21·465 from 0700–1600.

The BBC World Service is beamed to Asia from 0600 until 0815 via a relay located on Masirah Island, Oman on 21·550—at 0900 this station beams to Africa on 21·470 until 1130, when UK based transmitters take over until 1345. Other UK based transmitters broadcast the World Service to Africa and the Middle East on 21·710 from 1100 until 1515 and also radiate programmes in French and Hausa to W. Africa on 21·640 until 1415.

The 17 and 15MHz Bands

The conditions on the 17MHz (16m) band have improved and signals from several continents can usually be heard at some time during the day. Radio Australia can be heard on this band in the UK in the early morning, although their broadcast is intended for Asia and the Far East. Using a Trio R2000 receiver, **George Morley** has been listening to their signal on 17·715 around 0700 in Redhill, Surrey, but this is often weak and subject to interference.

The programmes from Radio Pakistan, Islamabad, are beamed towards Europe on 17·660 from 0715 until 1115 and make interesting listening. **Davy Hossak** has been hearing their world and local news from 0730 in Winchburgh, Scotland at SINPO 34444. John Nash logged them as SIO 344 at 1100 and at 1315 picked up Radio Cairo, Egypt on 17·675—their programmes in English commence at 1200 and are intended for the Far East.

The signals from UAE Radio Dubai are very strong in the UK—**Alwyn Evans** logged them in Anglesey as SINPO 54444 at 1030. They beam to Europe and N. Africa on 17·775 and 17·865 from 1000 until 1500. Attractive music and news in English form part of the programmes from the Voice of Greece in Athens which **Colin Rolls** has been hearing in Pulborough at 1230, on 17·565. The lively programmes in English which **Ian McLuckie** of Darvel has been hearing from the Voice of Israel in Jerusalem, commence at 1100—they broadcast in Russian, English, French, Hebrew and Georgian to Europe on this frequency from 0530 until 1525.

The programmes from RCI in Montreal, Canada are very popular with listeners too, especially their programme for DXers on Saturday evenings at 2035—"old timer" **George Markwick** has been listening to them on 17·820 with his home built superhet receiver and external 10·5m inverted "L" antenna in Thornaby, Cleveland.

The broadcasts to Europe from Radio Surinam, mentioned by **Jim Willett** in his report last month from Grimsby, can now be heard between 1700 and 1740, Monday to Friday inclusive on 17·755—these reach the UK via a relay transmitter located in Brazil and Sheila Hughes has been hearing them at SINPO 44344.

The BBC World service is broadcast on 16m by UK based transmitters at various times during the day on 17·695, 17·705, 17·715, 17·790, 17·810, 17·855 and 18·080—an out of band frequency. BBC relay transmitters in Kranji, Singapore, use 17·710 from 2359–0045; 17·795 from 0600–0815 and 17·880 from 0900–0945. Their Cyprus relay may be heard on 17·740 from 1430–1600 and on 17·885 from 0500–1400. The BBC Ascension Island relay uses 17·790 from 1030–1515; 17·830 from 1100–1130 and 17·880 from 1600–1800, these relay stations make interesting pointers to band conditions.

Radio Moscow broadcasts on many frequencies in the 16m band to different areas of the world during the day, namely 17·555, 17·580, 17·590, 17·610, 17·625, 17·645, 17·720, 17·730, 17·735, 17·740, 17·755, 17·760, 17·775, 17·805, 17·820, 17·835, 17·850, 17·860, 17·870, 17·880, 17·885 and 17·890—just think of the megawatts involved! **Maurice Andries** has been hearing their 17·645 transmission in Dendermonde, Belgium, which is beamed to the Far East from 1000 until 1600.

