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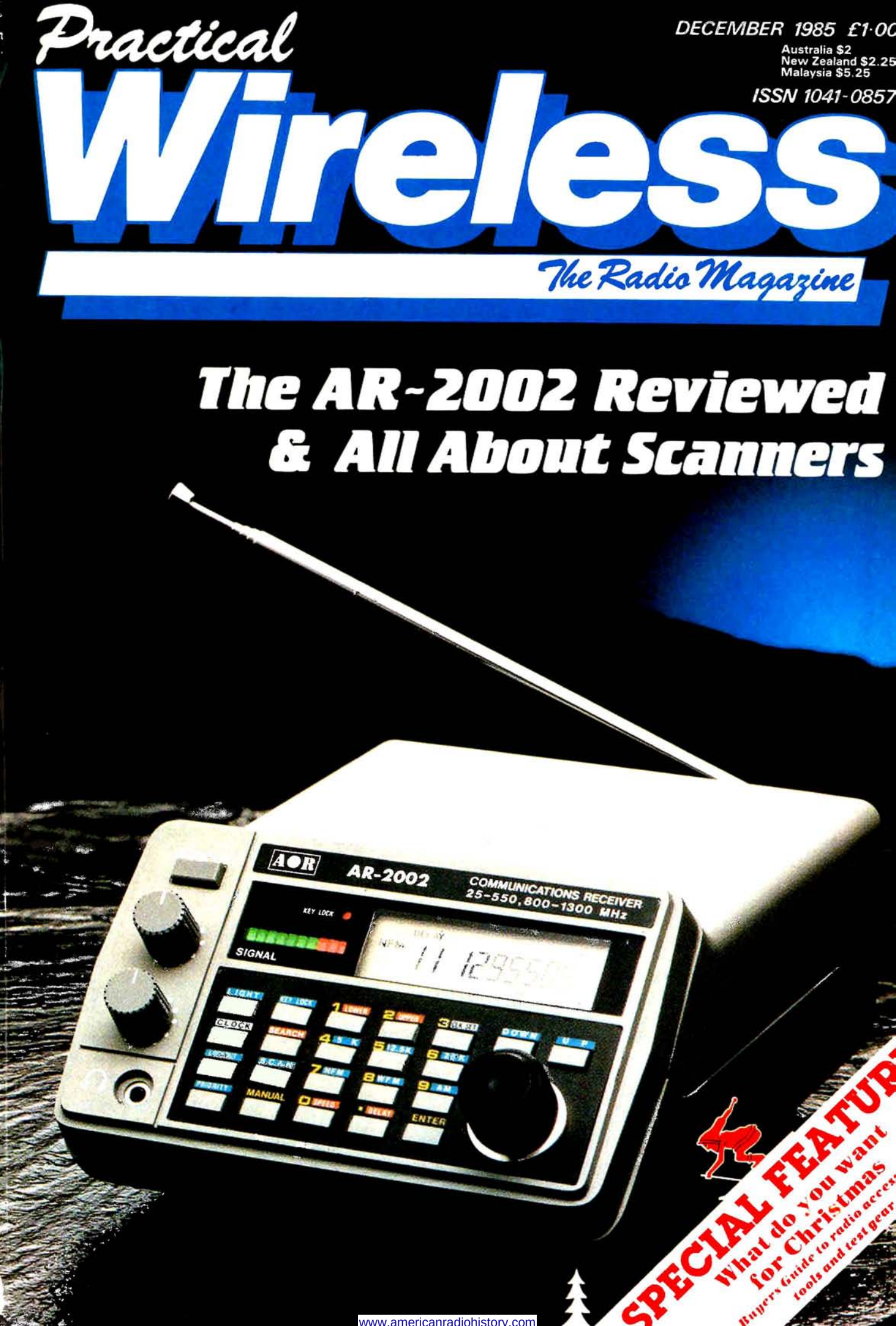
Practical Wireless

The Radio Magazine

The AR-2002 Reviewed & All About Scanners



SPECIAL FEATURE
What do you want for Christmas
Buyers Guide to radio access
tools and test gear

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TS930S	9 Band TX General Cov RX	1295.00	(—)
TS830S	160-10m Transceiver 9 Bands	832.75	(—)
AT230	All Band ATU/Power Meter	157.99	(2.00)
SP230	External Speaker Unit	47.73	(1.50)
TS530S	160m-10m Transceiver	698.00	(—)
TS430S	160m-10m Transceiver	720.00	(—)
PS430	Matching Power Supply	138.00	(3.00)
SP430	Matching Speaker	39.50	(1.50)
MB430	Mobile Mounting Bracket	13.17	(1.50)
FM430	FM Board for TS430	45.00	(1.50)
TS130S	8 Band 200W Pep Transceiver	633.06	(—)
SP120	Base Station External Speaker	30.74	(1.50)
AT130	100W Antenna Tuner	108.62	(1.50)
MC50	Dual Impedance Desk Microphone	36.19	(1.50)
MC35S	Fist Microphone 50K ohm IMP	17.01	(1.00)
LF30A	HF Low Pass Filter 1kW	24.68	(1.00)
TR7930	2M FM Mobile	329.00	(—)
TR9130	2M Multimode	499.00	(—)
TW4000A	2M/70cm mobile	522.00	(—)
TM201A	2M 25W mobile	296.00	(—)
TM401A	7cms FM 12W	316.00	(—)
TR2500	2M FM Synthesised Handheld	258.00	(—)
TR3500	70cm Handheld	270.00	(—)
TR2600	New 2M FM Synthesised Handheld	275.00	(—)
ST2	Base Stand	60.36	(1.50)
SC4	Soft Case	15.92	(1.00)
SMC25	Speaker Mike	18.66	(1.00)
PB25	Spare Battery Pack	29.10	(1.00)
MS1	Mobile Stand	37.31	(1.00)
R600	Gen. Cov. Receiver	299.52	(—)
R2000	Synthesiser 200KHz-30MHz Receiver	479.47	(—)
HC10	Digital Station World Time Clock	78.99	(1.50)
HS5	Deluxe Headphones	26.88	(1.00)
SP40	Mobile External Speaker	16.46	(1.00)

NEW MODELS

TH21E/41E	2M/70cm Mini-Handhelds	170.00/199 00
TM211E/411E	2M/70cm FM Mobiles	365.00/399.00
TS711E/811E	2M/70cm base stations	768.00/895.00
TR3600	70CM Handheld	292.00
TS940S	9 Band TX General Cov RX	1695.00

Linear Amps

TONO (G series)

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

TOKYO HIPOWER AMPS. NOW BACK IN STOCK

MICROWAVE MODULES

MML144/30-LS	inc preamp (1/3 w i/p)	82.90	(2.00)
MML144/50-S	inc preamp, switchable	92.00	(2.00)
ML144/100-S	inc preamp (10w i/p)	149.95	(2.50)
MML144/100-HS	inc preamp (25w i/p)	149.95	(2.50)
MML144/100-LS	inc preamp (1/3w i/p)	169.95	(2.50)
MML144/200S	inc preamp (3/10/25 i/p)	299.00	(2.50)
MML432/30L	inc preamp (1/3w i/p)	145.00	(2.00)
MML432/50	inc preamp (10w i/p)	129.95	(2.00)
MML432/100	linear (10w i/p)	299.00	(2.50)

B.N.O.S

LPM 144-1-100	2m, 1W in, 100W out, preamp	181.00	(2 50
LPM 144-3-100	2m, 3W in, 100W out, preamp	181.00	(2.50)
LPM 144-10-100	2m, 10W in, 100W out, preamp	157 00	(2.50)
LPM 144-25-160	2m, 25W in, 160W out, preamp	217.00	(2 50)
LPM 144-3-180	2m, 3W in, 180W out, preamp	247.00	(2.50)
LPM 144-10-180	2m, 10W in, 180W out, preamp	247.00	(2.50)
LP 144-3-50	2MN 50W out, preamp	108.00	(2.50)
LP 144-10-50	2M 10W in, preamp	108.00	(2.50)
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00	(2.50)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	235.00	(2.50)
LPM 432 10 50	70cm, 10W in, 50W out, preamp	195.00	(2.50)
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00	(2.50)

SWR/PWR Meters

HANSEN

FS50VP	50-150MHz 20/200 Interval PEP/SWR	106.70	(1.50)
FS300V	50-150MHz 20/200 PWR/SWR	53.50	(1.50)
FS300H	1.8-60MHz 20/200/10W	53 50	(1.50)
FS210	1.8-150MHz 20/200 Auto SWR	63.50	(1.50)
W720	140-430MHz 20/200W	41.50	(1.50)

WELZ

SP45	130-470MHz PWR/SWR	69.00	(1 50)
SP10X	1.8-150MHz PWR/SWR	34.00	(1.50)
SP200	1 8 160MHz PWR/SWR	89.00	(1.50)
SP250	1.8-60MHz PWR/SWR	65.00	(1.50)
SP300	1.8-500MHz PWR/SWR	129.00	(1.50)
SP350	1.8-500MHz PWR/SWR	79.00	(1.50)
SP400	130-500MHz PWR/SWR	89.00	(1.50)

NEW RANGE OF WELZ METERS NOW AVAILABLE

TOYO

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

Scanning Receivers

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

Icom Products

IC751	HF Transceiver	1299.00	(—)
IC745	HF Transceiver	899 00	(—)
IC735	New HF Transceiver	849 00	(—)
PS15	P.S Unit	145.00	(4 00)
PS30	Systems p.s.u. 25A	297.85	(—)
SM6	Base microphone for 751/745	40.25	(1.00)
IC290D	2m 25w M/Mode	479.00	(—)
IC290E	10w Multi-Mode Mobile	449.00	(—)
IC271E	2m 25w M/Mode Base Stn.	729.00	(—)
IC271H	100W version of above	899.00	(—)
IC25H	2m 45w FM	359.00	(—)
IC27E	25W FM mobile	379 00	(—)
IC45E	70c 10w FM	345.00	(—)
IC47E	25w 70cm FM mobile	469.00	(—)
ICBU1	B/U Supply for 25/45/290	29.90	(1.00)
ICR70	General Coverage Receiver	629 00	(—)
ICR71	General Coverage Receiver	729 00	(—)
IC02E	2m H/Held	269.00	(—)
IC2E	2m H/Held	199.00	(—)
ML1	2m 10w Linear	79.35	(2.00)
IC4E	70cm H/Held	259.00	(—)
IC04E	70cm handheld	279.00	(—)
BC35	Base Charger	62.10	(1.00)
HM9	Speaker mic	18.56	(1.00)
IC3	Carry Case	5.50	(1.00)
ICBP3	Std Battery Pack	27.50	(1.00)
BP5	High Power Battery Pack	52.80	(1.00)
CP1	Car Charging Lead	5.50	(1.00)
DC1	12v Adaptor	13.75	(1.00)

Mutek Products

SLNA 50	50MHz Switched preamp	44.90	(1.50)
SLNA 144s	144MHz Low noise switched preamp	39.95	(1.50)
SLNA 145sb	Preamp intended for 290	29.90	(1.50)
GLNA 432e	70cm Mast head preamp	149.90	(2.50)
RPCB 144ub	Front end FT221/225	79.90	(1.50)
RPCB 251ub	Front end IC251/211	84.90	(1.50)
BBBA 500u	20-500MHz Preamp	34.90	(1.50)
GFBA 144e	2m Mast head preamp	149.90	(2.50)
SBLA 144e	2m Mast head preamp	89.90	(2.50)
RPCB 271ub	Front end for IC271A	89.90	(1.50)
TVHF 230c	2M-FM-Transverter	334.90	(5.00)
LBPF 144v	Bandpass Filter	22.40	(1.50)
LBPF 432u	Bandpass Filter	22.40	(1 50)
TVVF 50c	6M Transverter	199.90	(2.50)
GLNA 433e	70cm Pre-amp	79.90	(2 50)
TVVF 144a	2M Transverter	239 90	(2.50)

Datong Products

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

CW/RTTY Equipment

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

MICROWAVE MODULES

MM2001	RTTY to TV converter	189.00	(2.00)
MM4001	RTTY terminal	269.00	(2.00)
MM4001KB	RTTY term with keyboard	299.00	(2.00)

BENCHER

BY1	Squeeze Key, Black base	53.95	(1.50)
BY2	Squeeze Key, Chrome base	69.95	(1.50)

HI-MOUND MORSE KEYS

HK702	Up down keyer marble base	30.95	(1.50)
HK703	Up down keyer	29.35	(1.50)
HK704	Up down keyer	19.95	(1.50)
HK705	Up down keyer	15.49	(1.50)
HK706	Up down keyer	16.96	(1.50)
HK708	Up down keyer	14.95	(1.50)
HK802	Up down solid brass	86.30	(2.00)
HK808	Up down keyer	39.95	(1.50)
MK704	Twin paddle keyer	13.50	(1.50)
MK705	Twin paddle keyer marble base	25.65	(1.50)

KENPRO

KP100	Squeeze CMOS 230/13.8v	82.50	(2.50)
KP200	Memory 4096 Multi Channel	169.50	(2.50)

Yaesu

FT1	HF Transceiver	P.O.A.	(—)
FT980	HF Transceiver	1450.00	(—)
SP980	Speaker	78.95	(2.00)
FT77	Mobile HF Transceiver	479.00	(—)
FP700	PSU	150.00	(5.00)
FC700	Tuner	105.00	(2.00)
FT77s	10w. version	449.00	(—)
FMU77	FM Board for FT77	28 35	(1.00)
FT757GX	HF Transceiver	739.00	(—)
FC757	Auto A.T.U.	255.00	(2.00)
FP757HD	Heavy Duty PSU	175.00	(2.00)
FP757GX	Switched Mode PSU	160 00	(2.00)
FL2050	Linear Amplifier	115.00	(2.00)
FT290	2m M/Mode Port/Transceiver	315.00	(—)
FT290	With Mutek front end fitted	345.00	(—)
FL2010	Linear Amplifier	69.00	(1 00)
MMB11	Mobile Bracket	30.00	(1.00)
NC11	Charger	11.50	(1.00)
CSC1	Carrying Case	5.00	(1.00)
YHA15	2m Helical	7.65	(1.00)
YHA44D	70cm ½wave	9.95	(1.00)
YM49	Speaker Mike	20.20	(1.00)
MMB15	Mobile Bracket	14.55	(1.00)
FT203R	NEW 2m H/Held/C/W FNB3	195.00	(—)
FT209R	NEW 2m H/Held/C/W FNB3	239.00	(—)
MMB10	Mobile Bracket	8.80	(1.00)
NC9C	Charger	9.60	(1.00)
NC8	Base/station Charger	64.80	(2.00)
PA3	Car Adaptor/Charger	18.00	(1 00)
FNB2	Spare Battery Pack	27.02	(1.00)
YM24A	Speaker Mike	23.75	(1.00)
FT726R	2m Base Station	775.00	(—)
430/726	70cm Module for above	255.00	(2.50)
FRT7700RX	A.T.U.	49.85	(1 50)
MH1B8	Hand 600 8pin mic	15 70	(1.00)
MD1B8	Desk 600 8pin mic	64.80	(1.00)
MF1A3B	Boom mobile mic	18.00	(1.00)
YH77	Lightweight phones	14.95	(1.00)
YH55	Padded phones	15.35	(1.00)
YH1	Lwieght Mobile H/set Boom mic	14.95	(1 00)
SB1	PTT Switch Box 208/708	15.70	(1.00)
SB2	PTT Switch Box 290/790	13.80	(1.00)
SB10	PTT Switch Box 270/2700	14.95	(1.00)
QTR24D	World Time Clock	33.35	(1.00)
FF501DX	Low Pass Filter	29.90	(1.00)

NEW MODELS

FRG8800	HF Receiver	475.00	(—)
FRV8800	Convertor 118-175 for above	80.00	(1.50)
FT703R	70cm H/Held	235.00	(—)
FT709R	70cm H/Held	259.00	(—)
FT270R	2m 25W F.M.	315.00	(—)
FT270RH	2m 45W F.M.	365.00	(—)
FT2700R	2m/70cm/25W/25W	499.00	(—)
FRG 9600	60-905MHz Scanning RX	449.00	(—)

Power Supplies

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

Aerial Rotators

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

Switches

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

Miscellaneous

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

TOKYO HI-POWER

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

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Practical Wireless
The Radio Magazine

VOL 61 DECEMBER 1985 NO. 12 ISSUE 945

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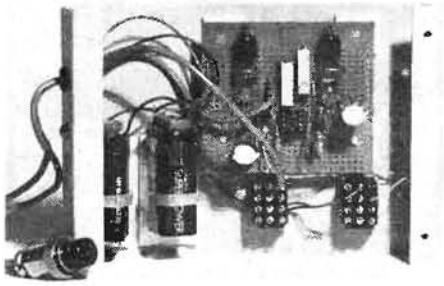

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We are sorry that Part 2 of Fred Judd's series *Broadside and Endfire Arrays* has been held over, due to pressure on editorial space.

NEXT MONTH

RTTY/Morse Modem

Famous Receivers—The R107

Braille Circuit Diagrams

On sale December 6

Editorial Offices:
Practical Wireless
Westover House
West Quay Road
Poole, Dorset BH15 1JG
☎ Poole (0202) 671191
Prestel 202671191

Editor Geoff Arnold T.Eng(CEI) FSERT G3GSR
Assistant Editor Dick Ganderton C.Eng., MIERE, G8VFH
Art Editor Steve Hunt
Technical Editor John Fell G0API
Technical Sub-Editor Elaine Howard G4LFM
Technical Artist Rob Mackie
Secretary Kathy Moore

Advertisement Offices:
Practical Wireless
King's Reach Tower
Stamford Street
London SE1 9LS
Telex: 915748 MAGDIV-G

Advertisement Manager Roger Hall G4TNT
☎ 01-261 6807
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I ENCLOSE £1 PLEASE SEND ME CATALOGUE & ANTENNA BOOK.

You don't need a 1750 Hz tone to gain access to the fastest mail order service for all radio amateurs and short wave listeners. With a copy of the LOWE ELECTRONICS catalogue and antenna book in the shack (send £1 for your copy) the best in amateur radio is quickly available.

LOWE SHOPS

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

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

Cambridge, not only a University town but the location of a LOWE ELECTRONICS' shop managed by Tony G4NBS. The address is 162 High Street, Chesterton, Cambridge (the telephone number is 0223 311230). From the A45 just to the north of Cambridge turn off into the town on the A1039, past the science park and turn left at the first roundabout, signposted Chesterton. After passing a children's playground on your left turn left again (between the shops) into Green End Road. Very quickly, and without you noticing it, Green End Road becomes High Street. Easy and free street parking is available outside the shop.

For South Wales, the LOWE ELECTRONICS' shop is located in Cardiff. Managed by Carl GW0CAB, the shop (the telephone number is 0222 464154) is within the premises (on the first floor) of South Wales Carpets, Clifton Street, Cardiff. Clifton Street is easily found, being a left turn off Newport Road just before the Infirmary. Once in Clifton Street, South Wales Carpets is the modern red brick building at the end of the street on the right hand side. Enter the shop, follow the arrows past the carpets, up the stairs and the "Emporium" awaits you. Free street parking is available outside the shop.

LOWE ELECTRONICS' London shop is located at 223/225 Field End Road, Eastcote, Middlesex (the telephone number is 01-429 3256). The new shop, managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings and as such being on the Metropolitan and Piccadilly lines (approximately 30 minutes from Baker Street main junction). For the motorist, we are only about 10 minutes' driving time from the M40, A40, North Circular Road (at Hanger Lane) and the new M25 junction at Denham. Immediately behind the shop is a large car park where you can currently park for the day for 20p. There is also free street parking outside the shop.

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

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

TRIO
TS830S

hf transceiver

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

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

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

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

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

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

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

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

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

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

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

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

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

LOWE ELECTRONICS LTD.

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

send £1 for complete mail order catalogue.

the TRIO two metre base station, the TS711E.

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

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

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

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

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

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

TS711E 2 metres £768.77 carr £7.00

also on seventy, the TS811E.

TS811E 70 centimetres £895.97 inc. VAT carr £7.00

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

I am not for one moment suggesting that current hand-helds should be photographed with an elephant but I have heard many amateurs refer to their existing hand-helds as "bricks". That the TH21E could not be called. In fact I am tempted to say it is the rig that not even a mouse could hid behind. Over the past fourteen years I have watched amateur radio equipment develop from cumbersome to perfection. I remember John, G3PCY, showing me the first TR2400 and our mutual amazement at how TRIO could put so much radio in such a small package. Later developments produced th TR2500 and its 70 centimetre version, the TR3500 and left me in no doubt that TRIO would soon produce a compact inside pocket transceiver. At the same time it became apparent that a simpler rig with performance would have great appeal. That transceiver is the TH21E and being typically TRIO is right first time. Size is not the most important feature, it's just the way the transceiver feels when picked up, imposible to put down. I am not going to give its dimensions, I will just say that it is hand sized, the true inside pocket transceiver. As an owner ad with the rig always on your person the hobby of amateur radio expands to an all day event. **Never miss a contact, never miss a friend.**

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

First of all the Pocketfone, now the TH41E.

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

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

Frequency selection by simple thumb-wheel switches.

Full repeater facilities including reverse repeater.

The rig comes complete with nicad pack and charger.

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

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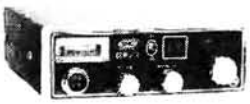

The SMC Oscar Two 10 Metre, was a 10 channel 27MHz, FM, CB, transceiver designed to satisfy the stringent Government specifications of MPT 1320. It has now been successfully modified to cater for the equally demanding requirements of the Amateur Radio service worldwide. Join the many others who have found that operating 10M FM can be a pleasant alternative to the overcrowded 2M band. The SMC Oscar 2 10M gives you 40 channels, channel 1 being 29.310 MHz and channel 40 29.7 MHz, a power o/p of approximately 4 watts and a receive sensitivity of better than 0.3uV for 12dB sinad. Also for your enjoyment when the band opens up, we have incorporated a −100kHz repeater shift (by using the original panel Hi/Low power switch), so from the car or at home you can enjoy 10M FM at a remarkable price!

ONLY £65 inc VAT

FRG 8800 £475.00 FRV 8800 £80.00

Continuous coverage from 150kHz to 30MHz. Two speed spin tuned VFO plus keyboard plus computer interface control. The FRG-8800 demodulates SSB (USB & LSB) CW, AM (Wide and Narrow) and FM narrow as standard, useful for 10M, CB and for VHF. The FRG-8800 comes with twelve memories programmed and scanned at the touch of a single button. Any of the memory channels will accept a frequency including the VHF range (optional VHF unit). The mode is also stored in the memory. Four filters are fitted as standard (SSB/CW, AM, AM-NAR and FM-NAR) chosen for optimum performance, with switchable AGC and variable tone control. The back-lit green L.C.D. display incorporates easy to read "any angle" 10mm digits. A twelve function display indicates the status at a glance. It includes memory channel number, mode, and frequency to a resolution of 100Hz. Also included is a two dimensional LCD, graphical SIMPO and 'S' meter. A 12 button keyboard allows quick accurate changes of frequency and band. Dual accurate 12 hour clocks, with AM/PM indicators uses the main digital display and features full back-up facilities (mains failure) and can activate the receiver or tape recorder via relay contacts. The FRV-8800, extends coverage to include 118-174MHz all within the main frame, allowing monitoring of, PMR, marine and air bands, as well as 2M. 240-220VAC to 110-120V, 50/60Hz mains are standard. 12VDC operation is optional.