Using a Realistic DX150A receiver plus 25m long wire antenna in Tunbridge Wells, **Darren Taplin** has been listening to Radio HCJB Quito, Ecuador, in the evening at 1900 on 17·790—their popular DX programme can be heard on Saturdays at 2130 on this frequency. Darren has also been hearing Radio Nederlands broadcasting to Africa via their relay transmitter in Bonaire, Nederlands Antilles on 17·605 from 1830–1925. Ian McLuckie picked up VOA in Washington, USA via their Bethany East USA transmitter on 17·785 at

Freq (MHz)	Station	Country	UTC	DXer
3·205	AIR Delhi	India	1740	H
3·230	R. RSA	S. Africa	0315	D
3·355	R. Botswana	Gabarone	1905	D
3·535	Fuzhou	China	0100	K
3·905	AIR Delhi	India	0030	C,H,K
3·925	AIR Delhi	India	1635	D,K
3·940	Wuhan	China	0045	K
3·950	Xinjiang	China	0115	K
3·955	BBC Daventry	England	2100	B
3·960	FBS	Falklands	0200	K
3·985	GRI Berne	Switzerland	1737	E
4·000	Bofoussam	Cameroon	0445	D,K
4·450	R. Afghanistan	Afghanistan		K
4·460	R. Beijing	China	2137	F
4·500	Xinjiang	China	0010	K
4·680	R. Nac. Espejo	Ecuador	0130	K
4·720	RRI	Indonesia		K
4·725	BBS Rangoon	Burma		K
4·735	Xinjiang	China		K
4·737	R. Mozambique Maputo	Mozambique	1700	J
4·750	R. Bertoura	Cameroon	2030	G,K
4·760	Yunnan Kumming	China	2250	D
4·765	R. Ecuador	Ecuador	0205	K
4·770	FRCN, Kaduna	Nigeria	2125	C,D,G,J,K
4·775	R. Gabon Libreville	Gabon	0015	K
4·775	TWR, Manzini	Swaziland		K
4·785	Baku, Azerbaidjan	USSR	2120	C,D
4·795	R. Douala	Cameroon	2120	I
4·800	LNBS Maseru	Lesotho	2150	C
4·805	Voice of Kenya	Kenya		K
4·810	RSA	S. Africa	2100	C,F,G
4·810	R. Yerevan	USSR	1845	D
4·815	R. Diff. TV Burkina	Burkina Faso	2045	G,K
4·820	R. Botswana	Botswana	1930	C,D,F,G,K
4·820	La Voz Evangelica	Honduras	2208	F
4·830	Africa No. 1	Gabon	2100	D,G,K
4·832	R. Reloj	Costa Rica	0640	F
4·835	RTM Bamako	Mali	2045	C,D,G
4·850	Prov. Uige	Angola	0100	K
4·855	R. Mozambique	Mozambique		K
4·855	R. Sana Yemen	Yemen		K
4·865	Lanzhou PRC	China	2205	D,F,K
4·870	R. Cotonou	Benin	1833	C,G
4·880	SABC R. Siud Afrika	S. Africa	2047	C,G
4·885	Voice of Kenya	Kenya	2050	G
4·890	R. Port Moresby	New Guinea	1800	J
4·895	Ashkhabad	USSR	2140	C
4·900	R. Diff. Nat. Conakry	Guinea	1940	G
4·905	R. Abu Dhabi	UAE	1830	C
4·905	N'djamena	Chad		K
4·915	Accra	Ghana	2045	D,G,K
4·920	R. Nat. N'djamena	Chad	2120	C,G,I
4·925	R. Merid	Colombia	0230	J
4·925	R. Mozambique	Mozambique	0130	K
4·930	Ashkhabad	USSR	2335	C
4·940	R. Abidjan	Ivory Coast	0640	J
4·940	R. Yakutsk	USSR	0415	D
4·940	R. Yaracuy	Venezuela	0145	K
4·945	RSA	S. Africa	1936	G
4·950	R. Pakistan	Pakistan	0005	K
4·958	Azerbaijan	USSR	0237	F
4·960	R. Federacion	Ecuador	0150	K
4·965	SWABC Windhoek	S. Africa		K
4·976	R. Uganda	Uganda	2044	G
4·980	Ecos del Torbes	Venezuela	2210	F
4·990	FRCN, Lagos	Nigeria	2140	A,C,G
4·990	R. RSA	S. Africa	0405	D
4·995	R. Ulan Bator	Mongolia	2359	K
5·005	R. Nacional, Bata	Eq. Guinea	2030	C,G
5·010	R. Garoua	Cameroon	2030	G
5·015	Arkhangelsk	USSR	1910	C
5·015	R. Cultura Cuiaba	Brazil	0200	K
5·020	R. Caracus	Venezuela	0040	K
5·047	R. Togo Lome	Togo	1940	C,G,J
5·050	R. Tanzania	Dar-es-Salaam	0035	K
5·057	Gjirokaster	Albania	2157	C

A — Alan Curry, Stockton-on-Tees
B — Roy Degg, Stoke-on-Trent
C — Neil Dove, Lockerbie
D — Bill Kelly, Belfast
E — Ian McLuckie, Darvel
F — George Morley, Redhill
G — Fred Pallant, Storrington
H — John Parry, Northwich
I — Philip Rambaut, Macclesfield
J — Tim Shirley, Bristol
K — Jim Willett, Grimsby

1905. They also use 17·800 from Bethany and 17·870 from their relay transmitter in Careysburg, Liberia at this time—all these transmissions are intended for Africa.

The conditions on the 15MHz (19m) band have also been improving and there have been a number of interesting stations

◀ **Fig. 1**

audible there from several continents during the day. One of them, located in the rare DX spot of Saipan, N. Mariana Islands is KYOI—**Philip Rambaut** has been hearing their "Super Rock" music on 15·190 in Macclesfield at 0835. He has also picked up Africa No. 1, in Gabon on 15·200 which broadcasts in French with some English segments from 0600–1657.

Radio Australia can be heard on this band between 0900 and 1100 on 15·415. Notes from **George Hewlett** of Torquay, who monitors most of their transmissions daily, indicate that the signals reach a peak around 1015–1030. Although the BBC Ascension Island relay on 15·105 is beamed towards Africa from 0730–0800, **David Middlemiss** has received a very strong signal from them in Eyemouth and listened to their programme "Network Africa". Using an FRG-7 receiver, he also listened to Radio Japan via their relay in Moyabi, Gabon on 15·230 with programmes for Europe and the Middle East from 0700–0800.

Some of the broadcasts on 19m during the morning include the Voice of Nigeria's transmission to Europe between 0900 and 1000, noted by Colin Rolls on 15·120; Radio Korea, Seoul, S. Korea on 15·575 at 1100, logged by John Nash and news, sports news and music from AFRTS in Washington, USA via their transmitter in Greenville, East USA on 15·430, which **Roy Degg** has been hearing in Stoke-on-Trent at 1100. In the evening, **Peter Vlietinck** of London has been listening to the Voice of Vietnam on 15·010. Their interesting programmes in English commence at 1900. Using a Trio R1000 receiver plus 13m wire antenna in Hitchin, **Mike Kitchener** has been enjoying the programmes from WRNO on 15·420 at 2000. He says "It makes a change to hear real US adverts on there compared with the Government ones on AFRTS just 10kHz away on 15·430!"

John Sadler of Bishops Stortford has added an a.t.u. ahead of his DX400 receiver, which has cut down interference from nearby TV receivers by about ten per cent. RNB Brasilia, Brazil on 15·265 has been coming in well since—listen for their broadcast to Europe from 1800 until 1850.

Some of the signals from across the Atlantic are strong in the evening. **Neil Dove** of Lockerbie logged WHRI of South Bend, USA as SINPO 45443 on 15·105 at 1950; RCI Montreal, Canada as SINPO 44554 on 15·150 at 2130; RAE Buenos Aires, Argentina as SINPO 44533 on 15·345 at 2110 and RSN Chile as SINPO 34443 on 15·140 at 2110. Roy Degg has been listening to the *DX Party Line* programme for DXers from Radio HCJB in Quito, Ecuador—tune to 15·270 on Mondays, Wednesdays and Saturdays at 2130.

The 11, 9, 7 and 6MHz Bands

Although signals from all continents have been audible on one or other of these bands during the day or night, the lack of sensible band planning in an overcrowded situation and the deliberate illegal jamming which takes place seriously detract from the pleasure of DXing.

The signals from Radio Australia on the 11MHz (25m) band are inconsistent in the early morning. George Hewlett's report indicated that their 11·910 transmission to the Pacific area, which commences at

QSL sent in by Tim Shirley

0400, peaks up around 0615 some mornings to SI0 433, but this is not the best band to choose for reception in the UK.

Using a Yaesu FRG-8800 receiver in Cardiff, **Al Dupres** logged ELWA Monrovia, Liberia on 11·955 at 0654 and received a good signal from Radio Kuwait on 11·675, with programmes in English from 1800–2100. Very strong signals can be heard from UAE Radio Dubai on 11·955 from 1500, **Julian Wood** of Buckie, Scotland has been listening to their broadcast in English which commences at 1600.