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FT 757GX
£739 inc VAT

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

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

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

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

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

All the presettable controls and connectors are conveniently located on the transceiver rear panel including VOX gain, anti-trip and delay, AM carrier and SSB processor levels, 25KHz marker switch, ext spkr and Hi Z AF outputs, patch input and external ALC, remote controller I/O port and band data for optional microprocessor automatic ATU.

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

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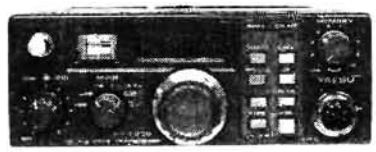

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SMC 38F	144MHz ⅜ wave 1.5dB 0.77m	£9.60
SMC 70N2S	144/432MHz 2m ¼ wave 0dB; 70cm ⅝ wave 3.2dB 0.47m	£8.45
SMC 70N2DX	144/432MHz 2m 6/8 wave 4.5dB 70cm 3 × ⅝ wave 7.2dB 1.55m	£23.75
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IC-735, The Complete HF Radio

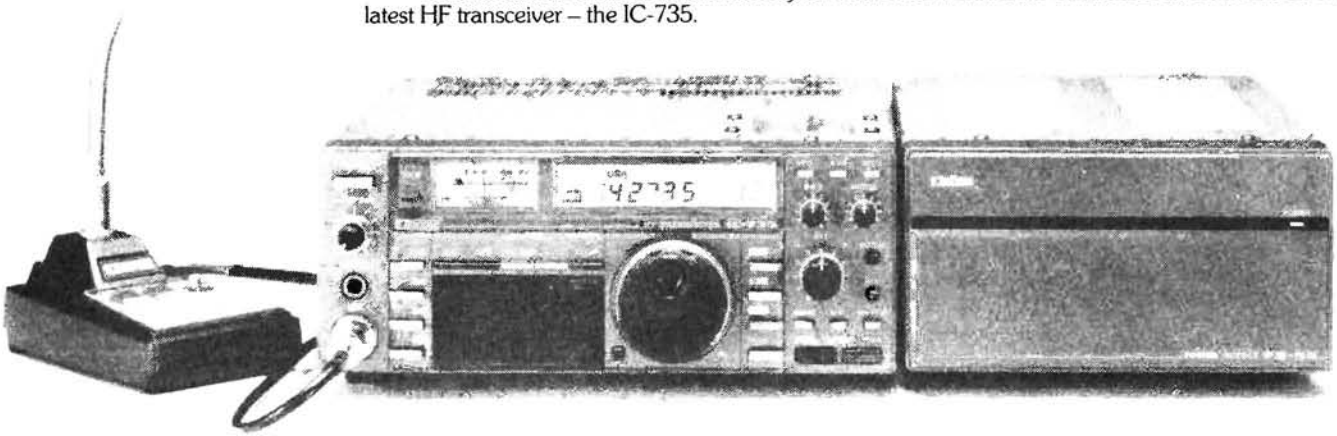
This new HF transceiver from ICOM is compact enough to make mobile or portable use a possibility. The IC-735 covers all Amateur frequencies from 1.8MHz to 30MHz including the three new bands 10, 18 and 24MHz. Modes include SSB, CW, AM and FM, all circuits are solid-state and output is approximately 100 watts.

Tuning ranges from 100kHz to 30MHz, made continuous by using a high-side IF and a CPU control system. RTTY operation is also possible. Dynamic range is 105dB with a 70.451 MHz first IF circuit. The direct feed mixer rejects spurious response and gives higher sensitivity and wider dynamic range. Pass-band tuning and a sharp IF notch filter provide clear reception even under duress. Preamp is 10dB and attenuator 20dB.

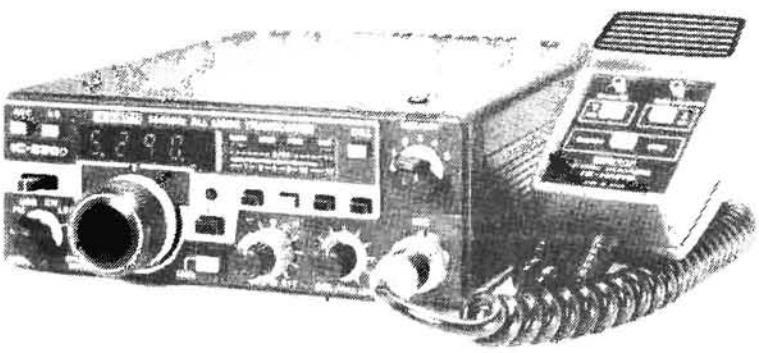
The new IC-735 from ICOM is easy to operate and versatile, it has various scanning functions, comprehensive LCD and 12 memories. Computer remote control is possible via the RS-232C jack.

Options include: the AT-150 automatic antenna tuner and shown here the PS-55 AC power supply and SM-8 desk mic.

Please contact Thanet Electronics or your local ICOM dealer for even more information on this latest HF transceiver – the IC-735.



IC-290D/290E Mobile



290D is the state of the art 2 meter mobile, it has 5 memories and VFO's to store your favourite repeaters and a priority channel to check your most important frequency automatically. Programmable offsets are included for odd repeater splits, tuning is 5KHz or 1KHz. 25KHz option.

The squelch on SSB silently scans for signals, while 2 VFO's with equalising capability mark your signal frequency with the touch of a button. Other features include: RIT, 1 KHz or 100Hz tuning/CW sidetone, AGC slow or fast in SSB and CW, Noise blanker to suppress pulse type noises on SSB/CW.

You can scan the whole band between VFO's/scan memories and VFO's. Adjustable scan rate 144 to 146 MHz, remote tuning with IC-HM10 and HM11 microphones. Digital frequency display, Hi/Low power switch. Optional Nicad battery system allows retention of memory.

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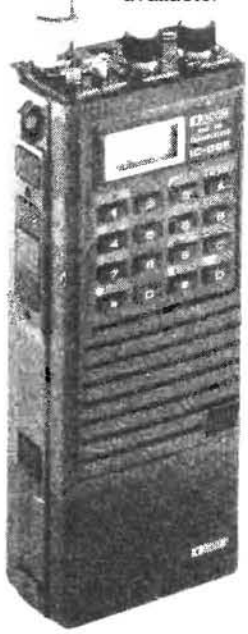
IC-02E, IC-04E Handheld

The direct entry microprocessor controlled IC-02E is a 2 meter handheld, features include: scanning, 10 memories, duplex offset storage in memory and odd offsets also stored in memory. Internal Lithium battery backup and repeater tone are included. Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority.

The IC-02E has an LCD readout indicating frequency, memory channel, signal strength, transmitter output and scanning functions.

HS-10 Headset also available, with earphone and boom microphone, which operates with either of the following:- HS 10-SB Switch box with pre-amplifier giving biased toggle on, off and continuous transmit. HS 10-SA Voice operated switch box, with pre-amplifier, mic gain, vox gain and delay. The IC-2E and 4E continue to be available.



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

IC-27E Mobile

You can get what you want just by picking up the telephone. Our mail-order dept. offers you: free, same-day despatch whenever possible, instant credit, interest-free H.P., telephone Barclaycard and Access facility and a 24 hour answering service.

Please note that we have a retail branch at 95, Mortimer Street, Herne Bay, Kent. Tel 369464. Give it a visit, BCNU.

This must be the smallest, 2M, FM mobile available today, measuring only 38mm H x 144mm W x 177mm D. It has all the features that you probably require included in this microprocessor controlled unit. In addition, if you feel lonely and can't find anybody on the band. just press "speech" and the optional built in speech synthesizer will tell you the frequency you are tuned to. This is a boon to the blind operator or to those that tuck their rigs out of sight.

Brief features:- 25/1 Watt output, green LED readout, scanning (memories and programmable limit band scan), priority scan, programmable duplex splits, 25 and 5Khz tuning steps, 10 memory channels with lithium back up cell, normal and reverse repeater switch, dual VFO. internal speaker and optional speech synthesizer. Just ask for a leaflet and we'll be glad to send you one.

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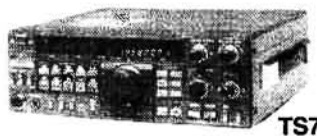

TS711E

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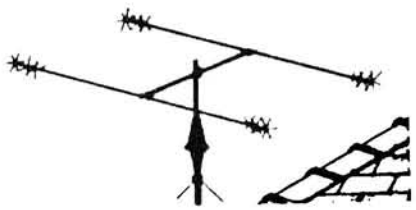
SPECIFICATION

Element length	11 feet	SWR at resonance	1.5 to 1.00 max
Boom length	60 inches	Power rating	1400 watts PEP
Turning radius	7 feet	Input impedance	50 ohms
Operating frequencies	10m, 15m, 20m	Wind resistance	80mph
Forward gain (ref D pole = 1.00)	3.6dB	Weight	14lbs
		Rotator requirements	AR40



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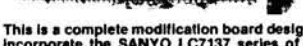

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This is a complete modification board designed to fit all CB radios that incorporate the SANYO LC7137 series of synthesizer chip, the unit comprises of a small pcb with six microchips and **fits almost all current legal (CB 27/81) radios**, the unit is supplied with **full fitting instructions** and can be **fitted easily by most enthusiasts**, with the current upsurge in interest in this band demand has been high as this means that over 90% of current CB radios can now be used on 10 mtr amateur band See other ads for more information. Over 300 sold in 2 months! Complete radios available & other kits.

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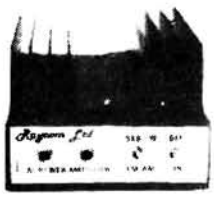

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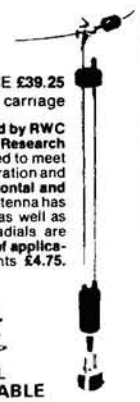

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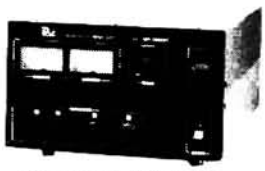

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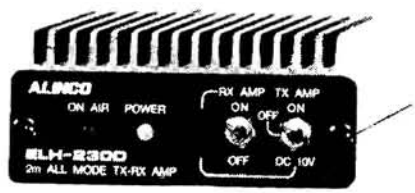

ELH230D
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with Pre-Amp
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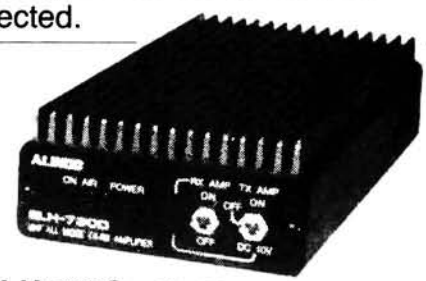

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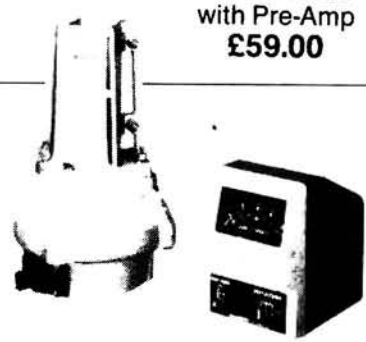

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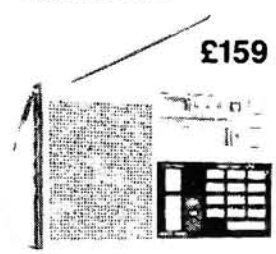

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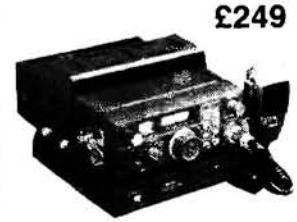

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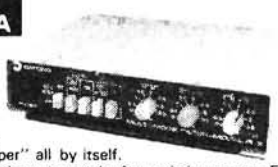

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WRITE ON ... *the page where you have your say*

Boredom

Sir: Listeners on the Amateur bands may have noticed a certain air of disillusionment in some quarters, particularly amongst v.h.f. users. The result of this varies from moans and gripes, to complete abandonment of amateur radio. The complainers seem loath to express their reasons for wishing to abandon the world's greatest hobby, perhaps for fear of embarrassing others, but from their comments it is relatively easy to identify simple boredom as the root cause of their disenchantment. The hobby still presents challenges to persons of almost any level of technical competence, so it's not the hobby itself that is boring, but the hobbyists themselves!

It might have been Disraeli who said, "Talk to a man about himself, and you'll hold his attention for hours," and so it is human nature for us all to waffle on at great length about our achievements, however tedious this may be for the listener. In the course of normal, face to face discussions, however, the unfortunate listener has the opportunity to interject his own comments at almost any time. Such opportunity does not occur with radio contacts, and many operators seem to take advantage of this, whilst it is only the etiquette of Amateur Radio that prevents the listening station from closing down.

Many of us have been part of three- or four-station nets where one's own "turn to speak" only comes round every 30 to 40 minutes. Many of us, too, have out of simple courtesy, waited, and listened, and waited, fighting against tiredness, boredom, hunger, thirst, cold, bursting bladders, visiting relatives and failing circulation, just to inform the other stations that we are closing down. If, additionally, one has to endure the ramblings and irrelevancies of one's fellows, it is hardly surprising that people turn away from Amateur Radio!

Many times, over the air, one hears stations freely admitting to not having been listening to all or part of another station's over, using some transparently lame excuse. This is not the fault of the listening station. Perhaps it would be more productive if the listening station told the truth, i.e. "Sorry, Fred. I missed the last ten minutes of your over because it was so long and boring and besides, you've told me the same story three times this week already, and in any case, I was thinking of what I could talk to **you** about for the next quarter of an hour."

I may be a relative newcomer, and I'll probably get some flak for writing this if you publish it, but may I suggest that operators follow the recommended operating procedures and (a) Keep overs as short as possible, and (b) Deal with only one conversational point at a time. By this means, no-one but the most impatient would feel ignored, nets would be happy events, and with luck, disillusionment may evaporate. This would also prevent the embarrassing situations where the loquacious operator is blathering away to a mobile station who disappeared over the horizon some five minutes earlier!

Remember, there is another Amateur at the other end of one's microphone, who is trying to get his/her moneysworth from the hobby too. Let the watchword(s) be, *"Happiness is a short over".*

Arthur Wardell G1IJG
Ovenden, Halifax
West Yorks

PW Meon

Sir: The writers have had several enquiries about the simple mixer termination at the i.f. port of the receive converter of the *PW* Meon.

Double-balanced ring mixers of the SBL-1 type are particularly sensitive to the termination at the local oscillator and i.f. ports. If the unwanted products of the mixing process are not correctly terminated, they may cause unexpectedly large conversion loss and reduction of dynamic range.

Complex terminations can be used to ensure correct termination at all frequencies produced by the mixing process, but by far the simplest method is the use of an attenuator at these ports. This has been done at the local oscillator port. However, extra loss at the i.f. port is undesirable since it will compromise performance and a lower loss termination is required.

An alternative approach was suggested in the 1978 *ARRL Handbook* (maybe even other issues, but the

PW COMMENT

Listening In

SALES OF SCANNING RECEIVERS, or scanners for short, both to business or official users and to enthusiasts, have soared in recent years. This is partly because of the increasing interest in two-way radio and its use in many walks of life, but also because of the versatility of modern receivers. Listening to scanners has become a popular pastime for many thousands of radio hobbyists, though some people (depending on their point of view) might call them voyeurs.

One problem for the new enthusiast is understanding the jargon. Too many scanner handbooks seem to have been written on the assumption that users will already know the difference between "scan" and "search", that "lock-out" isn't something to do with an industrial dispute, and so on, and that all the manufacturer needs to do is to explain the special features of that particular receiver.

To try to meet the needs of these newcomers, I have asked our very own Roger Hall G4TNT to write the article on scanners which appears in this issue—giving you the benefit of his years of experience in this area.

The legal position of scanner enthusiasts, both in the UK and elsewhere, is not a happy one. Laws about what you are or are not allowed to listen to, even when and where, vary enormously around the world.

Some countries have gone so far as to propose new laws totally banning the sale of scanners to private users, even extending that to general-coverage h.f. receivers in one case. Certainly, the manufacturers of two-way radio systems, anxious to offer customers some degree of privacy in their on-air conversations, are likely to resist very strongly any relaxing of the laws. As I mentioned last month, the new *Interception of Communications Act* will give powers in the UK to clamp down on eavesdropping on public telecommunication systems such as cellular radio and other radio-telephone systems, and on cordless phones.

It has to be said though, that except in a police state, it is not possible to enforce the sort of laws on radio reception which we have now in the UK, let alone any new, more restrictive ones. Far better to change the law so that it becomes legal to listen to any radio signals, but illegal to make use of information gained by listening to anything other than broadcast or amateur stations, or services for which the appropriate licence is held, such as CB. It would then be up to the firms providing radio communications equipment or systems, either to include "scramblers" or other encryption circuits, or to warn customers that their conversations are likely to be overheard.

The present UK laws on radio reception are, to all intents and purposes, unenforceable Unenforceable law is bad law, because it brings the law as a whole into disrepute, and it should be changed.

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

authors don't buy it every year!). In this approach a leadless disc capacitor is located directly at the i.f. port of the mixer. As long as down-conversion is used and the ratio of signal to i.f. frequency is at least 10 to 1 then the circuit works. The theory is that at signal and image frequency the reactance of the capacitor is low and the unwanted signal currents are shorted to ground. At i.f. the reactance is relatively high and the shunting effect is minute.

The authors are a little sceptical of this approach since it is understood that the unwanted products should be terminated in a suitable load. The logical step is to put a 50Ω resistor in series with the capacitor. At signal frequency the termination will be 50Ω in series with a low value of reactance; effectively giving 50Ω. At i.f. the reactance of the capacitor is a lot higher than 50Ω and the termination is effectively out of circuit. Termination is still 50Ω at i.f. because of the impedance transformation of the "L" match between the mixer and following stage.

The problem is not yet solved since leadless disc capacitors are awkward to use on p.c.b.s. A leaded 390pF capacitor cannot easily be used to replace the 390pF disc capacitor. The self-resonant frequency of the disc is over 1GHz but the measured self-resonant frequency of a Mullard 390pF 2222–630 series miniature ceramic plate capacitor is only 105MHz. Therefore at a signal frequency of 50MHz and above, the terminating impedance becomes somewhat higher than 50Ω. Several other values were tested and it was found that the 100pF Mullard 2222–650 series ceramic plate capacitor was resonant at over 160MHz. This value should be satisfactory at 50MHz. A lower value would be better at higher frequencies, e.g. 56pF at 144MHz.

Although with the frequencies used in the 50MHz transverter the ratio of signal to i.f. frequency is nowhere near the 10 to 1 specified for this method to work, the measured dynamic range and noise figure of the prototype transverters show that there is little to be gained by going to a more complex mixer termination.

Sam Jewell
Ipswich

OUR SERVICES

QUERIES

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

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

PROJECT COST

The approximate cost quoted in each constructional article includes the box or case used for the prototype.

SUBSCRIPTIONS

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

CONSTRUCTION RATING

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

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

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

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

INSURANCE

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

BACK NUMBERS AND BINDERS

Limited stocks of some recent issues of *PW* are available at £1 each, including post and packing to addresses at home and overseas (by surface mail).

Binders are available (Price £5.50 to UK addresses, £5 75 overseas, including post and packing) each accommodating one volume of *PW*. Please state the year and volume number for which the binder is required.

Send your orders to **Post Sales Department, IPC Magazines Ltd., Lavington House, 25 Lavington Street, London SE1 0PF.** All prices include VAT where appropriate.

Please make cheques, postal orders, etc., payable to IPC Magazines Limited.

BOOKSHELF

RADIO SYSTEMS FOR TECHNICIANS by D.C. Green. Published by Pitman Publishing Ltd. 282 pages. 184 x 245mm. Price £1.25
ISBN 0 273 02297 0

If you are beginning a course of study as a radio technician or engineer, then this book could prove useful. It introduces the basic principles of radio systems and includes worked examples to illustrate the principles under discussion.

Starting with amplitude modulation, the book works its way steadily through frequency modulation, modulators and demodulators, transmission lines, antennas, propagation, r.f. power amplifiers, transmitters, receivers, wideband line and radio systems and finishes with exercises (to see how much has sunk in!).

From the list of chapters it can be seen that the book provides a comprehensive coverage of the circuits and techniques used in modern systems.

The exercises at the end of the book are divided into two sections Radio Systems II and Radio Systems III. Various types of questions are set, true or false answers, multiple choice and short exercise answers. They cover all aspects of the subjects discussed in the various chapters and the answers are given later in the book.

Christmas Rally

Seems like a good idea. The Verulam Amateur Radio Club in conjunction with Gore Management Services Ltd will be running the first radio and electronics rally in north London on Sunday 1 December. The venue is the St. Albans City Hall—doors open at 1100 with admission at 50p. A wide range of trade and club stalls, including *PW*, plus bring and buy, bar and catering will be available—talk-in on 144 and 432MHz. Further details from: ***Hilary Claytonsmith on (0727) 59318 or P. A. O'Hara on (0923) 52959.***

Morse Dispensation

Following some months of rumour information received in September indicated that h.f. amateur licences have been issued by the DTI to certain handicapped people who have passed the RAE and been judged medically incapable of taking a Morse test. As this category of licence was previously unknown we contacted DTI and RAIBC who confirmed the information. For some years DTI have provided dispensation for a very limited number of people, following consultation with the medical services. It is understood that licence holders in this category are not allowed to use or acknowledge c.w. and must immediately QSY/QRT if c.w. appears on their operating frequency, which is confined to non-c.w. sections of the h.f. bands. The August/September issue of the RAIBC journal *Radial*, in response to membership enquiries, referred interested parties to the DTI and asked people to "carefully consider the implications. Not everyone agrees that 'special treatment' should be given to certain people, and the situation is a tricky one."

It is our understanding that a recent large increase in dispensation requests has resulted in a withdrawal of this facility pending investigation of the scheme by senior officials of the DTI. The extent and details of the scheme are apparently not fully known by the RSGB but it is the stated view of their Licensing Advisory Committee that the minimum requirement for the issue of a Class A licence in this category should be the ability to read Morse at 12 w.p.m. even if third party assistance is needed during the test.

Meanwhile it is perhaps worthwhile to remember that a very substantial number of handicapped people have managed the Morse Test and that it is possible for tests to be arranged at home for those unable to be moved.

Amateur access to Geostationary Satellite

A recent presstop item in the US *Ham Radio* reveals that NASA is proposing to make available the use of one of their Advanced Communications Technology Satellites (ACTS) for a two year period commencing in 1989. Amateur radio is one of the user groups identified by NASA. Slight snag is the satellite will use highly directive antennas aimed at "some major population centres" (presumably within the US) and the uplink within the 27·5–30GHz band. Still if you can accommodate that the downlink on 17·7–20·2GHz should be dead easy!

50MHz Progress

Well, as of 18 September there has not been much! UK amateurs still await the specific conditions (if any) to be applied to the 50–50·5MHz allocation. A DTI press officer stated that discussions were still in progress between RRD and RSGB and it was not expected to announce the results before the year's end. The RSGB still maintain their stated position that they are expecting to see a general (Class A and B) use of the band and when questioned the RRD have indicated that "special conditions"—if introduced, would not follow those already in force for the 100 permit holders. Meanwhile the possible general introduction of 50MHz within IARU Region 1 would seem to be a long way off due to the heavy reliance on Band I TV. Still, there's always cross-band operation and with the pending Sunspot maxima only the odd year or two (1992?) away we may look forward to some interesting DX. If BBC TV can make it into VK on wideband QRO.