Up in Lossiemouth, **Bill Stewart** uses a National Panasonic DR 28 receiver with just its internal whip antenna. He has been hearing some interesting stations on this band including Radio Finland, Helsinki on 11·945, with the news in English at 1310; RCI Montreal, Canada on 11·960 at 2125; Radio RSA Johannesburg S. Africa on 11·775 with news at 2135 and an Evangelical programme from WYFR via their transmitter in Okeechobee, Florida USA on 11·580 at 2140. **Alan Curry** has been listening to WYFR too, but at 1935, when he logged them as SINPO 32233 in Stockton-on-Tees. Alan uses a Yaesu FRG-7700 receiver in conjunction with an a.t.u.

and wire antenna and recently heard a programme of Indian music from All India Radio, New Delhi on 11·620 at 1948, noted as SINPO 43434 in his log. Alwyn Evans has been hearing them too, but on 11·865 and later listened to Radio Baghdad, Iraq on 11·750 at 0003 with a programme in English intended for North America.

The best reception of Radio Australia in the UK is on the 9MHz (31m) band in the morning, although several frequencies are used to different target areas, their transmission on 9·655 directed to Europe and the S. Pacific area from 0700 is the one to look for. Alan Curry noted them as SINPO 43333 in his log at 0855. Their transmission is spoilt by Radio Finland, who start up on the frequency and ruin things for both of them at 0930.

Philip Rambaut mentioned two transmissions in the early morning—Radio HCJB Quito, Ecuador, beaming to Europe on 9·860 at 0547 in Spanish and Nordic languages; Radio Nederlands broadcasting to Australia at 0830, via their Bonaire, Nederlands Antilles relay on 9·630. Later, he logged the Voice of Vietnam on 10·040

QSL sent in by Edward Tew

at 1713. Alan Curry heard SRI Berne, Switzerland on 9·535 at 1800 and Julian Wood logged REE Madrid, Spain on 9·765 at 1830. Writing from Nigeria, **Bobby Enebeli** reports that Radio Cairo, Egypt on 9·475 is a good signal there at 0250 when broadcasting to North America.

Good signals from Radio Australia can also be heard on the 7MHz (41m) band on 7·205 around 1400 and on the 6MHz (49m) band on 6·035 around 1600 via transmitters in Carnarvon—George Hewlett says "During Cyclone danger periods, Carnarvon's antennas are lowered by the station crews to avoid damage—the service is then radiated from Shepperton at lower power". **John Parry** has been listening to the early morning transmission to Europe from RCI in Montreal, Canada on 6·140 at 0615.

The 5, 4, 3 and 2MHz Bands

There are a number of new stations mentioned in the chart this time—can you hear them?

Post early for Christmas!

Send your reports in by December 24

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Have Spectrum 48K, also Interface One and micro drive. Would exchange for Belcom LS102L 28MHz multimode or 430MHz multimode mobile. J. D. Bolton G4XPP, 10 Bowness Road, Coniston Park Estate, Timperley, Cheshire WA15 7YA. *B907*

Have Eddystone transistor communications receiver (type 860). Would exchange for Texas T199/4A stand-alone peripherals, e.g. disc interface and drive, RS232, thermal printer. Or w.h.y? M. J. Lang G4DVK. Tel: Burnham-on-Sea 5976. *B913*

Have Class D wavemeter, valves, meters, lamps, photographic, automobile tools, geographic slides, fluorescents, switches—send s.a.e. for list. Would exchange for video tape, holiday, microwave, w.h.y? 25 Glenmore Road, Oxton, Birkenhead, Cheshire L43. *B918*

Have Grundig Traveller superhet, f.m., l.w., m.w., s.w., 5·9 to 18MHz, battery or a.c., manual, mint. Ricoh rangefinder semi-automatic camera model 500G in mint condition. Would exchange for general communications receiver Trio R59, Eddystone 840, etc. H. C. Bach. Tel: 01-794 9790. *B919*

Have Mitsubishi 9in battery/mains colour television. Would exchange for best RGB monitor offered. G. S. Dutton, 40 Grafton Road, Harwich, Essex CO12 3BD. *B920*

Have FT-290 with muTek front-end, Tokyo hi-power 30W linear, mobile 7/8 antenna, MMB11, s.w.r., etc. head set with mic. Would exchange for Honda or Kawasaki portable generator, AR2001 or Trio 3500, w.h.y? *B927*

Have radios from 20s to 60s, shack clearout through illness. Most are working and have been well kept. Names like Mullard, Defiant, GEC, HMV, Bush, etc. Would exchange for s.w.l. gear or w.h.y? T. Hoyle. Tel: Hull 801771. *B963*

Have Eddystone 730 communications receiver, 480kHz to 30MHz in 5 bands, S-meter, variable selectivity. Would exchange for Sony C5, C6, C7, video recorder, w.h.y? Tel: Watford 24752 *B968*

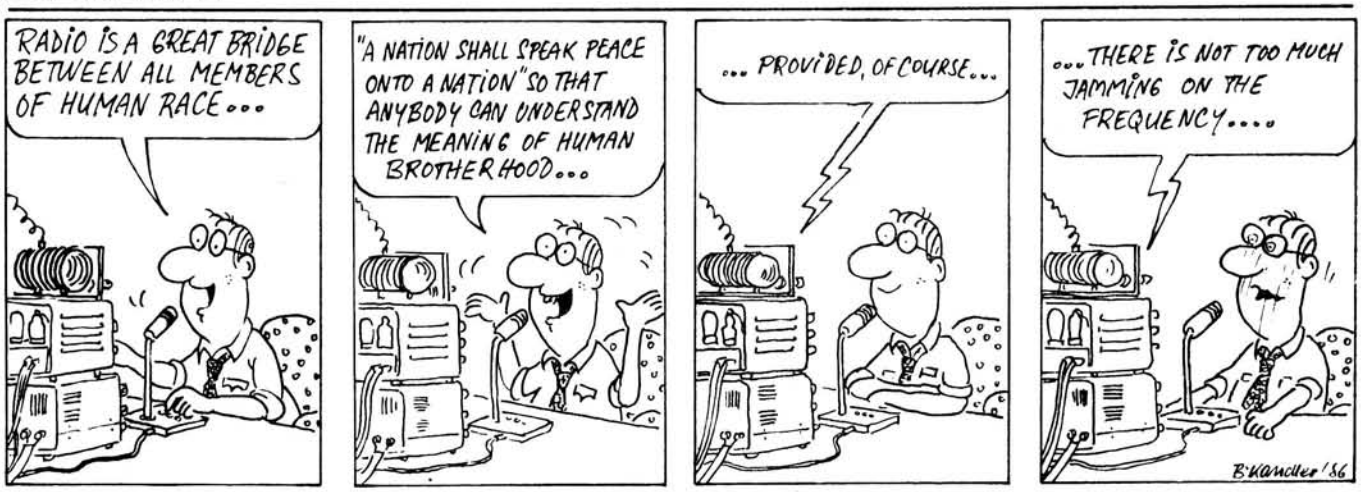
Have 20 × 50 Mark Scheffel binoculars, Toshiba stereo music centre matching speakers, Spectrum 48K, power supply, interface, base unit, word processor, copy tape, software, joystick, cassette recorder. Would exchange for transceiver, scanner or w.h.y? Tel: Oxford 772370. *B972*

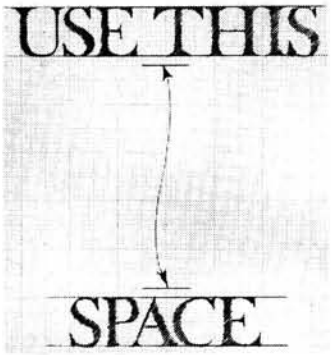
Have some fishing tackle, bought 1st week in July. Would exchange for a v.h.f./u.h.f. scanner. Steve. Tel: Bloxwich 493331. *B975*

Have Exa 500 camera, 2·8 Domiplan and 135 Meyer-Optic telephoto lens. Garrard 301 turntable boxed, Ferrograph tape deck. Would exchange for 144MHz or 430MHz gear of any sort. S. Goodwin. Tel: 0454 414516. *B986*