Amateur Radio Licensing

During February 1985 Ian Abel G3ZHI formulated a series of questions relating to amateur licensing. A written reply from the Radio Regulatory Department (RRD) was received by Ian during July and as a result of this exercise the DTI are to publish a fact sheet on the subject. Whilst several of the original questions remain unanswered the following direct extracts from the RRD reply will be of interest. The final fact sheet should be available during November.

"The issuing of Amateur Radio Licences: There are currently seven members of staff engaged in Radio Amateur work within RALU. This is their only work, with the exception of the Manager who is also responsible for the Citizens' Band Licensing Unit.

The workload on amateur licensing at the Post Office is variable. After the results of the May RAE are known it is not unusual to have as many as 5000 applications at once. Notwithstanding this a 5 working days turn-around is aimed at for normal times although at peak times this may increase to 10 working days. All applications must be submitted by post; there are no counter facilities at RALU. The functions of issuing an amateur radio licence is not always a purely mechanical business, for example, a call-sign, previously held by a Class "B" amateur who is now a Class "A", or previously held by a deceased person, may be transferred, on written request, to a close relative of that person. In addition, letters on amateur radio matters may be received and dealt with by RALU themselves who send out on average, 80 replies each week. Typically letters can relate to such matters as Club licences or the re-issue of callsigns and the Post Office deal with as many such straightforward enquiries as possible without reference to RRD.

Correspondence is also handled by Branch 2, RRD: this either comes in direct or via RALU if not a straightforward case. RRD correspondence covers all matters from the interpretation of particular clauses in the licence to

Crossband Operation II

Since our mention of the DTI clarification of crossband operation (*PW* August 1985, page 18), we have yet to see an official press release from the RRD. However, copies of the original DTI letter, sent to G3ZHI on 3 May 1985 can be obtained by sending 10p in stamps plus an s.a.e. to: ***Ian Abel, 52 Hollytree Avenue, Maltby, Yorks.***

DXpedition Down Under

PW reader Carol McKenzie VK5PWA, President of the Lower Eyre Peninsula Amateur Radio Club, reveals that they intend to operate the callsign VI5IYY as their contribution towards the 75th Anniversary of the Wireless Institute of Australia (the world's oldest) and International Youth Year. A DXpedition is to be mounted in conjunction with the Port Lincoln High School and St. Joseph's Convent, operating from Boston Island which is close to Port Lincoln in S. Australia.

During the period 8–14 December the group will be operational on the h.f. bands, possibly using a home-brew 2-valve transceiver on 3·5 and 7MHz. The club's Mathew Flinders Award, which takes the form of a bannerette depicting his work on *HMS Investigator*, is also available for confirmed contacts.

For further details or direct QSL (IRCs required to cover Airmail return) contact: ***VI5IYY, International Youth Year DXpedition, PO Box 937, Port Lincoln SA 5606, Australia.***

more specialised requests to change callsigns, or for statistical information. Perhaps the largest single subject of correspondence is on the question of reciprocal licensing. Excluding simple licence renewals, requests for *How to Become a Radio Amateur* booklets and notification of changes of address, RRD receive on average some 40 letters per week on amateur matters that require individual answers.

Amateur radio and wider policy issues: Changes to the Amateur Radio Licence come about as the result of representations made to the Department and by consultation and regular meetings with representatives of the amateur world. In particular, much work is done on behalf of amateurs by the Radio Society of Great Britain (RSGB) with whom the Department has considerable liaison. Changes may be also be stimulated internally, perhaps by suggestions from other parts of RRD. Amendments to the terms and conditions of the Amateur Licence would normally involve full consultation with the RSGB. Changes to the licence are either announced by general notice in the *London, Edinburgh* and *Belfast Gazettes* or in a newspaper published in London, in Edinburgh and in Belfast if it is a universal change, or are notified to individual licensees in writing.

RRD meets the RSGB usually on a quarterly basis to discuss any matters concerning amateur radio. This provides a valuable forum for both parties, at which many important issues are raised. Both the RSGB and the Department contribute to the, normally very full, agenda for these meetings and it is fair to comment that much progress had been made to the benefit of the amateur community as a result. For instance, just to give two examples, the new licence schedule and the recently announced experiment whereby Class B's can now practice Morse have arisen as a result of this liaison. DTI and RSGB also meet frequently to discuss specific items of interest and the RSGB also attends any necessary *ad hoc* working groups. Other matters may arise between these meetings and DTI and the RSGB are in daily contact by telephone, telex and letter in order to progress a wide variety of topics. The officials who most regularly meet RSGB are those who have direct responsibility for amateur radio matters.

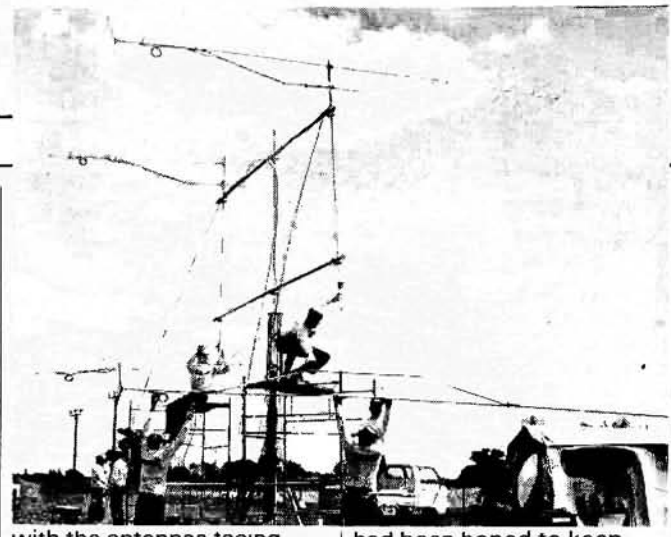
Two matters of particular interest to radio amateurs which the Department are directly involved with is the Radio Amateur Examination (RAE) and the Morse Test. There is an Advisory Committee on the RAE that meets regularly, and which includes representatives from RRD (and RSGB). It, from time to time, considers changes to the RAE, although none of a fundamental nature are being considered at present. In the case of the Morse Test, RRD are currently considering bids for conducting the Amateur Morse Test after April 1986.

There are wider policy issues which also affect the amateur world. The Department is reviewing the work of the RIS with a view to increasing the effectiveness of its law enforcement activities, we are consulting RSGB and we shall be looking for co-operation from the amateur service in identifying persistent offenders. This is within the spirit of the amateur service being self-regulating and will enable the RIS to use the resources it can devote to the amateur service more effectively.

The efforts of the Department in the international field are of direct benefit to the amateur hobby, such as in negotiating reciprocal arrangements with other countries and in controlling interference. In the case of reciprocal arrangements, there are already several in existence and we are currently looking at reciprocal arrangements with Japan, Greece and Yugoslavia, although the indications are that no firm decisions can be made for some time yet. The Department's role in administering the International Radio Regulations in the UK is particularly important and has relevance to the amateur service. Under Radio Regulation 342, administrations shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations or the other provisions of the Radio Regulations, except on the express condition that harmful interference shall not be caused to services carried on by stations operating in accordance with the International Telecommunications Convention and the Radio Regulations. This explains why particular bands are designated for certain types of services. It is also the Department's responsibility towards the Radio Regulations which gives one reason why there are no plans to drop the general Morse requirement for Class "A" licensees. Radio Regulations 2735 requires that, except for frequencies above 30MHz, any person seeking a licence to operate an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear texts in Morse Code signals.

RRD is always prepared to move with the times and agrees the introduction of new techniques so long as they are consistent with the prime consideration of not causing harmful interference. Examples of such new techniques that have been adopted for amateur radio are RTTY, AMTOR and Slow Scan Television."

Transatlantic 144MHz Record—Still Available

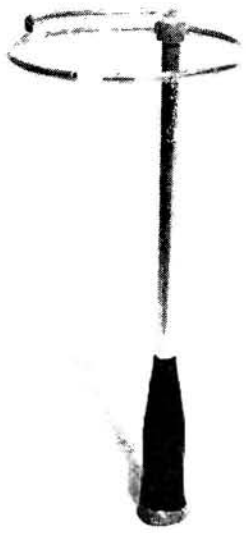


The much publicised 144MHz transatlantic QSO attempt by members of the West Kent Amateur Radio Society (G3WKS) unfortunately met with failure. The same weather phenomena that nearly stopped Marconi in 1901 was the principal culprit—holding steady a box of four 19-element Yagis on top of a 16m telescopic mast, whilst 450m up a Galway mountainside whose nearest westerly windbreak is in Newfoundland proved problematical! Attempts to rotate the array were abandoned after the first night and the stacking frame was guyed to ground direct, with the antennas facing directly into the *sustained* gale driven horizontal rain. Skeds were kept around the clock for five days with several "pings" observed but all of very short duration and unidentifiable.

If you didn't hear the full legal, mainly c.w. operation from IO53 don't blame your equipment—30m of mountainside above and behind the antennas blocked all European signals other than the local EI repeater. It had been hoped to keep skeds with a radio officer on the liner *QE2*, who also holds a /MM licence—75knot winds off Newfoundland removed his 9-element 144MHz Yagi, four elements of which remained a.w.o.l.

However, this was not the first and will doubtless not be the last time this v.h.f. path is attempted—longer overland paths have been worked (G-4X4), but the *challenge* still remains.

Silver Halo



Intrepid 430MHz mobile operators with a desire for omni-directional horizontal working will no doubt be interested in the latest Silver 70 antenna from Ant Products.

The Silver 70 Halo comprises a ruggedly constructed self-supporting circular halfwave dipole mounted on a 240mm stub mast/feeder terminated by a shrouded PL259 u.h.f. plug, suitable for most normal gutter or mag-mounts. Pre-set gamma matching and silver-plated copper tube ensures high *Q* and maximum radiation efficiency. The v.s.w.r. is quoted as being typically 1·2:1 and power handling capability is given as 100W c.w.

The Silver 70 Halo is guaranteed for two years against mechanical and electrical defects and is available at £17·95 direct from ***Ant Products, All Saints Industrial Estate, Baghill Lane, Pontefract, West Yorkshire. Tel (0977) 700949.***

Vibroplex

GW Morse Keys are now the UK distributors for Vibroplex keys and carry the full range together with spares. For further details of the Vibroplex range or for information on service work on these popular keys contact ***GW Morse Keys, 4 Owen Close, Rhyl, Clywd, Wales LL18 2LQ. Tel: (0745) 54763.***

THE VIBROPLEX COMPANY INC TRADE MARK

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RF Meters

Fieldtech now have available a range of r.f. power meters, loads and couplers made by Coaxial Dynamics. The power meters cover the range 0·1W to 50kW and each wattmeter accepts any of a wide range of plug-in measuring elements or "slugs". These "slugs" can be either Coaxial's own bi-directional elements or the standard types readily available elsewhere. Full details are available from ***Fieldtech Heathrow Ltd., Huntavia House, 420 Bath Road, Longford, Middlesex UB7 0ll. Tel: 01-897 6446.***

900MHz Transistors

Two new r.f. transistors are suitable for use in the rapidly growing markets around the 900MHz part of the radio spectrum.

The BLU97 and BLU98 are rated for output power levels of 30W and 14W respectively and offer long-term reliability in a compact 6-lead flange envelope. Minimum power gain for the 97 is 7dB and for the 98 8·5dB with both versions capable of withstanding a full load mismatch.

Both types are *npn* epitaxial devices with internal input matching and are intended to be used in common-base Class B circuits. Titanium-platinum-gold metallisation helps to give low current densities across the active areas to give the reliability needed for such applications as cellular radio base stations. Further details from ***Mullard Ltd., Mullard House, Torrington Place, London WC1E 7HD. Tel: 01-580 6633.***

Icom Superscanner

Details of Icoms latest communications receiver the IC-R7000 have arrived from Thanet Electronics. Blending the characteristics of previous general coverage and scanning receivers the IC-R7000 covers the ranges 25–1000MHz and 1·025–2·000GHz with f.m. WIDE/NARROW, a.m. and s.s.b mode options. Frequency selection is made by way of the direct-entry keyboard or central tuning knob—99 memory channels hold frequency and mode information. Five frequency step increments can be selected 0·1, 1, 5, 10, 12·5 and 25kHz. Scanning modes include full, program, mode selected, selected memory, autowrite program and priority. Sensitivity specifications indicate f.m. (15kHz), 0·25µV for 12dB SINAD: f.m. (9kHz) 0·3µV for 20dB quieting: a.m. 1µV for 10dB S/N and 0·3µV for 10dB S/N on s.s.b. The IC-R7000 comes complete with internal 240V p.s.u. and can be run from external 13·8V d.c.

Triple conversion on the narrowband modes together with, squelch, noise blanker, S-meter, dual-colour fluorescent display r.f. attenuator and audio output of 5W into 4Ω all make for a very interesting set—optional extras include infra-red remote control and voice synthesiser. Further details direct from ***Thanet Electronics, Dept PW, Herne Bay, Kent. Tel: (0227) 363859.***

PRODUCTS

Community Radio Gear

Eddystone Radio has been preparing for the introduction of Community Radio into the UK. The written reply from the Rt. Hon. Leon Brittan, MP, outlining the classes of licence and permitted modes of operation for these stations has allowed Eddystone to give details of the types of package that they will have available to meet the demand.

Based in the UK, Eddystone Radio are well known as designers of communication and broadcast transmitting equipment and prospective operators of community radio stations should contact the company who will be pleased to give them every possible assistance.

Eddystone Radio Ltd, Eddystone Works, Alvechurch Road, Birmingham B31 3PP. Tel: 021-475 2231.

UHF Yaesu Handhelds

Remember the *PW* reviews of the Yaesu FT-203, and FT-209 144MHz u.h.f. handheld transceivers? Well, you can now obtain their 430MHz u.h.f. look-alikes.

The FT-703R is the more basic version, providing thumbwheel frequency selection over the full 430–440MHz range. An r.f. output capability of 2·5W together with a dual-conversion superhet receiver (21·6MHz and 455kHz i.f.s.) with a basic sensitivity of 0·25μV for 12dB SINAD, results in a very versatile f.m. system. If your preference for control dictates the keypad format then the up-market FT-709R will be hard to beat for its choice of programmable options. An l.c.d. readout and choice of 3, 4·5 or 6·5W outputs, depending on battery pack capacity, together with the compatible receive capability make the FT-709R a very attractive proposition.

Full details of both transceivers from: ***South Midlands Communications Ltd., S.M. House, Rumbridge Street, Totton, Southampton SO4 4DP Tel: (0703) 867333.***

British 934MHz

We have, at long last, actually managed to get our hands on a Uniace 400 934MHz CB rig for evaluation. This British designed and built transceiver will be fully reviewed in a future issue of *PW* but in the interim here is a picture and brief specification.

The 400 is a completely new design and uses the latest technology including surface mounting components and microprocessor control. A hybrid v.c.o. running at 960MHz is used with mixing via double balanced Schottky diode mixers to achieve the desired operating frequencies.

A solid-state p.a. module provides 8W r.f. output with stability and immunity from the effects of high v.s.w.r. Cavity filters ensure a clean output.

The receiver uses a t.c.x.o. to achieve the necessary frequency stability and cavity filters in the RX line together with a crystal filter at 21·4MHz give good selectivity.

An 8-bit microprocessor controls the frequency synthesiser and the digital channel readout. Channel selection is by a 40-position rotary switch which allows conversion to 40 channels at a later date as and when the option becomes legal.

Look out for our full review of the Uniace 400. Further details and prices are available from ***Uniace Telecommunications Ltd., Unit 8, Conway Road Industrial Estate, Llandudno Junction, Gwynedd, N. Wales. Tel: (0492) 61 3232.***

ICS Handhelds

Looking for a new handheld rig for the 144MHz band? ICS Electronics have just been appointed exclusive UK distributors for a new range of handheld and mobile transceivers made by the Japanese company Alinco International.

The first arrival is the ALM203E 144MHz hand-held transceiver with push-button keypad operation. The rig is claimed to give all the most wanted features of a handheld at a price which is comparable to the more usual thumb-wheel operated units.

A 400mAh NiCad battery pack is provided together with a mains charger, belt clip, antenna and hand strap. An S-meter is built in and the rated output is 3W. Price is quoted as £209 inc. VAT with postage at £2·50 direct from ***ICS Electronics Ltd., PO Box 2, W. Sussex, BN18 0NX. Tel: (024 365) 590.***

Radio Books

Are you looking for the sort of book that gives you the frequencies of various broadcast transmissions? If so Interbooks can probably supply just what you are after. Their new free *Radio and RTTY Books* catalogue list some 26 books of interest to the radio amateur and short wave listener. To be placed on their mailing list and receive your free copy of the catalogue contact ***Interbooks, PWD3, Stanley, Perth, PH1 4QQ. Tel: (0738) 828575.***

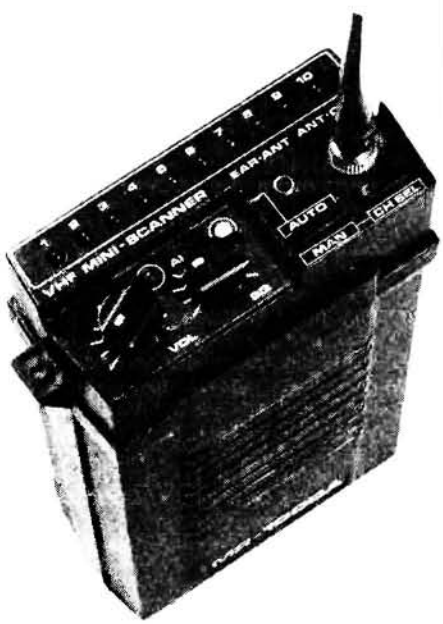
Scanners

Everything you always wanted to know, but were afraid to ask.

The listener who wants to tune into the v.h.f./u.h.f. bands is often bewildered by the complexity of modern scanners, so we asked Roger Hall to provide a background to this rapidly growing side of the hobby.

I am a scanner enthusiast from way back, and judging from letters that I receive, scanning is growing in popularity. Suddenly it seems that everyone wants a scanner and naturally manufacturers have not been slow catering to this demand. A quick glance through the advertisements in this magazine reveals an abundance of new models, each offering a bewildering assortment of features, functions, facilities and frequency ranges. To those who are already involved in this side of the hobby, these new machines hold few mysteries, but my mail shows that a number of readers are still confused by some of the intracacies of microprocessor control. This article will try to show how modern scanners work by explaining how they have evolved over the years.

In its simplest form, **scanning** is nothing more than sequentially listening to a number of pre-programmed channels, stopping whenever a busy one is found. The first scanners were just crystal-controlled receivers with up to 10 channels in the 144MHz (2m) amateur band, or the v.h.f. aircraft or marine bands. Pressing the SCAN button on one of these sets would make it check each channel in turn, stopping only when the squelch opened, showing that a carrier was present. It would then stay on that channel until the SCAN button was pressed again, when it would resume scanning until it stopped on the next busy channel. Some of these sets also had a MANUAL button that allowed the user to move the receiver along one channel at a time with each push of the button. This may seem very primitive by today's standards but at the time it was a major breakthrough for listeners. Before scanning receivers were invented it was necessary to manually spin the tuning dial to check for signs of activity and the listener was tied to the set for as long as he wanted to listen around. The arrival of the scanner meant that the receiver could be left doing the work.



The first improvement in scanner design came with the advent of auto-resume. This feature removed the need to press the SCAN button again to resume scanning. Whenever the carrier disappeared from the channel being monitored, the squelch would close and the set would then automatically start checking all the channels again until it found another carrier. This was an important new feature because it increased the speed with which a number of channels could be checked for activity. No time was wasted listening to quiet channels as the set would be constantly scanning unless a signal was present.

The next advance was the introduction of the **lockout** facility. Most early scanners had a row of numbered l.e.d.s, one of which lit to show which channel was being monitored. Soon, some manufacturers hit on the idea of incorporating a row of miniature toggle switches under these indicators so that the listener could switch off one or more of the channels. The scanner would then ignore those frequencies. This facility was useful when, for instance, the scanner had been crystalled up to receive the 144MHz repeater band. If the local repeater was always transmitting, the set would constantly stop on that channel and have to be restarted manually, only to stop on it again next time round. The LOCKOUT switch enabled the listener to skip that channel.

The arrival of frequency synthesisers heralded a whole new generation of scanners. Instead of having to buy new crystals to change the frequencies to be scanned, scanners with frequency synthesisers allowed the user to enter frequencies via a calculator-style keypad. These frequencies were then stored in the set's memories and could be scanned in the same way as the channels of a crystal-controlled set, but they could be changed at any time.

The Electra Corporation of America is usually credited with making the biggest breakthrough in scanner technology. Their Bearcat range used microprocessors to control all of the functions. This allowed them to incorporate several new facilities that had never been seen before and now most modern scanners are controlled in this way, but because Electra held the patents for the microprocessors, other manufacturers have had to pay them royalties.

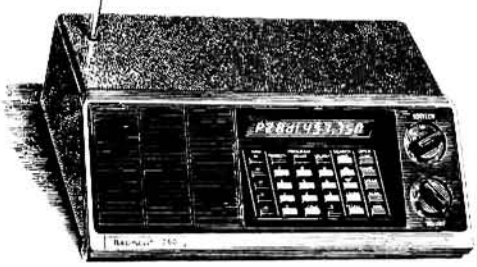
One of the most useful new facilities that is now available is **searching**. This is not the same as scanning, although the two are often confused. To use the search facility, the operator has to define a band by entering upper and lower frequency limits and then, when he presses the SEARCH button, the set will check every frequency in that band, usually in 5kHz steps, stopping whenever a carrier is present. This feature is useful if the listener knows the band that he wants to listen to but does not know the spot frequencies. For example, if he wants to find out the active frequencies in the 430MHz (70cm) amateur band, all that he has to do is enter 440 and 430 as the upper and lower limits and then search the band. When the set finds a busy frequency, it will stop and that frequency can then be entered into one of the memories. In this way all the memory channels can be filled with active spot frequencies. These can then be scanned and the dead parts of the band are ignored.

The 250FB is a typical Bearcat scanner that has numerous features that clearly illustrate some of the possibilities of microprocessor control. It will run on either 12V d.c. or 240V a.c. and covers 66–88, 146–174 and 420–512MHz. It has the usual volume and squelch controls and a keypad for entering frequencies and controlling the functions. There are 50 memories which can be scanned continuously or in separate banks of 10 at either high or low speed, and any number of the

memories can be locked out. A **delay** can also be added to any of the channels. This makes the scanner stay on that channel for a few seconds after the carrier has dropped, just in case one of the transmitting stations is a little slow replying. Without this feature, the scanner would have rushed off to check the other channels as soon as the carrier disappeared.

There is also a **priority** channel. When the PRIORITY button is pressed, the set will automatically check every 2 seconds the frequency that is in channel 1, regardless of what else it is doing and, if a signal appears on that frequency, it will override everything else and the set will switch to channel 1. The 250FB also has a search facility, and both scanning and searching can be done at either 5 or 15 steps per second.

This model has two unusual features that are not found on most others —**count** and **store**. Count is used in



conjunction with scanning. Whenever the COUNT button is pressed, the set will display the number of times that it has stopped on a particular channel. This is a great help in sorting out the active channels from the quiet ones. Store is similar to count but it works when searching. Instead of having to sit and watch the set while it is searching between pre-programmed limits, the STORE button allows the user to leave the set unattended. When SEARCH and STORE are pressed together, the set still checks all the frequencies in the pre-set band, but it does not stop on any of them. Instead it remembers which ones had signals on them and when the operator returns and presses the RECALL button, it displays all of the ones that have been active. As before, these can then be entered into the memories for scanning later.

On the back of the 250FB's case there are two 3·5mm jack sockets, one for an external speaker and one for a tape recorder. There are also two contacts that can be used in conjunction with the AUX button to turn a tape recorder on and off. When a signal appears on any of the channels that have had the **auxiliary** function activated, the recorder will automatically start whenever the squelch opens.

A large red l.e.d. digital display shows the frequency, which banks are being scanned, which of the features have been activated (priority, delay, auxiliary and lockout) and the time.

Receivers such as this have helped to popularise scanning but despite having all these features, the Bearcat 250FB is now obsolete, partly because the Electra Corporation of America has been taken over, and partly because yet another generation of scanners has now appeared. The first of this new generation was the AOR AR-2001. It does not have many of the Bearcat's features such as count and store, but what it does have is continuous frequency coverage. Instead of just being able to receive frequencies in pre-set bands, it will receive any frequency between 25 and 550MHz; there are no gaps in its frequency range. This massive coverage has proved to be an extremely popular feature and sales have been exceptionally good.

As well as having continuous coverage, the AR-2001 has some other very nice features. There is a built-in clock, a liquid crystal display (with a switchable light) and switchable frequency steps—5, 12·5 or 25kHz. It will receive a.m. or f.m. transmissions and, as it covers the v.h.f. broadcast band, it also has a wideband f.m. mode. Scanner manufacturers have obviously realised that this is the way to go and now there are several scanners on the market that have continuous coverage up to about 550MHz and some of the very new ones have an extra band that covers 800MHz to 1·3GHz.

Computer Control

Having stretched frequency coverage of scanners far further than anyone would have thought possible just a few years ago, the makers have been looking for other features that they can add to their sets. One of the exciting new ideas that they have come up with is external computer control. In the August and September 1985 issues of *PW*, we described how a home microcomputer can be used to control an h.f. receiver. Now it is possible to use one to control a scanner. Just before its demise, the Electra Corporation developed a new model, the 2100. This was a box that had only two external controls—volume and squelch. To make it work it was necessary to plug it into a home micro, the two units forming together a very versatile receiver. It had all the usual facilities for searching and scanning but they were controlled from the computer's keyboard. Using an external computer instead of an inbuilt microprocessor to control the functions meant that memory size was much greater and more features were available. One which I thought was extremely useful was **memo**. This allowed the user to write notes about the spot frequencies held in the memories, so that whenever the set subsequently stopped on one of those frequencies, the appropriate note would appear on the screen. These notes could be quite long and this feature would have been a great help to people like me who are constantly surrounded by scraps of paper.

Unfortunately the 2100 seems to have vanished now that Electra have been taken over, but there is hope. Lowe Electronics recently demonstrated an add-on board for the AR-2001 that provides it with an RS-232 serial computer interface. This allows it to be used with a microcomputer and when I saw it running, it was doing everything that had been claimed for the 2100. The control program had been written in BASIC with lots of sub-routines in order to make it easy to modify, but I was impressed with it as it was. Keith, Lowe's programmer, had given that particular set 800 memories which could be scanned all in one go or in banks of 20. The search facility had also been extended so that there were three banks whose upper and lower limits could be set and the user could choose which one to search with a keystroke. The video display showed everything that was happening, including a real-time clock and an S-meter. There was also a memo feature for tagging notes to frequencies. Frequency coverage had also been extended down to 15MHz but sensitivity tapered off at the lower end.

The advantages of external computer control are numerous; increased memory size, extra facilities, the ability to store frequencies on magnetic disc and then to load them into the

▶ 72

PW REVIEW

Geoff Arnold G3GSR looks at one of the new breed of scanning receivers that's breaking the gigahertz barrier

AOR AR-2002 Communications Receiver 25–550 and 800–1300MHz

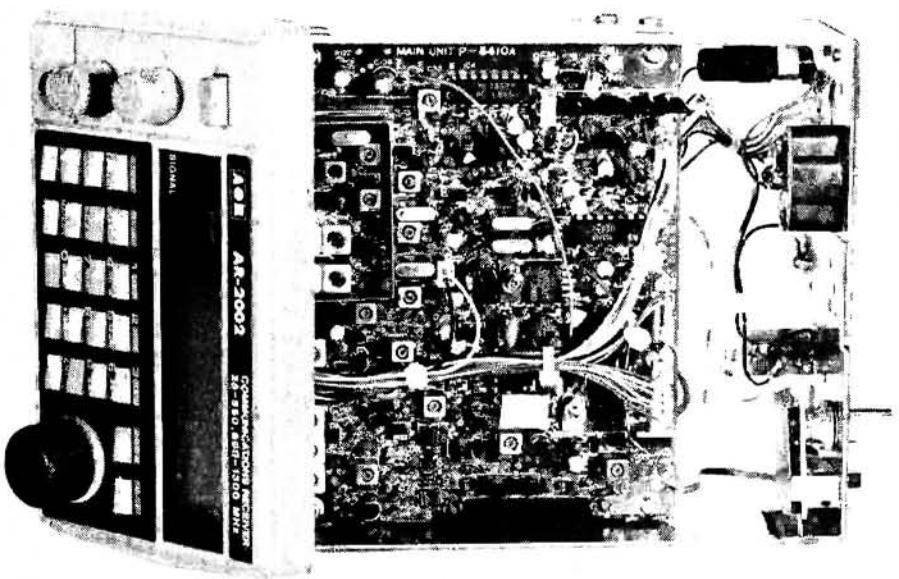
When we reviewed the AR-2001 Receiver in our May 1984 issue, our findings were that it was an excellent performer. Subsequent feedback from users has pointed out a number of features which could be improved upon, such as the touch-sensitive keyboard, and the S-meter (there wasn't one!). In our March issue this year, an article by Peter Turner G8TSY described a simple way of adding these particular facilities by means of an add-on box.

The manufacturers, AOR (which stands, believe it or not, for Authority on Radio), took note of these criticisms, added one or two improvements of their own, and came up with the AR-2002. All too often, when manufacturers bring out an "improved" model, they can't resist the temptation to change some things which should have been left well alone. I am pleased to say that AOR have not fallen into that trap, and despite going so far as to add an extra frequency band, they haven't changed the performance on the original band 25-550MHz at all, as comparison of our lab tests of the two sets will show.

So, what are the changes? Well, apart from that extra band, the touch-sensitive membrane keyboard has been replaced by a bank of real push-buttons; there is a useful l.e.d. S-meter; the VOLUME and SQUELCH controls have been separated; there is a front-panel headphone socket; a tuning knob has been added for the benefit of those users who prefer to twist a knob rather than press UP-DOWN buttons; and finally, a socket for computer control has been added to the back panel.

Most of these changes have involved no major alterations to the original AR-2001 design other than a new front panel layout. The extra frequency band is a little more involved. The circuit arrangement of the AR-2001 was: 600MHz low-pass filter, followed by up-conversion to a 750MHz first i.f. This was followed by a second i.f. at approximately 45MHz and a third i.f. at 455kHz for the n.b.f.m. and a.m. modes or at 5·5MHz for the w.b.f.m. mode. The upper band coverage on the AR-2002 is achieved by switching out the 750MHz first i.f., so that the input circuit arrangement becomes: 1·3GHz l.p.f. (with a roll-off in response below about 800MHz), followed by down-conversion to 45MHz. The same synthesised first local oscillator is used for the upper band, but in this case the oscillator frequency is 45MHz below the signal frequency. A quick calculation will show that the frequency span required of the first oscillator is about the same for the two bands.

Although this is a rather clever and economical way of engineering the extra coverage, it does bring one unfortunate penalty—using a first i.f. of 45MHz for a receiver operating in the gigahertz region means that second-channel or image rejection (of signals approximately 90MHz below the "wanted" signal frequency) is very poor. The use of a broad-band front-end filter, without any attempt at tracked tuning—however ineffective—does not help. Whether this shortcoming will affect the individual user will depend on what particular frequencies he or she is interested in, and what the level of u.h.f. radio usage is in the locality.



Results On The Air

As mentioned previously, performance on the lower band is identical to that which we found on the AR-2001.

★OUR TEST MEASUREMENTS

Sensitivity: μV e.m.f.

Freq. (MHz)	Input signal for 12dB SINAD n.b.f.m. (3kHz)	w.b.f.m. (45kHz)	Input signal for 10dB S + N/N a.m. (30%)
25·00	0·33	—	1·5
28·00	0·34	—	1·5
50·00	0·54	—	1·7
70·00	0·36	—	1·5
88·00	—	1·0	1·5
108·00	—	1·0	1·5
145·00	0·36	—	1·5
220·00	0·33	—	1·4
435·00	0·44	—	1·8
470·00	0·43	2·6	1·8
550·00	0·39	1·0	1·4
800·00	0·48	2·4	1·5
934·00	0·45	—	1·5
1000·00	0·55	—	1·7
1100·00	0·46	—	2·2
1300·00	0·40	—	2·2

Selectivity: @145MHz

Mode	6dB	60dB
n.b.f.m.	14kHz	*
w.b.f.m.	104kHz	227kHz
a.m.	12kHz	*

*Reciprocal mixing limited

AGC: Threshold 1μV. Output rises by 1dB for 72dB increase over threshold (4mV). Limiting begins at 20mV

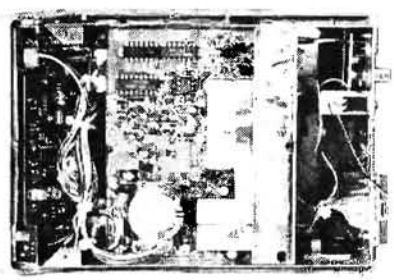
Audio response: n.b.f.m. –6dB 224 – 2720Hz (ref 1kHz)

Audio output: 0·9W into 8Ω for 10% t.h.d.

S-meter: 44μV e.m.f. for "S9" (all green l.e.d.s alight)

Supply: 12V d.c. (240V a.c. via supplied adaptor)

On the upper band, our tests in this area of south-east Dorset showed up no "nasties". Signals such as TV sound, 934MHz CB, and local amateur activity around 1296MHz all came in well. At my elevated home QTH it wasn't even necessary to use an external antenna. Operating is very simple, and that includes using the 20 memories provided. The AR-2002 which we tested was a pre-production model, and came without an operators handbook, just a couple of type-written sheets of notes. No doubt this will have been sorted out by the time the production models are shipped in from Japan.



Price

The AR-2002 costs £375 (subject to exchange rate fluctuations) including VAT. The review receiver was loaned by ***Lowe Electronics Ltd., Chesterfield Road, Matlock, Derbyshire, telephone 0629 2817,*** to whom our thanks are extended.

SWAP SPOT

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

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

Have Realistic PRO2008 scanner receiver in v.g.c. Would exchange for any type of communications receiver. Graham Stokes, 24 Senlac Green, Manor Park Estate, Uckfield, Sussex. *A349*

Have Pentax ME-Super with 50mm f:1·7, 28mm wide angle, 40mm to 80mm, 75mm to 150mm, auto-winder, flash, tripod, all in new conditon. Would exchange for Icom IC-R70, Trio R2000, or similar. Cash adjustment either way. T. Ridgway, 17 South Road, Aberystwyth, Dyfed. Tel: 0970 4271. *A350*

Have approximately 250 radio magazines; *PW, PE, EE, R&EW* etc. Would exchange for 430MHz converter, small computer or w.h.y. Tel: Barnsley (0266) 723503. *A391*

Have 12AVQ vertical h.f. antenna, 5-band. Would exchange for gents 10-gear cycle. Tel: Sheffield (0742) 588606. *A415*

Have stamps of Portugal and overseas. Would exchange for external speaker, the Icom IC-SP2. Cash adjustment if necessary. CT1BRM, Jose Manuel, 33 Av Gago Coutinho, 7050 Montemor-o-Novo, Portugal. *A421*

Have approximately £200 of CB radio equipment. Would exchange the lot for any h.f. or v.h.f. receiver with digital frequency readout. Gary. Tel: Fareham (0329) 239771. *A422*

Have Zenith EM s.l.r. camera, light meter, computer flash, tripod, 2X converter, 3X converter and sundries. Also automatic slide projector, 3 slide magazines and standing screen 1·2m × 1·2m. Would exchange for FT-290R or similar 144MHz multi-mode. Gerry. Tel: Fakenham (0328) 701436. *A449*

Have Datong AD-370 outdoor active antenna, complete with p.s.u. Would exchange for Datong D-70 Morse Tutor. G1OZL, 27 Saxon House, Saxon Avenue, Hanworth, Middx TW13 5NA. Tel: 01-755 1422. *A469*

Have Time-code radio clock in unfinished kit (value £70), tuned to MSF. Would exchange for Sinclair QL compatible peripheral. N.L.H. Cresdee, 14 Arminers Close, Clayhall, Gosport, Hants. Tel: 0705 502019. *A478*

Have Jason OG10 oscilloscope, Electroniques QP166 RX front-end, substantial 375-600V p.s.u. with l.t.s, 3-phase 30A ironclad switch and fusebox, (worth £40). Would exchange for any compact g.c. RX (Eddystone 740/750 preferred), which need not be working. Tel: Tewkesbury (0694) 297205. *A491*

SSTV from Space

A report by Graham Wood G3VPC, John Yale G3ZTY and Peter Barrett G6BEP

Another page in the history of Amateur Radio was written when Tony England W0ORE and John-David Bartoe W4NYZ, on board the space Shuttle *Challenger,* transmitted television pictures to the world's amateurs on their recent flight. The pictures were transmitted in the slow scan television mode which allowed the use of conventional 144MHz (2m) v.h.f. f.m. equipment—a portable hand-held transceiver in the space-craft and standard f.m. receivers to be found in most v.h.f. operators' shacks.

What is SSTV?

Slow-scan TV, SSTV for short, is a method of sending and receiving pictures within the bandwidth of an ordinary telephony channel. There are various standards and formats in use throughout the world but, nowadays, they all operate on the same principle.

The picture to be sent is "snatched" and stored in a digital memory, exactly like the freeze frame that some TV programmes use, then the stored picture is read out slowly into a tone generator, the output of which replaces the microphone in the microphone socket of the transmitter. At the receiving end, the audio tone is decoded and digitised and, in the authors' case, the picture is displayed on the monitor screen of a BBC micro.

The digital memory in the SSTV transmit converter holds the picture as a number of picture cells (pixels) each of which may represent one of a number of shades of grey. By far the most popular is the format using 128 pixels to a line and 128 lines to a frame. The picture is usually converted to 16 levels of grey, the lightest being white and the darkest being black—the other 14 filling in the shades in between. This format takes around 8 seconds to transmit a single frame, so you can see

Part of the space-lab instrumentation, the tail-fin of *Challenger* and the Earth beyond

Weightlessness makes a neat group pose rather difficult

that moving pictures are not really possible. However, the results are not far off the quality of photographs that appear in the newspapers—see the accompanying figures and also the excellent *Television* regular feature by Ron Ham.

In the quest for better definition, further "high resolution" formats have been developed. Since the bandwidth of the SSTV signal was designed to occupy no more spectrum than a 'phone transmission, it becomes apparent that to put more information into the picture it will take a longer period of time to send it. Consider the case of the format having 256 pixels on 256 lines. This has twice as many pixels to a line and twice as many lines to a frame as the 8 seconds format and, consequently, takes 4 times as long to send. It should be mentioned that this format usually has 64 grey shades as well and, as a result, requires 16 times more memory in the transmit converter than the 8-second format!

Colour

The next logical development was colour SSTV. Once again there are several methods of transmitting colour pictures over radio. The earliest and probably the most popular is the 8-second frame sequential format. Here the original picture is snatched into memory like its black and white counterpart, but this time the memory is in three sections. There is a section for each of the red, green and blue signals that comprise the colour picture and each section of the memory is the same size as the black and white equivalent. So we now have the picture stored in pixels in three memory sections each section representing the red, green and blue content of the original scene.

The sections are transmitted as a complete frame of one colour followed by complete frames of the other two. It is usual to send the red frame first and sometimes to send it twice, using the first to check the picture quality, and then to send the green frame and finally the blue frame. Careful attention to the operator on 'phone will reveal what he intends to do—he may say "two, one and one", which means that the red frame will be sent twice and then the green and blue frames will follow once each. The main problem with frame sequential colour is that of QRM and QSB which will spoil parts of each of the three frames and, according to Murphy's Law, will leave the picture with no part unaffected on one of the three colours.

To help offset this problem, line-sequential colour systems were developed. Here a line of the red picture is sent, followed by a line of green, followed by a line of blue and repeated until the whole picture has been sent. Each of the red, green and blue lines refer to the same scan-line of the picture so that if QRM or QSB spoil the reception they will affect the same area of the picture in each of the three colours leaving, hopefully, the majority of the frame unaffected. Colour reception is a little more difficult to obtain because the picture takes three times longer to transmit than if it were in black and white. At least that used to be the case!

Robot 1200c

The Robot 1200c, as used by W0ORE, uses an entirely new system to send colour pictures and it does so in less time than both the sequential methods outlined above.

The system is based on the fact that the optimum use of transmission time is best used to produce high-resolution black and white images and these may then be coloured in a lower resolution method. This is not unlike the way that

Watch the birdie!

standard broadcast TV works, where the maximum bandwidth is used to create fine monochrome detail and the chrominance information is transmitted at much reduced bandwidth to provide the colour in the picture. The result of all this is that a picture at a given resolution takes only two thirds of the time to send in the new Robot format.

The transmissions made by W0ORE on board *Challenger* with the Robot equipment were generally an automatic cycle of:
(a) frame-sequential 8-second colour
(b) Robot format 12-second colour
(c) Robot format 24-second colour.

Receiving the Space Pictures

Despite problems arising shortly after lift-off, the *Challenger* was put into orbit only slightly lower than that intended for the flight. In general, the orbits of the shuttle series are not very high and may be directly compared with the "low" orbiting satellites such as UOSAT/OSCARS 9 and 11. These orbits at best offer approximately a 10 minute period when the satellite is in view from a fixed point on the ground. With such a limited time, it is important that the station be well organised to make the best use of the time available.

Preparations

At G3VPC, the receiver audio is routed through to a "magic box". It isn't magic really, but it does handle the routing of audio signals to and from the radio equipment, the cassette recorder, the computer, the RTTY terminal unit and the SSTV interface. Thus any chosen audio signal source is available to the remaining pieces of equipment and, as everything is permanently connected, there is no longer any problem finding the right sort of plugs and leads to put things together on the spur of the moment. Such an arrangement is highly recommended for any shack as it permits instant recording of the signals from the radio and direct playback into the TX mic socket. It has proved invaluable to other operators when some particular characteristic of their transmission can be recorded and played back to them so they can hear exactly what it sounds like!

The only preparation required here was to make sure that all the plugs were firmly engaged (one wasn't) and that the tape-head was clean.

In order to find out the status of the operations on board the space-craft, the special News Bulletins from RSGB HQ were invaluable since the orbital predictions for scheduled operations for London, Leeds and Glasgow were given together with the Keplerian Elements of the *Challenger's* orbit. Since the workload on the astronauts varies on an almost hourly basis and there was no guarantee that transmissions would be made on the scheduled orbits, the orbital elements were installed in the OSCAR-10 program from AMSAT and a list of all likely orbits in range was generated. This proved very useful since the first sked did not take place and a transmission was made on the following non-scheduled orbit.

A low-resolution picture of Dr. Tony England W0ORE

Equipment Used

The 144MHz station at G3VPC comprises:

Antennas	Vertical Colinear UR67M feeder 20-element horizontal beam H-100 feeder
Transceiver	FT-221RD Modified front end
Recorder	ITT SL58—mains powered
SSTV	Home-brew interface and software
Micro	BBC-B with disks and monochrome and colour monitors.

Whilst the station is quite reasonably equipped for terrestrial operation, the very directional long Yagi is a severe disadvantage for space communications since it does not have an elevation motor. This means that a signal emanating from the sky above 20 degrees elevation was severely attenuated. In fact the best signals were obtained from the *Challenger* when it was some 1500km distant and, consequently, fairly low in the sky. However, switching between the vertical and horizontal antennas ensured that the best signal was obtained.

The *Challenger* downlink on 145·550MHz (S22) was recorded on tape whenever the signal showed promise of coming up out of the noise. Being an f.m. transmission, the signal needs to be a little stronger to handle SSTV than if it were an s.s.b. 'phone transmission. Nevertheless, when the beam was swung for best signal, the results were very good as long as the space craft was not too high in the sky.

The Pictures

During the passes of the *Challenger*, the main attention of the operator was given to steering the antenna and correcting the receiver tuning for Doppler shift, leaving the tape recorder to capture the audio signals for later decoding.

When the tape was played back and the decoded pictures were studied, it was noticed that there were some lines on each of the different formats that were always corrupted. It is presumed that there was some internal QRM on the space craft that upset the snatching of the video frame from the cameras. Since the pictures were of otherwise high quality, it was decided to perform some computer processing on the received images and the results are shown in the accompanying figures.

The BBC micro is not able to resolve the pictures in colour because the colours are used to represent the brightness of the scene: the different colours giving a different brightness level on a black and white monitor. Thus a picture can be resolved in eight shades using mode 2. Also the display format does not exactly agree with the standard, being 160 pixels on 128 lines for the low-resolution format and 160 pixels on 256 lines for the high-resolution format. Nonetheless, the computer images are a very good representation of the original scene and, being on a micro, offer the ability to enhance them which is not at all possible on dedicated SSTV converters.

Conclusion

The whole exercise was an unqualified success despite the limitations of uncertain operating periods and terrestrial antennas. It is to be hoped that future Shuttle flights will carry amateur radio of this very interesting nature which helps offset the other problems experienced by NASA with this project. Certainly, the best use of the limited time that the space-craft was within range was made by continuously cycling through the various formats.

There also seemed to be much less QRM on the downlink channel than there was on the earlier Shuttle mission and most of the passes were received with no QRM at all.

The authors would like to convey their thanks to the RSGB for their news bulletins, and their apologies to experienced SSTV operators for ignoring the intimate differences between US and European standards, so as not to confuse the novice.

Finally, a plea to all operators. Please give the SSTV bandplan frequencies a little room when working on 'phone. Many a picture on 20m is totally lost due to s.s.b. operators working on or very close to 14·230MHz. Other bandplan frequencies on which SSTV may be found are: 3·730, 7·040, 21·340, 28·680 and 144·500MHz. ***PW***

Set your linear up without risking a melt-down using this invaluable test instrument designed by A. Dean

Two-Tone Oscillator

It is a licence requirement for an amateur station to be able to measure the transmitter output power delivered to an antenna (taking into account feeder losses which are easily calculated).

Although a.m., f.m. and c.w. power measurements present no special problems, the measurement of p.e.p. (peak envelope power) of an s.s.b. signal is a little more difficult. It can be proven that with a single sinewave modulating tone, the average power (that which is read by a wattmeter) is equal to the p.e.p., however, this method of measurement is not ideal for two reasons:

1. Since the average power is equal to the peak envelope power the transmitter output stage is being driven very hard indeed. Most transmitters cannot tolerate this, especially when setting up where overloads are to be expected. This sort of abuse may lead to permanent damage.
2. With a single modulating tone, the overall quality of the transmission cannot be assessed.

Both problem areas can be avoided if the two-tone oscillator to be described is used to modulate the transmitter.