Have TS-430S h.f. transceiver with YK88SN s.s.b. filter and f.m. 430 units fitted, v.g.c., MMT144/28 transverter and cables to fit above h.f. rig, service manual for h.f. rig. Would exchange for good TS-830S h.f. transceiver. Terry G4OXD, 41 Keats Way, Hitchin, Herts SG4 0DP. *B987*

BENNY





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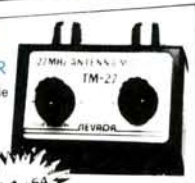

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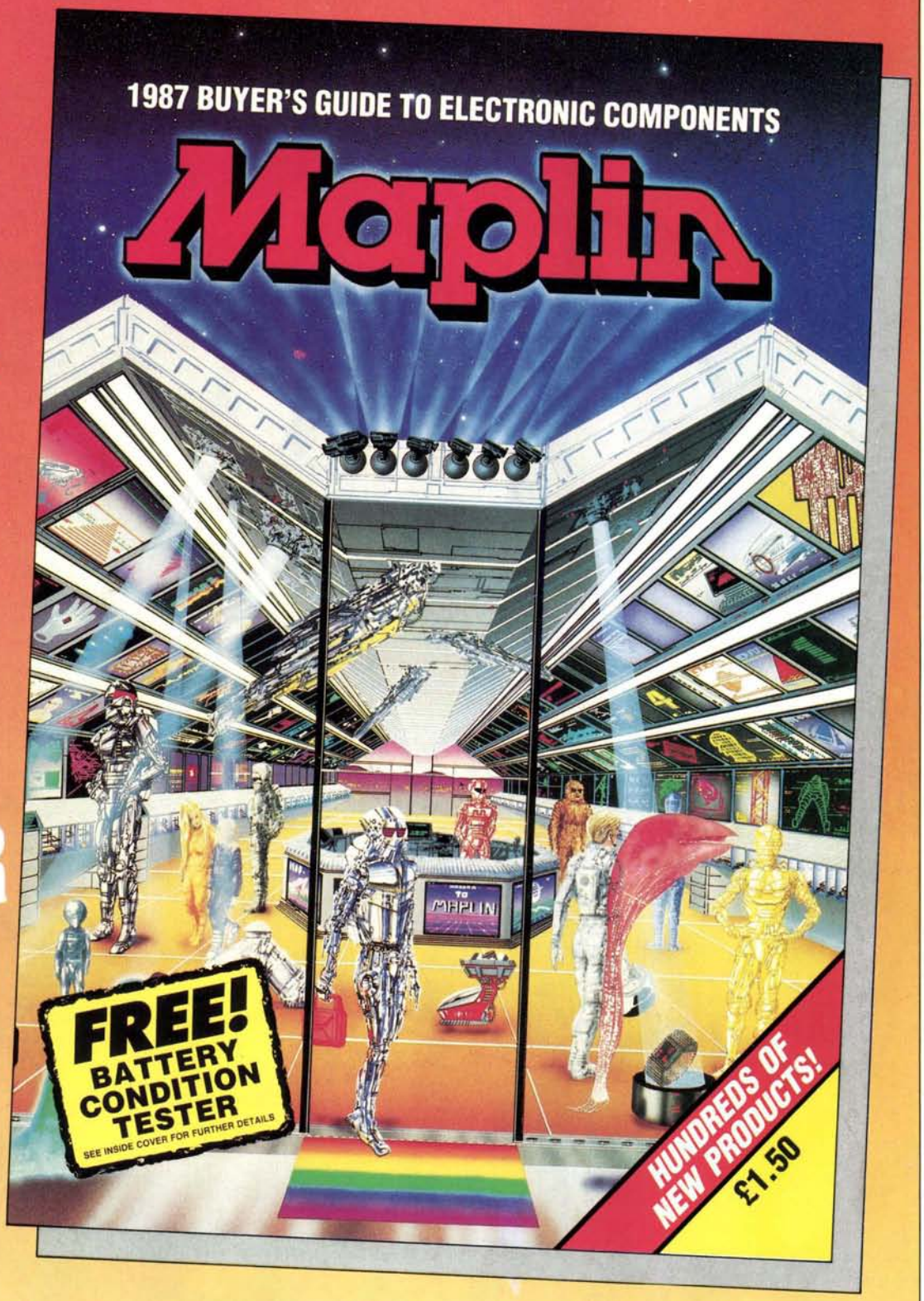

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