Measuring PEP

As can be seen from Fig. 5(c), when two tones of different frequency but identical amplitudes are combined, the resultant waveform varies from zero to twice the single tone amplitude at a rate equal to the difference frequency. If an s.s.b. transmitter is modulated with this waveform then:

$$\text{peak power in load} = \frac{(2V)^2}{R} \text{ or } \frac{4(V)^2}{R}$$

The **mean** power in the load is equal to the sum of the powers in each tone, i.e.

$$\frac{(V_1)^2}{R} + \frac{(V_2)^2}{R} \text{ or } \frac{2(V)^2}{R}$$

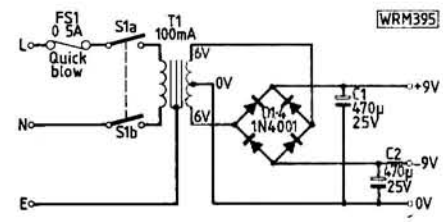
Hence the mean power in the load (that which a conventional wattmeter reads) is 0·5 p.e.p. From this, it is clear that with a two-tone oscillator as a modulation source, p.e.p. can be calculated by doubling the reading obtained on the wattmeter.

Circuit Details

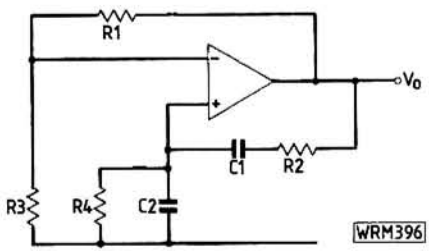
The practical circuit described in this article, Fig. 2, consists of two Wien Bridge oscillators using operational amplifiers, providing high quality sinewave signals which are essential not only for accuracy of p.e.p. measurement, but also to prevent interference due to unwanted harmonics.

The theoretical Wien Bridge circuit is shown in Fig. 1—the Wien network R2, C1, R4, C2 providing the positive feedback necessary to cause oscillation and R1, R3 providing negative feedback to control oscillation. It can be shown that the gain required to sustain oscillation in a Wien Bridge oscillator is 3, a lower gain and oscillation would stop—a higher gain and distortion would be generated. The gain of the practical Wien Bridge oscillator, Fig. 2, is held at precisely 3 by using a self heated thermistor with a negative temperature co-efficient. Assuming that the amplitude of the oscillation was falling, this would cause the temperature of the thermistor element to fall, thus increasing its resistance. Since the thermistor is in the negative feedback path of the op-amp, the gain will increase correcting the drop and causing the output to stabilise at, in this case, about 1 volt peak–peak. Stabilisation can also be achieved using f.e.t.s to control the gain of the op-amp, but this method is more complex and tends to introduce greater distortion.

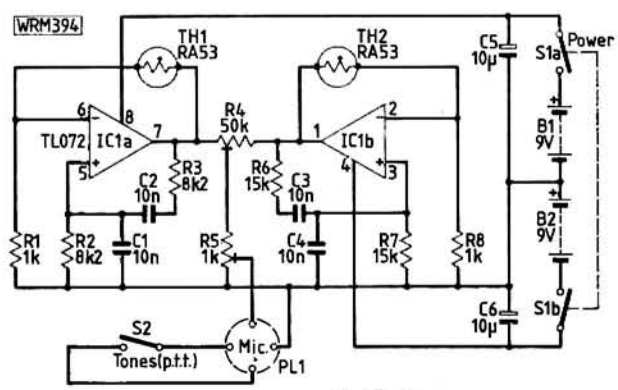
The frequencies of the oscillators are not critical although they should not be harmonically related—with the values shown, the frequencies are approximately 1·94kHz and 1·06kHz. The outputs of the oscillators are combined by



▲ **Fig. 3: Optional p.s.u.**

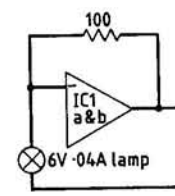


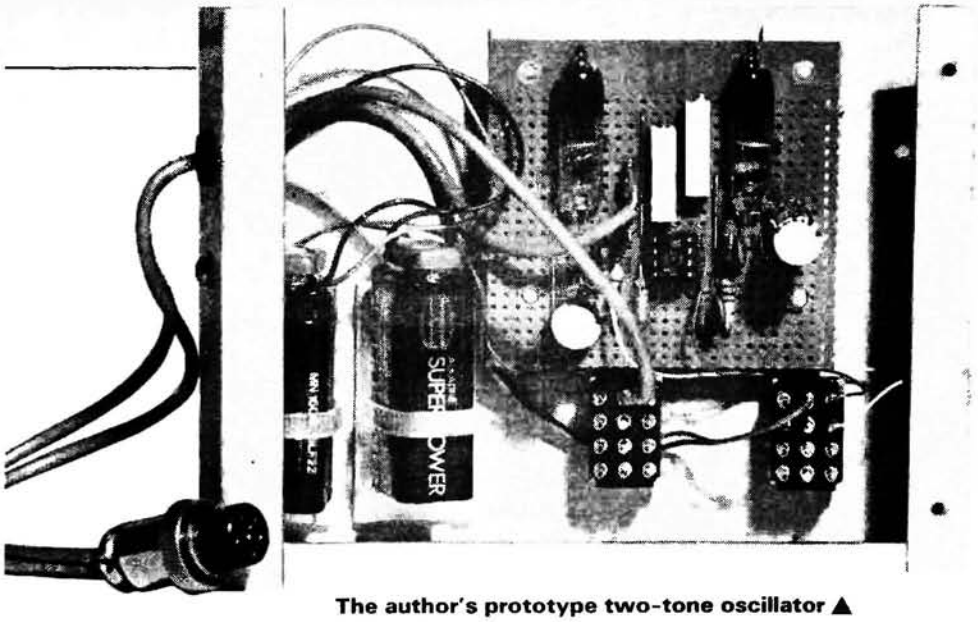
▲ **Fig. 1: Oscillation freq = 1/(2πRC) where R = R2 = R4 and C = C1 = C2. Gain for oscillation Av = 3 ∴ (R1 + R3)/R3 = 3**



▲ **Fig. 2**

Fig. 4: Alternative stabilisation circuit using positive temp. coefficient of lamp filament ▼





The author's prototype two-tone oscillator ▲

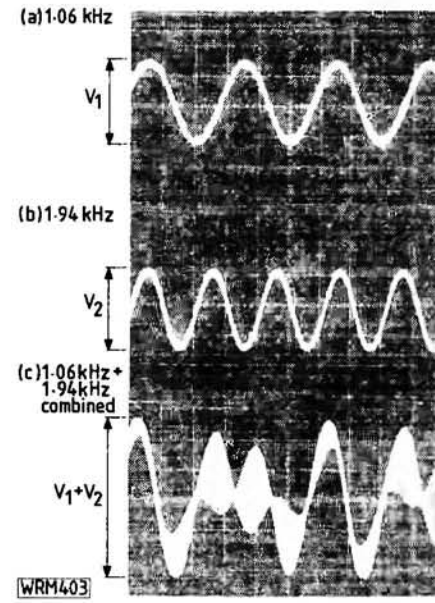


Fig. 5: Output waveforms ▶

R4 which allows their amplitudes to be balanced and R5 attenuates the combined signal down to microphone level.

Construction

Component values and layout are non-critical and the unit may be constructed on Veroboard or a purpose made p.c.b. Since the unit draws very little current and is only used occasionally 6–F22 (PP3) type batteries may be used, keeping size down to a minimum. Alternatively the mains supply shown in Fig. 3 may be used, in which case S1 should be used to switch the mains supply instead of the d.c. supply rails. Once set up, R4 and R5 should need no further adjustments. The output signal and the "push-to-talk" switch should be connected to the appropriate pins on the microphone plug, these being dependant on the transmitter used.

Setting Up

The simplest method of balancing the outputs of the oscillators is to monitor the output of the unit on an a.c. voltmeter, with output level (set by R5) at maximum. Short the thermistor wires of one oscillator together and take note of output level. Repeat for the second oscillator and compare readings—R4 should be adjusted and the whole test repeated until the two output readings are identical.

The output of the unit should next be adjusted to the point where the audio limiter in the transmitter begins to operate to ensure that the microphone cannot produce peaks higher than those generated by the oscillator. This is best done by gradually increasing the output level by adjusting R5 whilst observing the transmitter output power. A point should be reached where the power no longer increases with further adjustment of R5—at this point maximum modulation is being achieved and R5 should be set a little higher than this point. ***PW***

★ COMPONENTS

Resistors

¼W 5% Carbon film

1kΩ	2	R1,8
8·2kΩ	2	R2,3
15kΩ	2	R6,7

Cermet multiturn trimmer

1kΩ	1	R5
50kΩ	1	R4

Capacitors

Ceramic disc

10nF	4	C1–4

Tantalum electrolytic, 16V

10µF	2	C5,6

Semiconductors

Integrated circuits

TL072	1	IC1

Miscellaneous

RA53 thermistors, TH1/2; d.p.s.t. miniature toggle switch, S1; s.p.s.t. biased miniature toggle switch, S2; 0·1in Veroboard 73 × 66mm; microphone plug; Metallic case 160 × 115 × 55mm.

How Much? & How Difficult?
£15
Intermediate

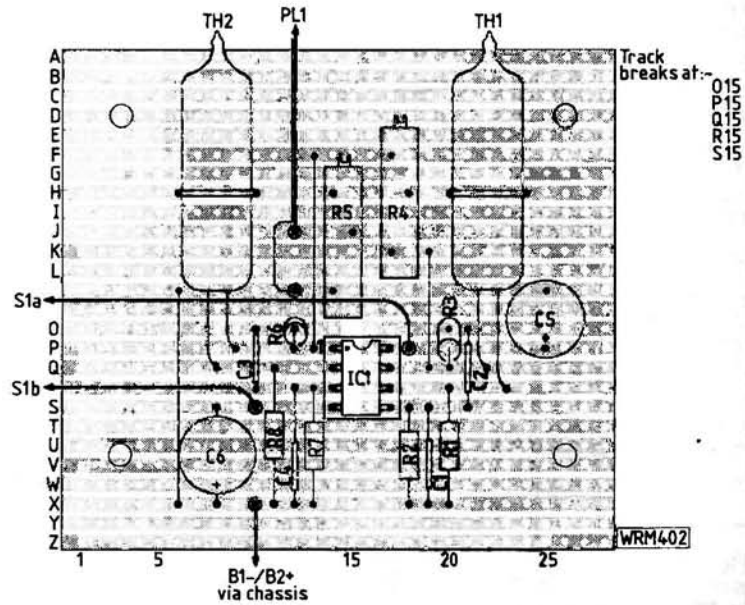


Fig. 6: Component layout based on Veroboard

Weather Satellites

To conclude this series Terry Weatherley G3WDI examines the Timestep/BBC display format

So far in this series we have looked at the two types of weather satellites available to the amateur enthusiast; the polar oribiting satellite and the geostationary satellite—Meteosat 2.

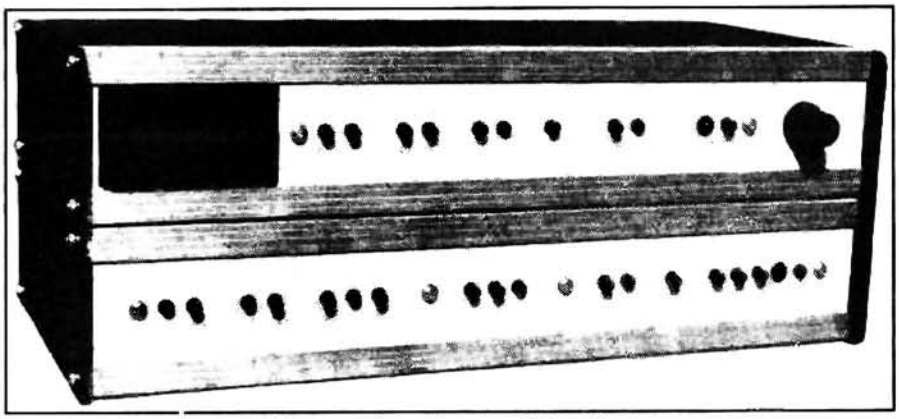
We have discussed the format of the pictures that are transmitted by the satellites and looked at ways of receiving the signal. In this article we will look at one way of using a popular home computer to display the pictures in either black and white or false colour using a colour monitor.

To display this type of picture you require an interface between the receiver and the computer. We will look at the interface and accompanying software produced by a regular advertiser in *Practical Wireless*—Timestep Electronics.

To display a "square" picture from a weather satellite we need to receive 800 lines. At a rate of 4 lines a second, this is received over a period of 200 seconds or 3 minutes 20 seconds. Each line can be considered as being made up of 800 pixels thus, for a full resolution picture, we need a graphics display of 800 × 800. Clearly none of the computers on the home market approach this resolution since it is rather expensive on memory.

I ought to qualify that statement by saying that this article was written in 1985. Future readers may get a smile from that statement just as I did when reading an "old" electronics magazine article that quoted an expert as saying that by 1985 the 8K memory chip might become a reality!

One home computer which offers something near is the BBC-B computer produced by Acorn. This computer offers a variety of graphic modes with each mode a trade-off between pixel resolution, colours displayed and memory requirements. The highest pixel resolution is MODE 0 and this offers 640 pixels by 256 pixels, but each pixel can only be one of two colours. While this is useful for weather maps it is a little restricting when one attempts to interpret a picture. MODE 1 is more promising and this offers a pixel resolution of 320 × 256 with a choice of four colours. MODE 2 offers a pixel resolution of 160 × 256 but a choice of 16 colours —in practice this is reduced by half since 8 colours are "flashing". A "flashing colour" weather picture is a real psychedelic experience!



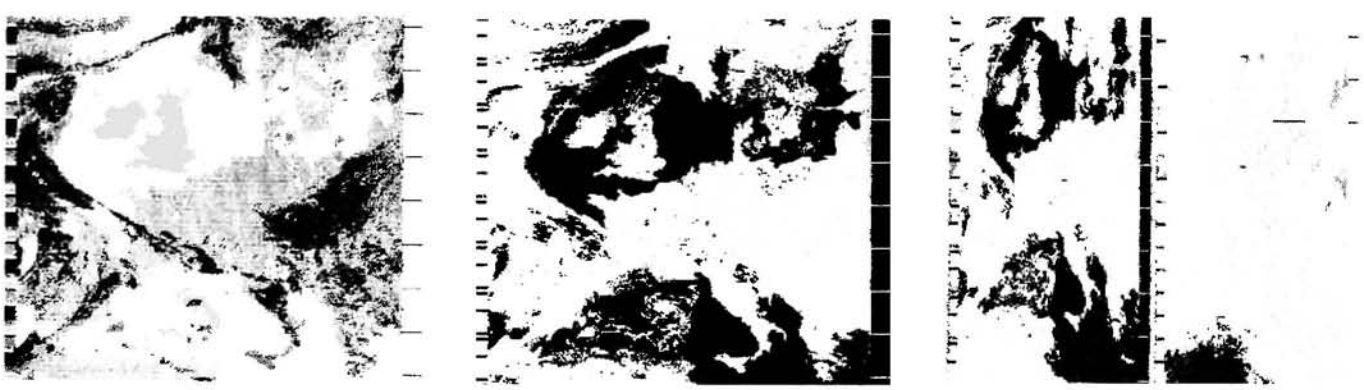
Timestep Interface and Receiver

Each of these modes require 20K of memory so the computer would then seem to be well suited to our purposes and in practice has proved to be so.

The BBC-B computer is well equipped with Input/Output Ports and it is through two of these that the picture information is put into the computer. Unfortunately the raw audio signal has to be processed before it is in a suitable format for the computer ports to handle. As explained previously the WEFAX signal is amplitude modulation on a 2·4kHz subcarrier. To convert this signal into a computer compatible signal it needs to be converted into a digital format.

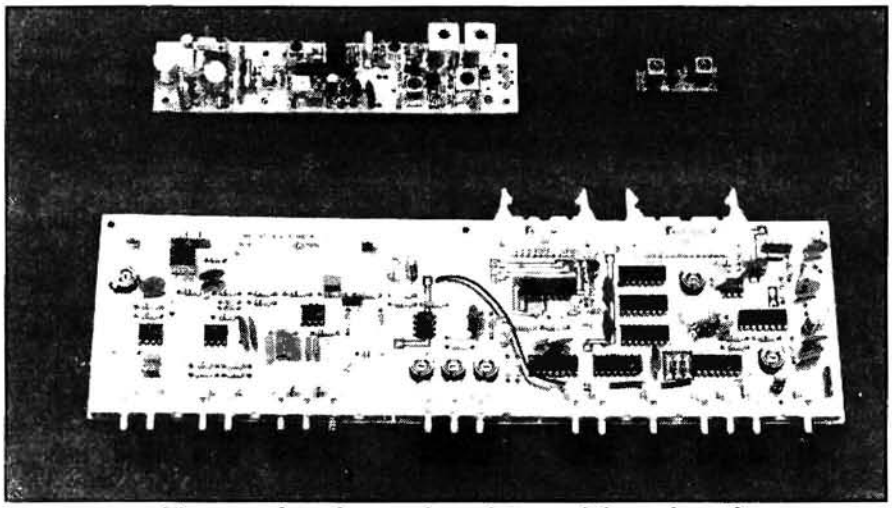
The most convenient way of doing this is to use an Analogue to Digital Converter i.c., commonly called a-ds. The BBC-B computer has an inbuilt a-d port which is used for the "joystick", unfortunately this is only sampled at a relatively slow rate—the conversion time being 10ms. With the satellite sending one line every 250ms this would only give us 25 samples per line. A faster a-d is obviously required and its data must be interfaced to the computer via the User Port. It is also essential to have a clock signal as this tells the computer when to start a new line. Without a clock signal the picture would be scrambled irretrievably.

The Timestep Weather Satellite Interface does all the signal processing required, as well as containing a very fast a-d it also contains all the necessary electronic circuitry. The audio output from the receiver is amplified and passed through a high-pass filter to remove any low frequency interference. Then, since the sub-carrier frequency (2·4kHz) and the maximum video bandwidth (1·1kHz) are close, making half-wave rectification unsuitable, the next stage is a full-wave average detector. The resulting d.c.



Various examples of home computer processed weather pictures

~What's Up There?



Timestep Interface and receiver modules unboxed

voltage is very linear and well-balanced being entirely dependant on the input level of the 2·4kHz tone. The signal is then passed through low-pass filters to remove any high frequency noise before being passed to the a-d stage and from there to the User Port of the computer.

As previously explained it is also necessary for the computer to receive a signal related clock signal to denote the start of a new line. There are three ways that this clock signal can be obtained; (i) from a crystal, (ii) from a reference signal recorded at the same time as the signal or (iii) from the received signal itself. The Timestep interface gives all three options.

The clock is derived from phase-locked-loop circuitry set to run at close to 2·4kHz so that it will lock on an incoming 2·4kHz signal. The output from the p.l.l. is fed to a divider chain and to a monostable which gives a very short 2 or 4Hz pulse. When the SLIP button is pressed on the interface this "unlocks" the p.l.l. and the oscillator continues to run at a slightly different frequency. This non-synchronous clock causes the picture to drift across the screen and allows the user to set the picture edge to the side of the screen. The locking signal is derived from a 2·4MHz crystal or the signal itself.

When the received signal is used as the reference it has to be processed before being passed to the p.l.l. In the Timestep Interface a two-section band-pass filter is used to remove all but the 2·4kHz signal. While this method is quite simple, if the satellite signal fades or is lost for any reason so is the sync pulse. When the signal is recovered the picture edge will appear in a different position on the screen. This does not happen when the crystal source is used as even if the signal is lost for several minutes the picture edge stays where it is set.

When using tape signals the reference channel should be recorded on the other track. It therefore allows the p.l.l. to track variations in tape speed and keeps the picture in perfect sync. The Timestep Interface makes the crystal derived reference source available for tape recorder use. It is also possible to use the taped signal itself as a reference source in the same way as the live signal.

There is a provision in the interface for remote switching of the tape recorder using the squelch line from the Timestep Weather Satellite Receiver Monitor. When the squelch opens a relay is energised enabling night-time passes of a satellite to be recorded for later display.

Power for the interface is taken directly from the BBC-B computer.

This then describes the Timestep Interface. The signal and sync pulse is presented to the computer user and printer ports and from there the software takes over.

The software reads the port, scales the digital number and plots the result to the screen as a coloured pixel. If a sync pulse is detected then a new line is started.

A program, in BASIC, that could do that might read:

```
FOR Y=0124 TO 0 STEP -4
FOR X=0 TO 1279 STEP 4
GCOL 0,C (C being the scaled a-d
PLOT 69,X,Y                figure)
NEXT:NEXT
```

Unfortunately BASIC is too slow to be of any use in this situation but it does explain much of what is needed from a machine code program.

One of the features of the BBC-B computer is its ability to use software contained in a ROM or EPROM. This software can reside permanently inside the computer ready for instant recall when needed. The software accompanying the Timestep Interface is on one such EPROM. The EPROM is called SATPIC and is called into use by keying:

```
*S
```

Each EPROM is customised so that on call-up the computer displays the message:

```
SATPIC property of . . . . . .
```

thereby protecting both the owner and the programmer.

The EPROM is accompanied by full fitting instructions, function key strip and comprehensive working instructions.

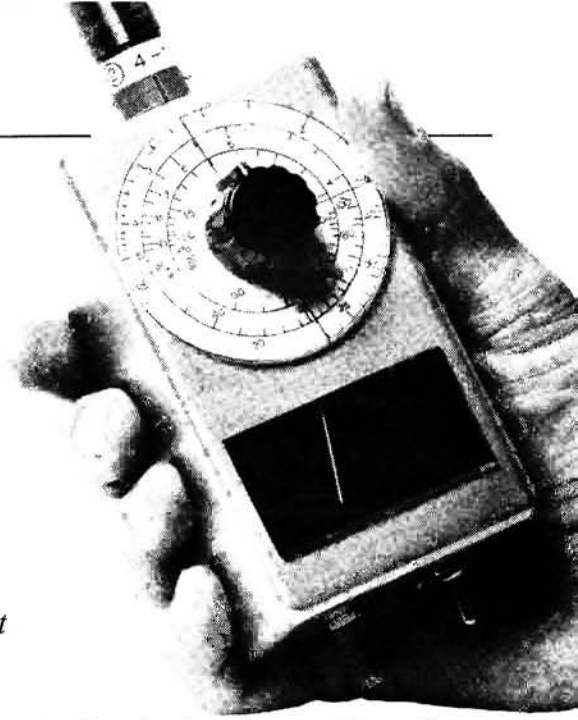
▶ 35

Visible light picture—NOAA-9

Computer Concepts "Printmaster" display

Meteosat picture—visible light

Using the PW FET DIP Oscillator



John Thornton-Lawrence GW3JGA looks at tests you can carry out with a dip oscillator (d.o.)

In normal use the coil on the d.o. is loosely coupled inductively to the resonant circuit to be investigated, in most cases by holding the oscillator coil near to the circuit. The d.o. is then tuned, by means of its variable capacitor, through its frequency range(s) until a dip in the meter reading is detected. The frequency is then determined from the coil frequency range and the tuning dial reading.

It must be emphasised that the d.o. is more an indicating detector than a precision measuring instrument. Its performance, sensitivity and accuracy depend very much on the care and skill of the user, so it is important to experiment with it and get the feel of its features and limitations. Once you have done this you will wonder how you ever managed without it!

To start practising, you will need to lash up a resonant circuit. A suitable coil might consist of 9 turns of plastic covered connecting wire wound on a 45mm diameter former (toilet roll tube) with a 100pF capacitor connected across the ends. The inductance will be about 5μH and this, in parallel with 100pF, will resonate around 7MHz.

Plug the appropriate coil (Range 2) into the d.o. and switch on. Set the LEVEL control to give a reading on the meter around mid-scale, hold the d.o. coil in line with the test coil, end-to-end as shown in Fig. 1a. Tune the d.o. across the band and locate the dip at around 7MHz. Having located the dip, slowly move the d.o. away from the test coil noting how the dip reduces and the tuning becomes more critical. Try changing the relative positions of the d.o. and the test coil as in Fig. 1b and c, to find the best way of coupling to the coil. Having got the "feel" of it, try dipping any fairly accessible tuned circuit you can locate in the shack—the a.t.u., a wavemeter, the r.f. stages of an old receiver etc.

Accuracy

The frequency dial of the d.o. is quite adequate for most checks where a frequency accuracy of around ± 10 per cent is acceptable. For more precise measurements of resonant frequency, or where small changes in frequency are of interest, the d.o. should be used in conjunction with a general purpose communications receiver. In this method, the radiated signal from the d.o. is received and the frequency is measured on the receiver dial or readout. Usually, just a short length of wire connected to the receiver antenna socket is quite sufficient. Nominal measurements of resonant frequency might be adequate on transmitter multiplier stages, antenna tuning units etc. More precise measurements might be required on antenna traps, stubs, filters etc.

For example, you may wish to measure the resonant frequency of a trap from a trapped dipole. First place it on an insulating platform (e.g. a small cardboard box), to reduce earth capacitance and measure the resonant frequency with the d.o. using the loosest possible coupling—a just detectable dip. At the same time the frequency of the d.o. should be measured on the receiver. An alternative method of frequency measurement would be to use a digital frequency counter by coupling it to the d.o. either by a link coil or a small capacitor as shown in Fig. 2.

Self resonant antennas such as a dipole, trapped dipole, base and mobile verticals, can be dipped by coupling the d.o. via a coupling coil connected to the feed end of the coaxial feeder as shown in Fig. 3. The arrangement allows the frequency counter to be capacitively coupled directly to the coaxial cable. It should be noted that this measurement only indicates the resonant frequency (or frequencies) of the antenna and a conventional v.s.w.r. measurement at the operating frequency would be necessary to determine the matching of antenna to the feeder cable.

Indirect Methods of Coupling

Many tuned circuits cannot be directly coupled and there are various tricks that can be used to overcome this problem.

Toroids: These usually consist of a single layer winding on a ring of ferrite or other magnetic material. These can be dipped by using a coupling loop. Take about 150mm of plastic covered wire, pass it through the ring and solder the ends together to make a loop. Flatten the loop and twist the wire to form a further loop at the end for coupling to the d.o., as shown in Fig. 4a. If the toroid leads are accessible then it is sometimes possible to couple directly into these, as shown in Fig. 4b. This is quite convenient if you are winding a toroid and experimenting with the number of turns.

Coils in cans: The same technique of

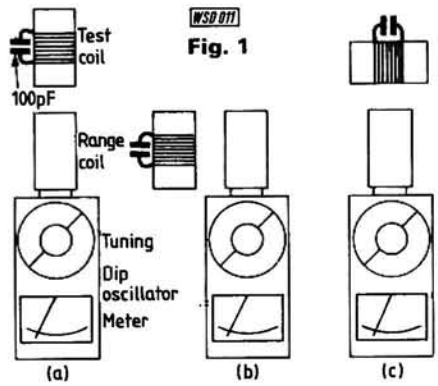


Fig. 1

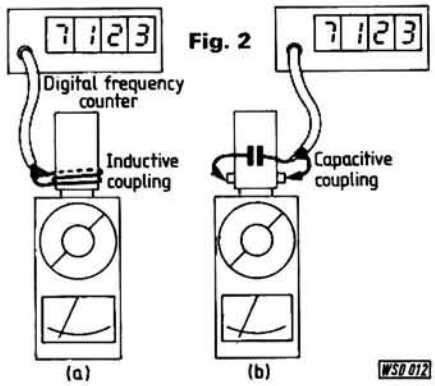


Fig. 2

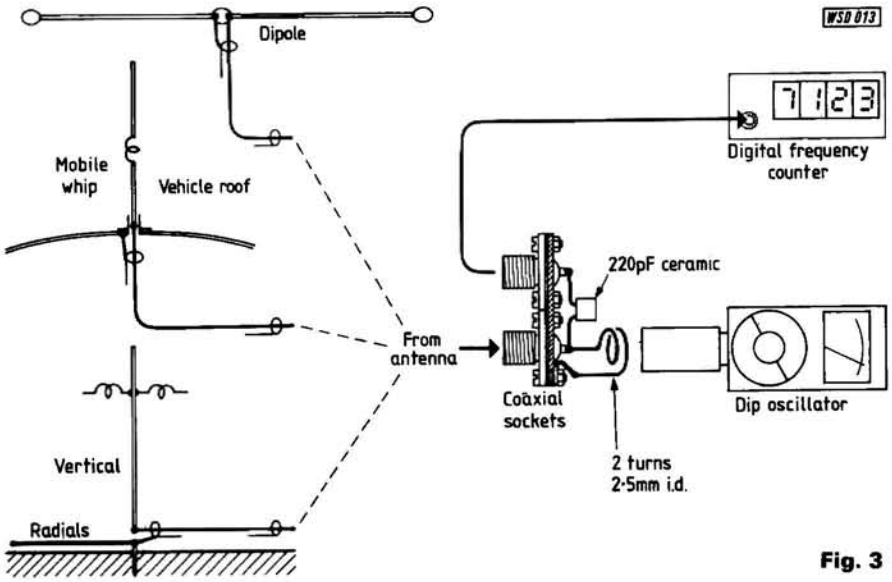


Fig. 3

coupling to the leads can sometimes be used for coils in pot-cores or screening cans—providing the tuning capacitor is not built in. Where the coil and capacitor combination is totally enclosed in a can, as in an i.f. transformer, it is possible to capacitively couple the d.o. to the circuit using a 5pF capacitor, as shown in Fig. 5. In the GW3JGA d.o. there are lugs on the sides of the d.o. coil which provide convenient connection points. The 5pF capacitor will detune the circuit slightly and a smaller value may be adequate at higher frequencies.

What Your DO Can Do

Inductance

When experimenting with radio circuits, you may need to know the value of an inductor or to wind one having a particular inductance. To measure inductors such as coils, chokes and r.f. or i.f. transformers, a capacitor of known value is connected across the winding and the d.o. is then used to measure the natural resonant frequency of the circuit. The inductance is then given by the formula:

$$L(\mu H) = \frac{25300}{C(pF) \times f^2(MHz)}$$

A convenient value of capacitance for most applications is 100pF and silvered mica capacitors of this value, with a close tolerance of ± 1 per cent are readily available. The circuit may be coupled to the d.o. by any of the methods mentioned previously. Note that the value of inductance is related to frequency squared so, except for rough checks, accurate frequency measurement is an important factor and a receiver should be used for this purpose.

More specialised measurements of coupled bandpass filters and circuits can also be made, using the d.o. For example, the coefficient of coupling between the primary and secondary can be found by measuring the inductance of one winding with the other shorted and then open, as shown in Fig. 6. The coupling factor (k) is given by:

$$k = 1 - \frac{L(shorted)}{L(open)}$$

The mutual inductance between the two windings can be found by measuring the inductance of the two connected in series and then reversing one winding and repeating the measurement, as shown in Fig. 7. A quarter of the difference between the two measurements gives the mutual inductance.

$$M = \frac{L_{(a)} - L_{(b)}}{4}$$

Again the accuracy of these measurements depends largely on being able to measure frequency or small changes in frequency accurately.

Capacitance

To measure capacitance, the unknown capacitor is connected across an inductor of known value and again the d.o. is used to measure the resonant frequency. The capacitance is then given by the formula:

$$C(pF) = \frac{25330}{L(\mu H) \times f^2(MHz)}$$

A convenient value of inductance would be 5μH. It is not normally possible to buy a suitable coil of this inductance, but it is quite easy to make one and constructional details are given at the end of this article.

When measuring capacitors, remember that the connecting leads will have capacitance to each other and should be kept as short as possible. The maximum value of capacitance that can be measured using the 5μH inductor is limited to about 1·5nF (1500pF) by the d.o.'s lowest measurement frequency of 1·8MHz. The ability to measure capacitance will now enable you to identify all those useful looking variable capacitors picked up at junk sales and rallies!

Transmission Lines

Whether the transmission lines are coaxial or twin wire, they have a characteristic impedance (Zo) and if the line is not terminated in its characteristic impedance then, for a particular frequency and length of line, a certain pattern of standing waves will occur. This property, particularly of a quarter wavelength of line, is often used for antenna impedance matching. Because the wave travels more slowly in the line or cable than in free space (the Velocity Factor) the physical length will be less than the usual free-space length

To measure an electrical quarter wavelength of line, the line must be shorted at one end with a small loop of wire, just sufficient to couple to the

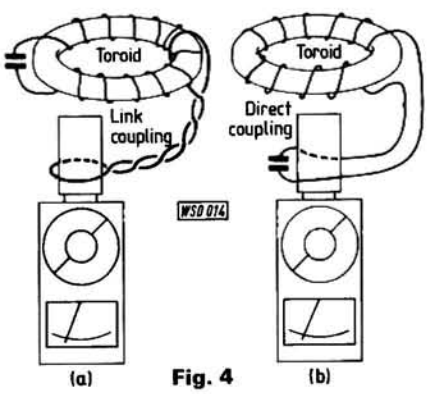


Fig. 4

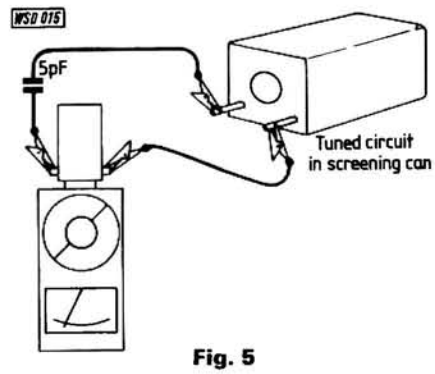


Fig. 5

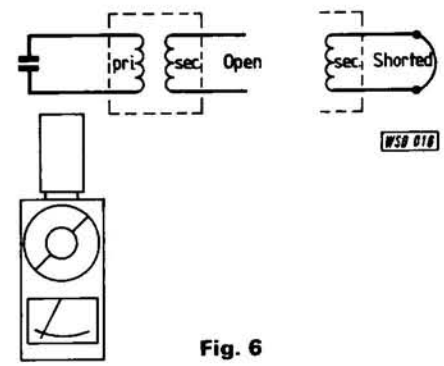


Fig. 6

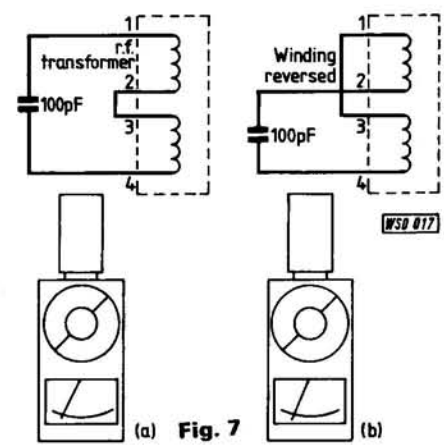


Fig. 7

d.o., as shown in Fig. 8. Resonance will occur at odd multiples of a quarter wavelength and the d.o. is tuned to find the lowest frequency at which a dip occurs.

In practice, if you wanted to make up a quarter wave line, the cable would be cut somewhat longer than required and trimmed a little at a time to its electrical length using the d.o. with a receiver to check the resonant frequency.

Velocity Factor

The velocity factor of a cable can be calculated by comparing the physical length of an electrical quarter wave with the free space quarter wavelength. For example, a 5 metre length of coaxial cable, shorted at one end is found to cause a dip on the d.o. at 10MHz (no dips are detectable below this frequency). This means that the 5m length of coaxial cable is an electrical quarter wavelength at 10MHz (one wavelength would therefore be 5 × 4 = 20m in length).

The wavelength of a radio wave of 10MHz, in free space is given by:

$$\text{wavelength (m)} = \frac{300}{\text{fMHz}} = \frac{300}{10} = 30\text{m}$$

The radio wave travels slower in coaxial cable than in free space and from this the velocity factor of the cable can be calculated:

$$\text{velocity factor} = \frac{\text{wavelength in coaxial cable}}{\text{wavelength in free space}} =$$

$$\frac{20\text{m}}{30\text{m}} = 0{\cdot}67$$

TX PA Stage Neutralisation

The circuit of an h.f. band transmitter p.a. stage is shown in Fig. 9. With all power supplies switched off and the transmitter switched to its highest frequency band, usually 29MHz, the d.o. is coupled to the grid circuit of the p.a. stage (L1, C3) and tuned for a dip. Rotating the anode tuning capacitor C1 will probably cause a small fluctuation as it goes through the resonance due to the grid—anode capacitance of the valve. Whilst rocking the anode tuning capacitor backwards and forwards, the neutralising capacitor C4 should be carefully adjusted to reduce the fluctuation on the d.o. to a minimum. This indicates that the stage is neutralised, with the minimum of coupling between the grid and anode circuits.

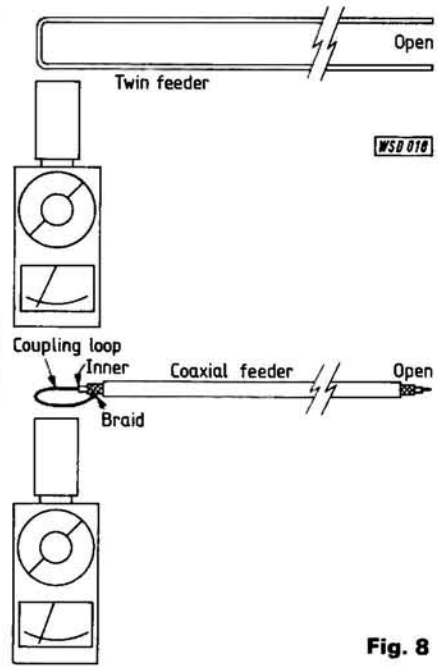


Fig. 8

Spurious Resonances

In electronic equipment, particularly transmitters and receivers, certain components and parts of the wiring can cause spurious resonances. A spurious resonance occurs when a stray capacitive effect or a stray inductive effect forms an unintended resonant circuit. This may cause unexplained instability, loss of signal or (in transmitters) overheating.

The r.f. chokes used in transmitters are prone to this problem, particularly when mounted near to a screen or metal chassis. The stray capacitance forms a spurious resonant circuit with part of the choke winding. When investigated with a d.o., several spurious resonances may be detected and the choke may have to be repositioned to minimise those occurring on or near the operating frequencies.

Decoupling capacitors and the inductance of their leads are also likely to exhibit spurious resonances. You may like to try dipping a 1nF disc capacitor with its leads cut to 15mm and soldered together at the ends.

Signal Generator

The d.o. can be pressed into service as a simple signal generator and may be used for testing receivers, checking wavemeters, with a coupling loop for powering an r.f. bridge, as a beat frequency or carrier injection oscillator etc. In fact, for almost any purpose requiring a source of c.w. signal.

Absorption Wavemeter

The d.o. with its tuned circuit, its amplitude detecting circuit and a meter can be used as an absorption wavemeter over its normal frequency ranges. Most commercial d.o.s have a switch to remove the oscillator supply voltage to change to wavemeter operation. On the GW3JGA d.o., the LEVEL control is turned fully counter-clockwise for wavemeter use.

In this mode, the coil is coupled inductively to the oscillator, frequency multiplier or amplifier stage under investigation. At resonance the meter will peak up-scale, the opposite direction to the dip condition.

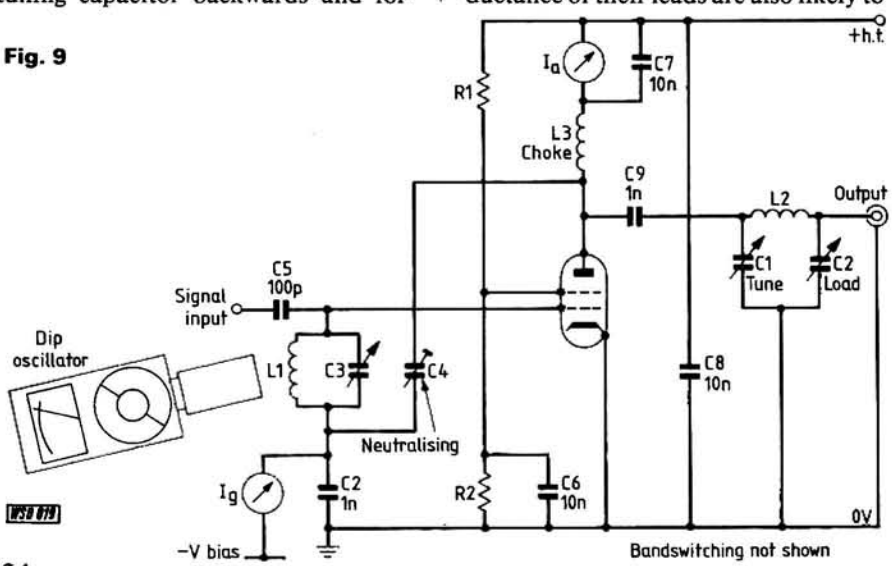
***Q*-Multiplier Operation**

On the GW3JGA d.o., if the LEVEL control is increased (clockwise) and set immediately below the point where oscillation commences, then the circuit operates as a *Q*-multiplier wavemeter giving much increased sensitivity and selectivity.

Field Strength Meter

The d.o., in its absorption wavemeter mode, can also be used as a field strength meter by coupling a short rod antenna to the "live" side of the plug-in coil. In the GW3JGA d.o. there is a convenient lug on each coil and connection to this can be made using a small crocodile clip. The rod antenna can be held to the side of the d.o. using two plastic suction hooks (available from hardware stores), shown in Fig. 10.

Fig. 9



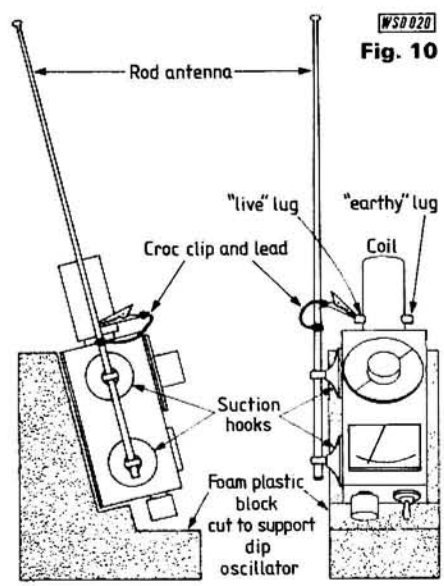


Fig. 10

Metal Detecting

The d.o. frequency will be affected when a metal object is brought in the close proximity of the d.o. coil. If the signal from the d.o. is monitored on a receiver with the b.f.o. switched on, then small changes in frequency are easily detected. Using this arrangement the d.o. can be employed to search for cables or metal boxes buried in a wall, metal water pipes, steel joints, even nails in wood. The range is limited to a few centimetres but the resolution is quite sharp.

Making a Standard 5µH Inductor

If you have successfully wound a set of coils for the d.o. then winding this coil will pose no problems. The coil is made from the same material as the d.o. coils and consists of 20 turns of 24 s.w.g. enamelled copper wire close wound, as shown in Fig. 11. Terminals are provided for connecting to the coil, 6BA or 3·5mm size are ideal. When the coil is completed, a 100pF 1 per cent

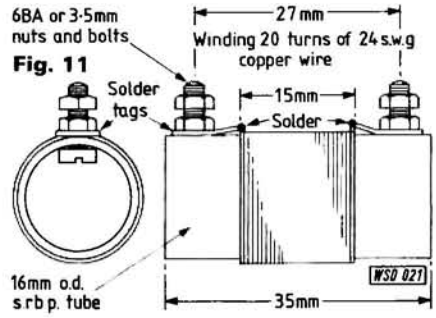


Fig. 11

silvered mica capacitor is connected across it and the resonant frequency is checked with the d.o. This should be 7·1MHz and can be checked on the station receiver. If necessary, the value of the inductance can be varied slightly by compressing or spacing the end turns of the winding to bring the circuit on to frequency. When completed, the coil should be varnished to permanently fix the turns in position.

In Conclusion

There must be many more ways in which this versatile little instrument may be used. I hope that you will have much enjoyment finding them.

Acknowledgements

Grateful thanks to members of the Practical Amateur Radio class at the Prestatyn Adult Centre who all built d.o.s and to GW3CF for his helpful comments. Thanks also to G-Whip Products and GW8ACG for practical information on dipping whip antennas.

References

Simple Grid Dip Oscillator by G3IRE & G3JZ. *Short Wave Magazine*, March 1957.

The Art of Dipping by WB4OBZ. *QST*, January 1974.

Dip Oscillators and their Many Uses by G3BDQ. *Amateur Radio* November 1984.

The Radio Amateurs Handbook. Measurements section. ARRL.

Radio Communications Handbook. Measurements section. RSGB.

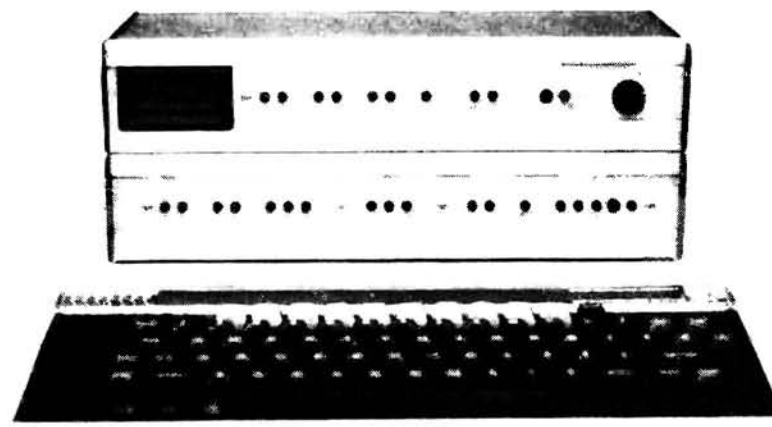
Electrical Technology. Inductance chapter, by Edward Hughes.

---

31 ▶ When first called-up the program assumes a default mode which can be returned to at any time by use of the BREAK key. The menu is obtained by using the ESCAPE key When the ESCAPE key is pressed the user is presented with a menu giving a number of options. The first option enables the user to change the colour of the picture display. There are many colour choices, four being displayed at any one time, but the choices can be scrolled using the cursor keys. Thus the user can choose the four colours best suited to the monitor in use be it colour, black and white or green and white. The colour set either chosen or already in use flashes so there is no doubt which ones have been picked.

The other options alter the other picture parameters. The H key alters the height ratio while the starting point for the scan can be altered to, for example, top right by pressing TR. The third option alters the time taken to complete one scan of the screen and thus can be used to enlarge the picture. This all sounds a little complicated but one soon becomes used to it. The function keys have been set to pre-program the parameters for different satellites and these keys simplify the setting-up of the software. It is possible by altering these parameters for the experienced listener to resolve many of the FAX transmissions that may be heard on the bands.

The picture, when received, can be stored on disc by pressing function key *f*1. This saves the pictures as a screen dump, with the software automatically giving the picture a unique filename. A single-sided 40-track disc can store up to 4 pictures and these pictures can be later recalled for future viewing.


Timestep Interface and BBC-B computer

It is possible to dump the stored pictures to a printer using a screen dump or the Computer Concepts ROM Printmaster. Personally I find that printing the pictures is rather hard on the printer ribbon but if they are printed out in reverse—black clouds and white sea—they are equally intelligible and easier on the printer. There is an example in the illustrations of "reversed prints".

The Timestep Interface and software work extremely well, the pictures obtained—although restricted on grey scale—are recognisable as weather pictures and at times good detail is discernible. NOAA pictures of the UK illustrating this article show the type of detail obtainable. The Timestep system will find a place in schools and colleges where students will be able to have real-time data and a class provided with pictures, via a printer, quite quickly and cheaply. It opens up a new and exciting area for the computer enthusiast to explore and is another example of the practical use to which the computer can be put. ***PW***


NOAA using BBC-B colour monitor, Timestep Interface and Software

PRESTEL

In the last part of this article Dick Ganderton G8VFH looks at the viewdata terminal packages for the most popular computers amongst PW readers. With one of these and your micro you too can get into the data comms revolution.

To be able to use your home computer as a communications terminal to access services such as bulletin boards and viewdata systems you will need a suitable modem together with the necessary software for your computer. In this part we will look at modems and software for those computers most popular with *PW* readers.

The modem is necessary to enable your computer to communicate with, say, the Prestel computer over the telephone lines. For the computers we are dealing with you will need a modem and these range from the cheap single baud rate types intended for just Prestel to the all-singing-all-dancing variety with a wide range of facilities. Whatever make of modem you decide to buy it must be approved for connection to BT's telephone system. If it does not carry the green approval sticker then do not buy it.

If your computer has an RS232 port then you will have no problems in choosing a modem. Even the BBC's RS423 port is not as limiting as it would seem. For those computers which are not blessed with an RS232 port you will be limited to choosing a modem which has been designed especially for your model of computer. Most modem manufacturers also supply the appropriate software to allow your computer to interface with the computer at the other end of the line and it is usually offered as a package deal with a modem at special discounts.

ZX81

If you own one of these computers your choice of suitable software and hardware is going to be severely limited. In fact you would need to be very dedicated to get your ZX81 up and running even on bulletin boards. Maplin sell a kit of parts for a ZX81 modem interface together with a ready programmed EPROM and this includes the essential conversion from ZX81 code to ASCII code but the baud rate, although adjustable, is given as 300 baud.

ZX Spectrum

This includes the Spectrum+ and again you will be rather limited. Maplin do a kit of parts to enable you to build the necessary RS232 interface along with a ready programmed EPROM. As with the ZX81 you need to be dedicated.

Modem House now supply the VTX5000 package originally produced under the Prism name. This package contains a viewdata modem, so that you can get onto Prestel for example, and the computer sits on top of the modem connected via the edge connector at the rear of the computer. One useful feature of the software is the preparation of mailbox messages off-line thus saving your telephone bill. You can use the ZX printer to print out pages including mosaic graphics as well as all the usual viewdata facilities.

Tandata provide a Prestel terminal program in the form of a plug-in cartridge which includes the RS232 interface. Off-line message editing is provided as is a print facility.

Miracle Technology also have the necessary interface and software package to get your Spectrum onto Prestel and bulletin boards.

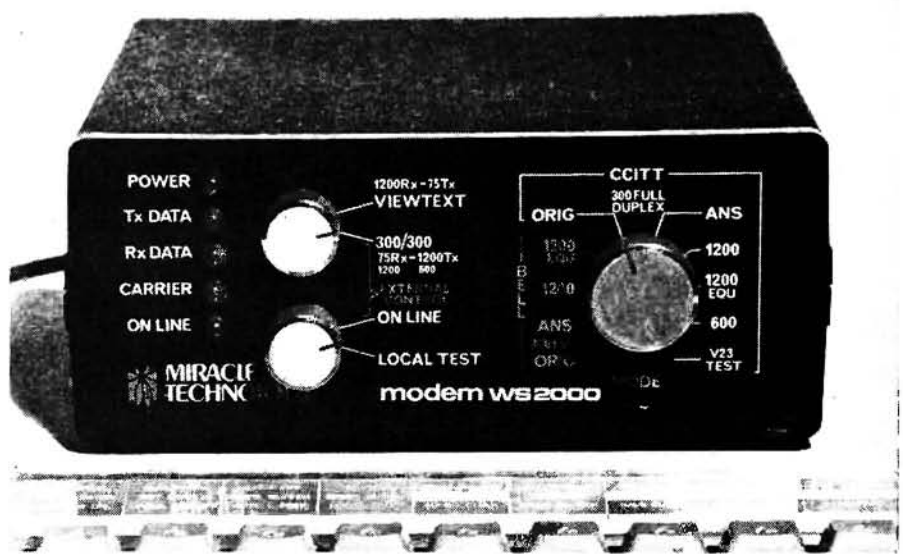
BBC–B

The Beeb has the advantage of having the necessary interfaces built-in although the RS423 port is considered to be a trifle limiting. However there is a wide range of suitable terminal software packages available at reasonable cost.

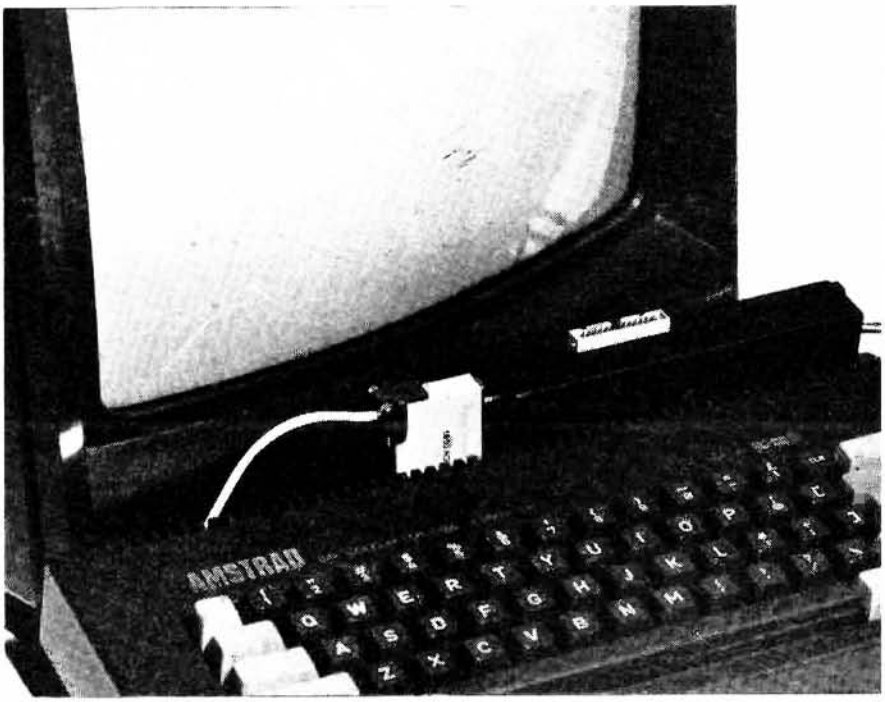
Commstar is probably the best known comms software for the Beeb and is supplied by Pace Microelectronics in the form of a plug-in ROM. Installation inside the Beeb is simple and the instructions, provided in a 105 page manual, comprehensive. The program makes use of the Beeb's function keys for several commonly used tasks and has its own buffer for storing information.

Databeeb is a ROM based comms package from Miracle Technology. It has the ability to give the Beeb access to a wide range of viewdata and bulletin board systems and also has built-in autodial, auto-answer and software control facilities for use with MT's WS2000 modem with the appropriate extra boards fitted. Facilities are provided for storage of pages together with a carousel and file transfer. The Beeb's function keys are used to give easy access to commonly used commands. The instruction book is understandable and explains the various facilities adequately.

Tandata supply a ROM-based package (Tan–ROM) for the BBC–B computer. It has a full Prestel screen editor to allow you to create messages on Prestel pages off-line for later transmission which will once again help to minimise the phone bill.



The WS2000 modem from Miracle Technology is fully automatic, suitable for use with a wide range of protocols, and is ideally paired with their new Databeeb ROM for the Beeb



The Skywave Software Multi-Port plugs into the rear of the popular Amstrad CPC 464 home computer and converts it into a very useful data communications terminal

Amstrad CPC 464

This computer has been gaining in popularity amongst *PW* readers since its introduction just over a year ago and Skywave Software have brought out the necessary interface to allow your 464 to be used as a comms terminal. The interface is called Multi-Port and plugs into the rear edge connector of the computer. Multi-Port provides a full RS232 serial port, a 24-bit parallel port and a sideways ROM card to take two ROMs. The Skycom ROM-based software comes with Multi-Port and gives access to Prestel, Telecom Gold and bulletin boards and has an impressive list of useful features. Skycom has been developed by Skywave Software in close collaboration with Viewfax 258 and Micronet 800 for use with the new Amstrad Database on Prestel. Skywave are at present offering package deals with a choice of modem at very favourable prices. Modem House also market the Skywave Software Amstrad package with modem while Cirkit have announced their own Amstrad Package.

Commodore 64

For this computer, also becoming popular with *PW* readers, both Modem House and Tandata can provide suitable packages for access to Prestel.

Modems

As has been mentioned earlier some computers require special interfaces before they can be connected to a modem and in some instances the modem is actually built into the interface. Otherwise you can use almost any combination of modem, interface and software. Some software has certain features that can only be utilised in conjunction with the recommended modem.

Miracle Technology make a range of modems and their WS2000 model is very popular. This can be fitted with autodial and auto-answer boards to allow the maximum use to be made of their Databeeb software. Once the mode has been selected the operation of the modem is fully automatic—(don't forget to tell it to drop the line though, otherwise you might be surprised at the size of your telephone bill!)

The WS2000 covers a very wide range of baud rates and is simple to use. The mode is set by a combination of three rotary switches on the front panel while the back panel carries a socket for the BT telephone, a 25-way D type RS232 socket, a 20-way USER PORT socket for computer control purposes and a 5-pin Domino ACCESSORY socket. Mains ON/OFF and AUTO/MANUAL switches are also on the back panel, the AUTO/MANUAL switch being fitted only when autodial/auto-answer is fitted.

Another very popular modem is the Nightingale by Pace Microelectronics. Again an auto-answer and autodial board is available for fitting inside the modem. This modem is usually partnered by the Commstar software for the BBC-B making a very powerful combination. The Nightingale connects to the computer via a 5-pin Domino connector and covers all the baud rate combinations in use in the UK. The controls are very simple to use being all push buttons on the front panel together with a SELF TEST button at the back. There is a BT type telephone socket on the rear panel to take the telephone plug and the modem doesn't affect the use of the telephone.

PW

Suppliers

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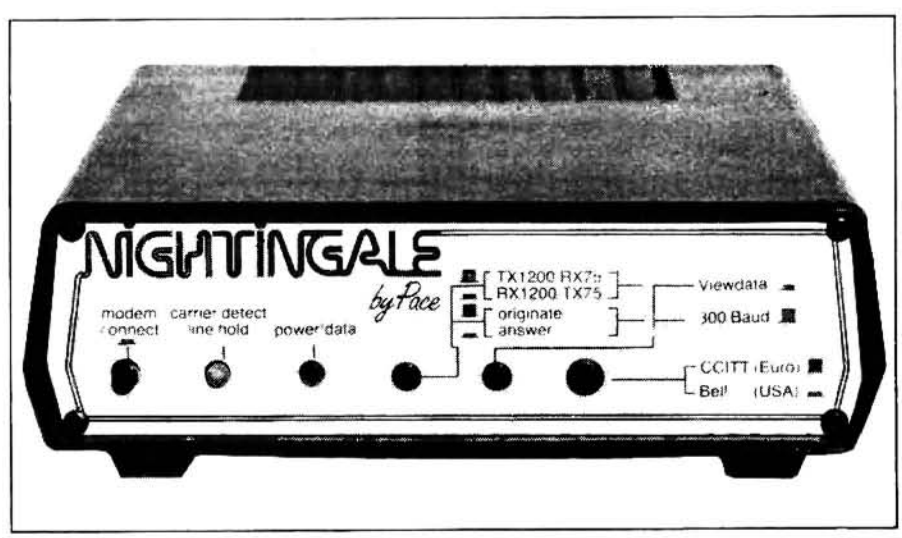

The Nightingale modem from Pace Micro Technology is one of the most popular modems in the UK. It will work with a wide range of baud rates and is most often used with Pace's Commstar ROM on the BBC–B

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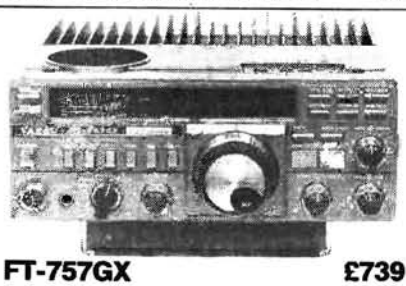

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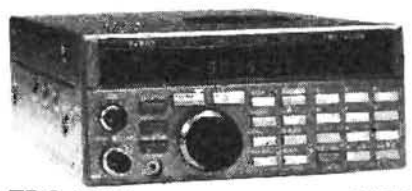

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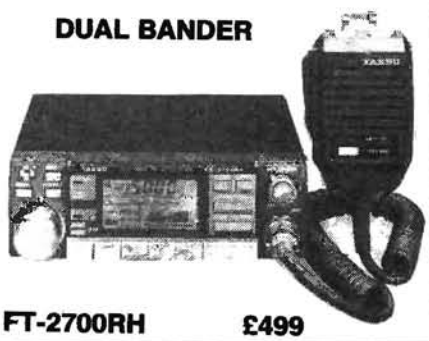

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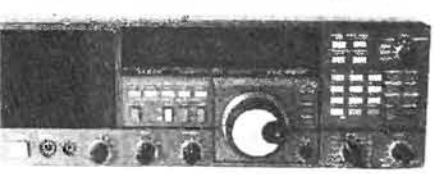
-435S	70cm ⅝ over ⅝ / whip	28.50
M-4M	Mag mount for above	16.95

CROWAVE MODULES

ML144/30LS	inc preamp (1/3w l/p)	82.90
ML144/50S	inc preamp, switchable	92.00
144/100S	inc preamp (10w l/p)	149.95
ML144/100HS	inc preamp (25w l/p)	149.95
ML144/100LS	inc preamp (1/3w l/p)	169.95
ML144/200S	inc preamp (3/10/25 l/p)	299.00
ML432/30L	inc preamp (1/3w l/p)	145.00
ML432/50	inc preamp (10w l/p)	129.95
ML432/100	linear (10w l/p)	299.00

N.O.S.

M 144-1-100	2m, 1W in, 100W out, preamp	181.00
M 144-3-100	2m, 3W in, 100W out, preamp	181.00
M 144-10-100	2m, 10W in, 100W out, preamp	197.00
M 144-25-160	2m, 25W in, 160W out, preamp	217.00
M 144-3-180	2m, 3W in, 180W out, preamp	247.00
M 144-10-180	2m, 10W in, 180W out, preamp	247.00
144-3-50	2MN, 50W out, preamp	108.00
144-10-50	2M, 10W out, preamp	108.00
M 432-1-50	70cm, 1W in, 50W out, preamp	197.00
M 432-3-50	70cm, 3W in, 50W out, preamp	197.00
M 432-10-50	70cm, 10W in, 50W out, preamp	167.00



FRG-8800 **£475**

TOKYO HY POWER

TU's

-200	HF bands ATU 200W PEP	82.95
-400L	HF bands ATU 350W PEP	175.75

NEARS VHF

30V	30W 2m linear 0.5-3W input	45.00
-35V	VHF linear 0.5-5W (3W in 30W out)	69.95
82V	85W 2m linear 10W input	144.49
110V	110W 2m linear	199.00
160V	160W 2m linear 10W input	244.52
-160V25	160W 2m linear 25W input	209.75

NEAR UHF

20U	20W 70cm linear	82.90
-30U	30W 70cm linear	119.00
-45U	45W 70cm linear 10W input	152.76
90U	90W 70cm linear 10W input	268.59

REAMPS

RA-2	2m mast head pre-amp	94.99
RA-7	70cm mast head pre amp	103.29

MET ANTENNAS — NOW IN STOCK

70cms		
432-5B	5 Ele	16.95
432-19T/ATV	19 Ele	35.60
432-17X	17 Ele Crossed	49.17
432-17T	17 Ele Long	39.20
2M		
144-5	5 Ele	19.55
144-7T	7 Ele	24.15
144-8T	8 Ele Long	31.26
144-14T	14 Ele	46.71
144-19T	19 Ele	55.88
144-6X	6 Ele Crossed	39.75
144-GP	Ground Plane	14.41
4M		
70/3	3 Ele	30.12
70/5	5 Ele	45.74
POWER SPLITTERS		
70cms	2 Way	19.55
	4 Way	23.00
2M	2 Way	25.50
	4 Way	28.75

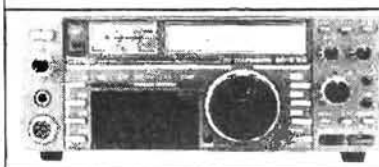
ICOM PRODUCTS

IC751	HF Transceiver	1299.00
IC745	HF Transceiver	899.00
IC735	New HF Transceiver	849.00
PS15	P.S. Unit	145.00
PS30	Systems p.s.u. 25A	297.85
SM6	Base microphone for 751/745	40.25
IC290D	2m 25W M/Mode	479.00
IC290E	10W Multi-Mode Mobile	449.00
IC271E	2m 25W M/Mode Base Stn.	729.00
IC271H	100W version of above	899.00
IC25H	2m 45W FM	359.00
IC27E	25W FM mobile	379.00
IC45E	70cm 10W FM	345.00
IC47E	25W 70cm FM mobile	469.00
ICBU1	B/U supply for 25/45/290	29.90
ICR70	General Coverage Receiver	629.00
ICR71	General Coverage Receiver	729.00
ICO2E	2m H/Held	269.00
IC2E	2m H/Held	199.00
ML1	2m 10W Linear	79.35
IC4E	70cm H/Held	259.00
ICO4E	70cm Handheld	279.00
BC35	Base Charger	62.10
HM9	Speaker mic	18.56
IC3	Carry Case	5.50
ICBP3	Std Battery Pack	27.50
BP5	High Power Battery Pack	52.80
CP1	Car Charging Lead	5.50
DC1	12v Adaptor	13.75

IC-3200E

DATONG PRODUCTS

PC1	Gen. Cov. Con	137.40
VLF	Very low frequency conv	29.90
FL2	Multi-mode audio filter	89.70
FL3	Audio filter for receivers	129.00
ASP/P	r.f. speech clipper for Trio	82.80
ASP/A	r.f. speech clipper for Yaesu	82.80
ASP	As above with 6 pin conn	89.70
D75	Manual RF speech clipper	56.35
D70	Morse Tutor	56.35
MK	Keyboard morse sender	137.40
RFA	RF switched pre-amp	33.90
AD270-MPU	Active dipole with mains p.s.u.	51.75
AD370-MPU	Active dipole with mains p.s.u.	69.00
MPU	Mains power unit	6.90
DC144/28	2m converter	39.67
PTS1	Tone squelch unit	45.00
ANF	Automatic notch filter	67.85
SRB2	Auto Woodpecker blanker	85.25



IC-735

T30	30 watt 3.5-500 MHz dummy load	8.05
T100	100 watt 3.5-500 MHz dummy load	35.20
T200	200 watt 3.5-500 MHz dummy load	42.55
BL40X	50 ohm-50 ohm 1:1 Balun 1kw pep	16.90
BL50A	50 ohm-50 ohm 1-1 Balun 4kw (pep) 2kw (cw)	19.84
SA450N	2 way antenna switch, 'N' connectors	18.40
SA450M	2 way antenna switch SO239 connectors	14.49
YM1X	3.5-150 MHz 120 watt SWR/PWR meter	21.49
Insulators		
AE/EGG	Ceramic egg insulator	0.40
AE/DOG	Ceramic dog bone insulator	0.60
TOYO		
T430	144/432 120W	44.65
T435	144/432 200W	49.35
HI-MOUND MORSE KEYS		
HK702	Up down keyer marble base	30.95
HK703	Up down keyer	29.35
HK704	Up down keyer	19.95
HK705	Up down keyer	15.49
HK706	Up down keyer	16.96
HK708	Up down keyer	14.95
HK802	Up down solid brass	86.31
HK803	Up down brass	82.64
HK808	Up down keyer	39.95
MK704	Twin paddle keyer	13.50
MK705	Twin paddle keyer marble base	25.65
KENPRO		
KP100	Squeeze CMOS 230/13.8v	82.50
KP200	Memory 4096 Multi channel	169.50

COMING SOON

★ **FT 770 70cm Mobile** ★

All the features of the FT 270 but on 70cms

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Holdings, 45 Johnston St., Blackburn. Tel: 0254 59595

EAST MIDLANDS
R.A.S. Notts., 3 Farndon Green, Wollaton Park, Nottingham. Tel: 0602 280267

YORKSHIRE
A.J. Hooker, 42 Nether Hall Rd., Doncaster. Tel: 0302 25690

373 UXBRIDGE ROAD, ACTON, LONDON W3 9RN

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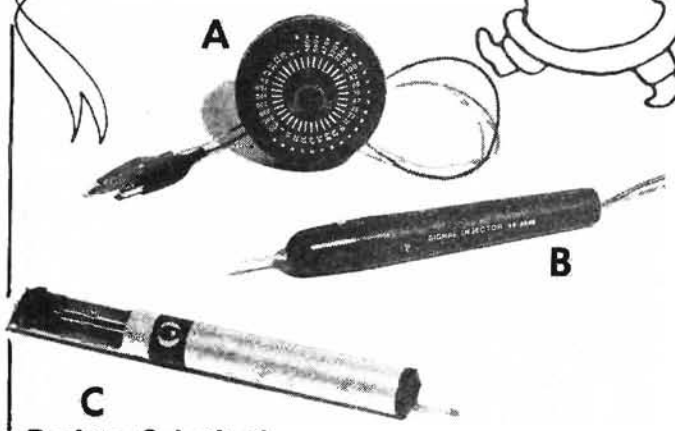
Amateur Radio Exchange FREEPOST London W3 9BR

DROP A HINT TO YOUR LOVED ONES WITH OUR CHRISTMAS SHOPPING GUIDE

GIFTS GALORE!

Under £5

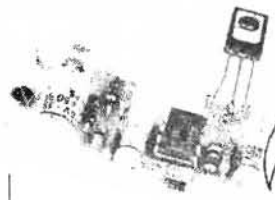


Resistor Substitution Box (A): With a range from 5Ω to 1MΩ this could be a useful tool to have in the shack for those who like experimenting with circuits. Audio Electronics.

Signal Injector (B): This is a very useful tool when fault finding on all those projects lying around in the shack. Audio Electronics.

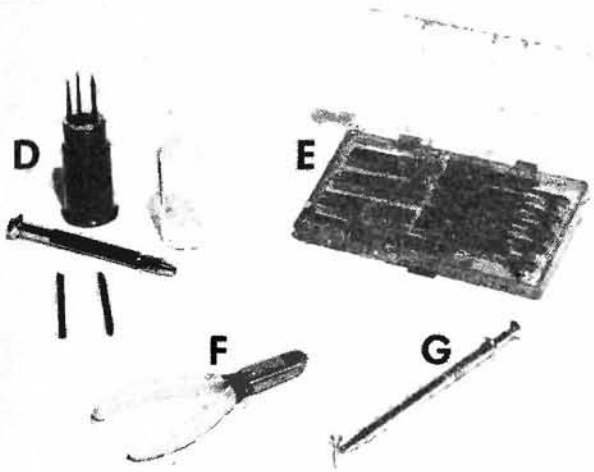
Desoldering Pump (C): This device has a Teflon nozzle, metallic body and heavy duty return spring producing a high suction. The one in the photograph is available from Audio Electronics. Other advertisers such as Electrovalue also can supply such tools.

Practical Wireless Publications: Definitely representing good value for money! Most hobbyists will find at least one that they are interested in. All publications are available from; IPC Magazines Ltd., Post Sales Department, Lavington House, 25 Lavington Street, London SE1 0PF.
Out of Thin Air £1.25
Passport to Amateur Radio £1.50
Wires and Waves £3.00
Are the Voltages Correct? £1.50
Introducing RTTY £1.00
Introducing Morse £1.25
Introducing QRP £1.50
Practical Power Supplies £1.25
Add p&p (60p for one title; £1.00 for two or more).



Regulator Kit: This regulator, the REG-1 from Wood and Douglas, requires a very low differential voltage to stabilise. It is therefore ideal for mobile equipment where the highest possible power supply voltage is needed to ensure reliable operation.

Boxes: Project boxes can also be ideal for those who like building their own equipment. It always looks impressive if the projects are boxed nicely. A wide range of boxes or enclosures are available from component suppliers.

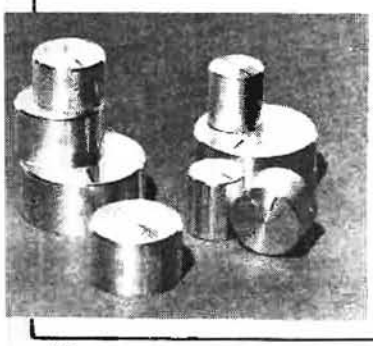


Tool Set (D): Five in one tool set with three flat bladed screwdrivers, one crosshead and a round spike all fitting into one master handle. All items are housed in a plastics container for safe keeping. Audio Electronics.

Tool Set (E): Small tool sets are an ideal gift for the enthusiastic youngster. Then again they are easily tucked into the pocket (or handbag) so can be useful for any hobbyist. There are many types of small kits available such as the one in the photograph. This has five spanners from 4–6mm, five hexagon nut runners from 3–5mm, three small screwdrivers, two crosshead screwdrivers, one awl and three allen keys from 1·5–2·5mm, all items fit into a master swivel handle. Audio Electronics, Electrovalue.

Tools (F): There is a wide variety of tools available in this price bracket. A range of tools made from drop-forged high carbon steel with yellow insulated handles are stocked by Audio Electronics. The photograph shows the 4½in miniature round nosed side cutters; also in the range are snipe, long and bent nose pliers and end nippers. Other companies stock such items and can be seen advertising in *PW*, such as Electrovalue.

Pick-Up Tool (G): A spring loaded pick-up tool can prove very useful when you have just dropped a fixing screw down inside the latest project. Four fingers extend when the plunger is pressed and then close when retracted. It's an ideal pocket size at 127mm with a pen clip style pen. Audio Electronics.



Front Panel Controls: If there is a home-brew enthusiast (the electronic type) in the house then the look of a finished project is very important. Front panel controls like those in the photograph could be useful. Most component suppliers can help with this type of item, see advertisements in this issue.

Batteries: Rechargeable NiCad batteries can be used in a wide variety of equipment, from portable rigs to electronic keyers. NiCad equivalents for most common batteries are available from many dealers.

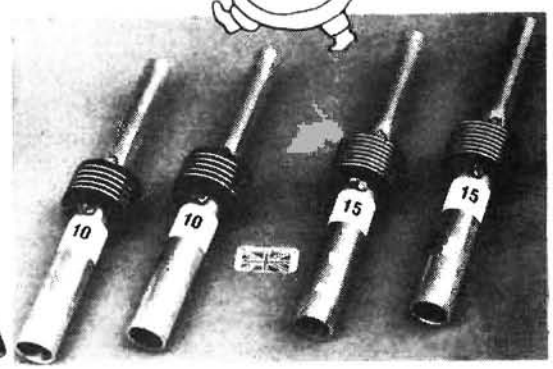
Maidenhead Locator Map of Europe: BNOS produce a paper or plasticised map, in colour which is available from many radio dealers.

Headphones: Light-weight Headphones with a 3·5mm mono plug fitted as standard and options to have 3·5mm stereo or ¼in mono or stereo jacks fitted as alternatives. C.M. Howes.

GIFTS GALORE!

Under £25

Auto Repair Kit: When fitting the wiring in the car, so you can go /M, this soldering kit could be helpful. The 25W iron is fitted with 4·5m of 2-core cable for use with a 12V battery. The iron is fitted with two heavy gauge crocodile clips. Antex.



Antenna Traps: These traps for 28MHz (10m) and 21MHz (15m) are available with 150mm of aluminium tube at each end to enable the building of 2- or 3-element rotary tri-banders, trap verticals etc, either λ/4 or λ/2 in height. Other traps are available in pairs for dipoles or singly for trapped unipoles. Formers are cast and machine threaded, and coils are wound with 1·5mm lacquered copper wire. 28MHz (10m), 21MHz (15m), 14MHz (20m), 7MHz (40m) and 3·5MHz (80m) traps are available. G2DYM.

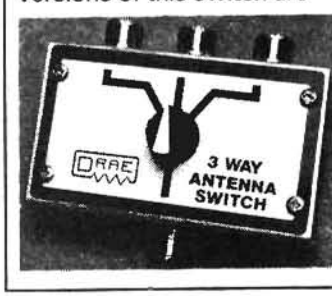
SWR/Power Meter: This type of meter indicates transmitter operation, monitors your antenna and cable condition and is easy to use. It can cover the frequency range 3·5–150MHz. SMC are one of the dealers who stock a meter fitting this description.

Power Supply Units: One of the most popular items is the p.s.u. There are plenty available for 12V d.c. output at about 4 amp rating—useful for most receivers or many lower power transceivers. Talk to your local dealer and see what's available.

Multimeters: These are always a great favourite as they come priced to suit most pockets. The three shown in this photograph are from Lowe Electronics: (l-r) the KRT-100 a mini pocket meter, up to 1000V a.c./d.c. 1kΩ/V; the KRT-500—a 43 range 50kΩ/V top quality test instrument; and the KRT-200—an 18 range 20kΩ/V station test meter. Many advertisers in *PW* stock extensive ranges of multimeters and there should be one to suit each person.

Don't forget your local dealer may stock most of the items shown here, or ones very similar. He will be able to advise you on the brands carried in stock.

3-way v.h.f. switch: Two versions of this switch are available, with SO239 or N type connections. Both are rated at 250W carrying capacity, 50Ω impedance with a single-pole, three-way silver plated brass contact switch. The one shown here is stocked by Davtrend but SEM, SMC and Lowe Electronics are amongst other advertisers who also stock similar items.



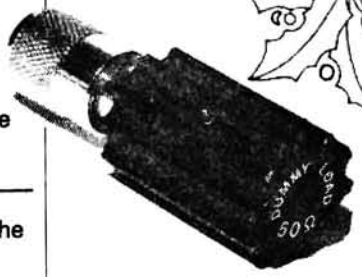
Practical Wireless Subscription: An ideal present that lasts all year long. Twelve issues of **Practical Wireless** delivered to your door for just £13 (UK). Just the way to make sure you get all the issues to build that new project. PRACTICAL WIRELESS, Subscription Department, Oakfield House, 35 Perrymount Road, Haywards Heath, West Sussex RH16 3DH.

Soldering Kits: The SK5 comprises a 17 watt miniature soldering iron complete with stand, 1m of solder and a *How to Solder* leaflet. The soldering iron can be purchased separately. The SK1 kit comprises a miniature mains soldering iron with a 2·3, 4 and 4·7mm bits, a reel of solder, heat sink and *How to Solder* leaflet. All these items shown here are from Antex (Electronics) Ltd.

Headphones: HS-6 headphones weigh just 100g and so are *very* lightweight. They have a frequency response from 100–10 000Hz, 12·5Ω impedance and a maximum input of 100mW at 1kHz.

Lowe Electronics & Ward Electronics are among those who stock this make although most dealers can supply similar headphones.

Dummy Loads: The DL-20 is rated at 15W continuous, 30W maximum and 50Ω impedance and covers the frequency range up to 150MHz. SMC stock the DL-20 but most dealers will have similar items in stock.



The HS-7 phones make the previous ones seem positively heavy! They weigh 15g and must be amongst the lightest available, supplied complete with 3·5mm plug and two adaptors, for 2·5mm and 0·25in connectors.

Impedance is 16Ω and maximum input at 1kHz is 50mW. These are also available from Lowe Electronics, Ward Electronics as well as other regular advertisers.

Kits:

Practice Oscillator/CW Side Tone: This provides a sinewave note and will work either from your Morse key or from the output of your rig by r.f. sensing. C. M. Howes.

Speech Processor: This is suitable for high or low impedance microphones and uses a 9V battery or 12V rig power supply. C. M. Howes.

144MHz Linear Amplifier: The PA2/30 is a version designed to be used with rigs with up to 4W output (IC-202, FT-290, etc.) and gives about 8 or 9dB of gain. C. M. Howes.

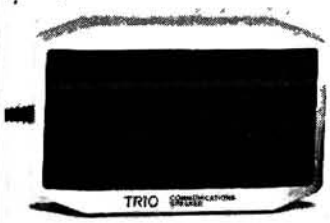
Antenna Noise Bridge: This measures resonance from 1–160MHz and radiation resistance from 2–1000Ω. It provides a resistive bridge for a clear null at v.h.f., is transceiver protected and also measures r.f. coil resistance. Cambridge Kits.

Tunable Audio Notch Filter: This kit gives a 40dB notch and will tune between 350 and 5000Hz. It also has a built-in speaker amplifier to sharpen the notch. Cambridge Kits.

Two-Tone Oscillator: You can check your linear for linearity, bias, flat-topping and carrier balance with one or two 100mV audio tones. Cambridge Kits.

Deluxe VFO Knob: Deluxe ball race knob, designed to fit the TS-830S, TS-530 series and the VFO-240. The gift for the radio amateur who has everything!

Mobile Speakers: This type of speaker can either be used in the shack or can just as easily be fitted into the car. They can be an ideal replacement for the internal speaker in most mobile rigs which tend to get hidden once the rig is firmly and safely mounted in the car.



Battery Chargers: These come in all shapes and sizes: 1–4 AA cells; 1–2 6-F22 (PP3) cells; 2 or 4 AA, C or D cells. The ones in the photograph are stocked by BNOS.

Kits: The kits mentioned in Gifts Galore are only some of the high quality kits for the radio amateur. The advertisements in *PW* will help you find companies that produce various types of kits.

Each kit comes with good, clear instruction, glass-fibre p.c.b., all board mounted components and is designed so that even a newcomer can meet with success. Most firms produce information about their kits which may prove useful when deciding which kit to choose.

Identification Plaques: Made from Welsh slate with 25mm high solid brass lettering; each plaque is free standing and has been sprayed with clear hard lacquer. Three sizes are available, 8 × 3½ × ½in, 12 × 4 × ½in and 16 × 5 × ½in, prices rise accordingly. These unusual items are available from GW Morse Keys.

Switched Balun Matching Units: These baluns are available with or without the Marconi "T" facility for those interested in top band or the long and medium waves. The unit matches the unbalanced output of a transmitter or input of a receiver to a balanced anti-TVI 75Ω twin feeder and is available from G2DYM Aerials.

70MHz Phasing Harness: If your main interest is 70MHz the PMH2/4M 2-way phasing harness could be for you. It is designed for two 70MHz Yagis. Photo Acoustics.

Discone Antenna: This antenna is ideal for use with scanning receivers or to cover complete bands. Its input impedance is 50Ω with an average v.s.w.r. of 1·5:1. It covers 65-520MHz. SMC.

HF Balun: Covering the frequency range 1·8–50MHz with 50Ω impedance—an idea for the h.f. enthusiast?

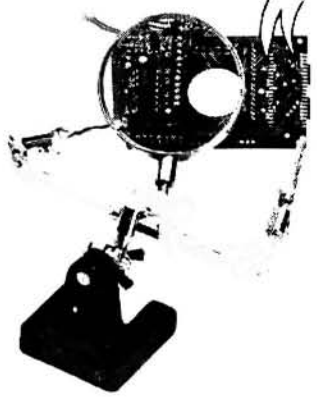
Don't forget to read the Products pages in *PW* every month for more good ideas.

Portasol: A portable gas soldering iron sounds as though it could be very useful on those jobs where a mains cable just won't reach. This one is powered by ordinary lighter fuel and can adjust the temperature. The unit comes with a protective cap so can be safely carried like a pen. Amongst the suppliers of the unit are Greenwood Electronics and JEM Marketing.

Crab Clamps: These grip objects without twisting them and have a jaw capacity of 4½in. They come with optional nylon protection pads and can hold tubular, tapered, flat and irregular objects. Crab clamps can be purchased either singly or in pairs. JEM Marketing.

Helping Hand: This invaluable device holds your p.c.b. or cable leaving both hands free to solder. Different makes are available with and without the magnifying glass. Lowe Electronics, JEM Marketing.

Mobile Antennas: A wide range of antennas are available, including those from the Jaybeam range. There are λ/4 and 5λ/8 stainless steel whips, λ/4 and 5λ/8 glassfibre whips for 144MHz, λ/4 stainless steel whips for 430MHz and 430MHz mobile colinears.



430MHz Pre-Amplifier: The Wood and Douglas 70PA5 is a dual-gate GaAs m.e.s.f.e.t. pre-amplifier. The noise figure is typically 1·8dB and a gain of 16dB. There is also input *pin* diode protection and post amplifier attenuator/line feed facilities.

144MHz Pre-Amplifier: The Wood and Douglas 144PA4 has a low loss input circuit to reduce the noise figure under 2dB.

VHF Antennas: There are many makes of antennas to choose from and it can be very confusing when faced with so many different types and names. We will only be mentioning a few here to give an idea of what is available. Once again your local dealer, or any of the advertisers in *PW*, will be able to give advice on their range of antennas.

One you may like to consider is the Tonna range. The 9-element fixed Yagi antenna, with its 13dBi gain and 15dB front-to-back ratio, is only 3·3m in length.

In the Jaybeam range the LR2/2M is a half-wave and end-fed dipole offering low angle radiation with excellent bandwidth and low v.s.w.r.

Among our advertisers who told us about these antennas are Photo Acoustics and Randam Electronics, but a call to other dealers will tell you what they have in stock.

UHF Antennas: The 19-element Tonna 435MHz antenna has 16dBi gain, 23dB front-to-back ratio and is 3·2m in length. For those with very limited space the 5-element 430MHz Yagi from Halbar may be of interest. It has a boomlength of just 635mm and is end mounted so only needs a turning circle of 585mm, yet it has a gain of 10dBi.

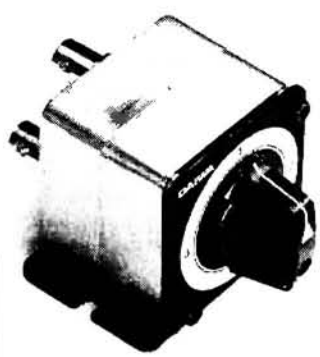
GIFTS GALORE!

Under £50

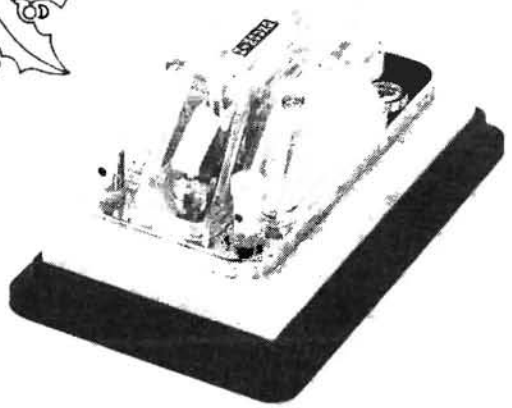
Mobile SWR/Power Meter: This compact meter covers 3·5–150MHz and is of the cross-needle type, suitable for up to 150W forward power. Lowes. Don't forget there are base station versions available such as the SWR500 from Telecomms.

Antennas: Obviously the higher the price range the larger the number of antennas available. In this price bracket the choice ranges from dual-band base station verticals to u.h.f. verticals and tri-band helicals as well as beams. Any antenna dealer, many of whom advertise in *PW* and also appear at the end of this feature, will help you choose the type of antenna you require. Don't forget there are a wide range of mobile h.f. antennas in this price range such as G-whips or the Glenstar Navy Special.

RF Signal Generators: Many companies can supply items of test equipment like signal generators in this price range. For example the Nombrex 42 covers 150kHz to 300MHz with an output of 750mW. It can be run from either batteries or an external supply. Altair.

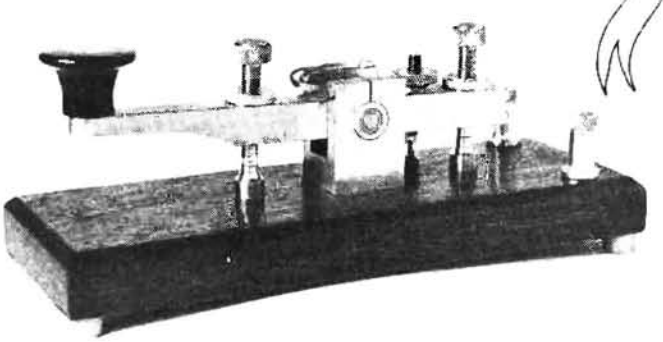


Coaxial Switches: The switch in the photograph is a 4-way coaxial switch with BNC connectors. The frequency range of this switch covers d.c. to 1·5GHz. Available from Lowes, but most dealers carry stocks of coaxial switches.

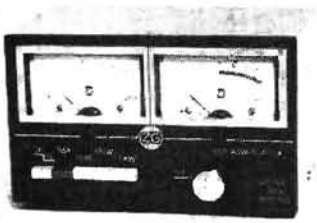


Morse Keys: In this price range there is a great range of keys to choose from. The one in the photograph is the HK-702 which is the deluxe version on a marble base. Other keys in this price range are the HK-808, another deluxe version on a marble base with hard silver contacts, and the HK-703 which has an ABS base and silver contacts. Bredhurst. Lowes and SMC are among *PW* advertisers who stock this range of keys.

Morse Key Kit: Build your own solid brass Morse Key! A very unusual idea for a present. This kit contains all components and instructions including ball race bearings, solid silver contacts and precision contact adjustment using fine pitch threaded screws. It comes with a polished wood base. Available from R.A. Kent Engineers.

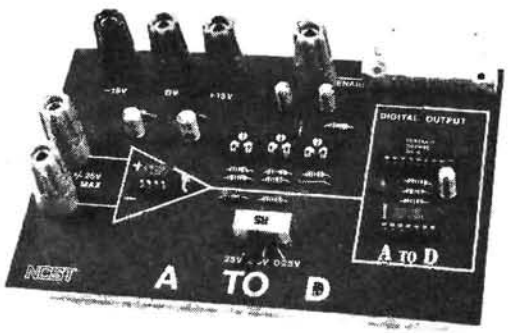


SWR/Power Meter: Another product which has many makes and models in this price bracket is the s.w.r./power meter. This



one is from Telecomms, the Zetagi MOD500. It covers 3–200MHz up to a maximum of 2kW p.e.p. The impedance is 50 or 75Ω switchable and the insertion loss is less than 0·2dB.

Analogue to Digital Converter: This board produces an 8-bit digital code in 10µs from analogue input voltages in the range ±25V, ±2·5V and ±250mV. The board is compatible with the BBC-B although it can be used with a wide range of popular home computers. Data Harvest Ltd.



Converters: Datong are one company that produce a 144MHz to 28MHz converter, the DC144/28 Converters are a useful addition to the shack enabling the amateur to explore new bands without necessarily buying new rigs

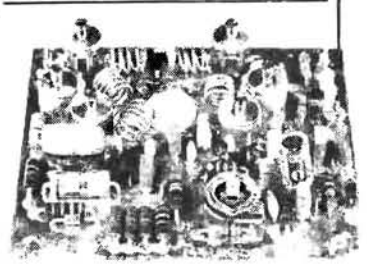
Mobile/Fist Microphones: Many mobile/portable rigs have optional deluxe microphones available. These usually have UP/DOWN scanning and other controls that match the rig. Your local dealer can advise as to suitable microphones for your rig

Multimeters: There are a variety of digital multimeters that fall into this price range. The one shown here is the HC-6010 from Armon Electronics. It has a $3\frac{1}{2}$ digit l.c.d. display with auto-zero, auto polarity and low battery indicator. It has overload protection on all ranges and the range selection buttons are colour coded to allow quick selection.

Kits: There are kits available from many kit specialists that fit into this price range. From the Cambridge Kit stable come such projects as: a crystal calibrator which gives switched equal-level 2MHz, 200kHz and 50kHz markers; 50MHz and 70MHz converters and antenna tuners for 100kHz to 30MHz. Kits can be a good idea for the enthusiastic home constructor.

Clocks: A 24-hour clock is always a useful item in the shack. There are many types available from very low-priced, simple digital clocks to those that will tell you the time in any part of the world. The QTR-24 from SMC allows you to work out the time in other places and runs on batteries so is useful for portable operations as well as at home.

144MHz Linear Kit: The 144LIN10B from Wood and Douglas has an output of a nominal 10W when used for s.s.b. There is a manual override for the r.f. sensing for very low drive levels and a "hang-time" constant for s.s.b. operation.

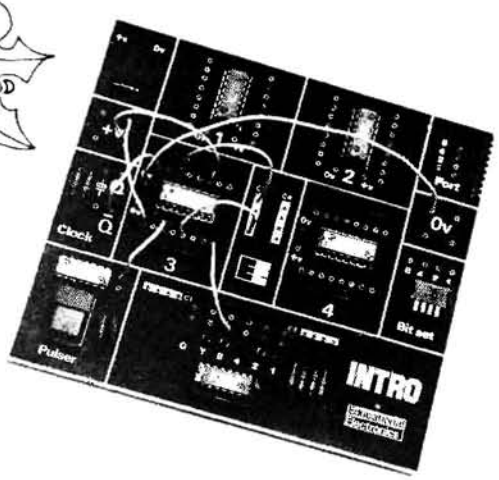


Desk Microphones: This is just one of a whole range of desk microphones available. The type shown here is the MC80, which is an electret desk mic with UP/DOWN facilities. Lowes. Many other manufacturers make these types of microphones, your local dealer should be able to tell you the range they stock.

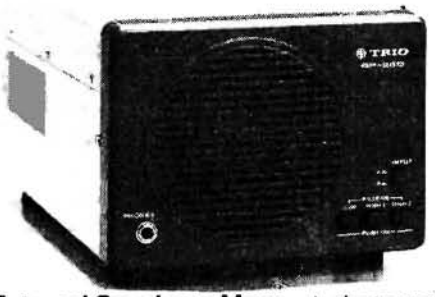
Polarphaser II: Designed for use on the 144MHz band in conjunction with a crossed Yagi. It allows the user to control the polarisation from righthand to lefthand circular or vertical to horizontal. Useful for satellite reception and DX contacts where the polarisation changes due to the signal path Available from SMC.

GIFTS GALORE!

Under £100



Introducing Microelectronics Course: This course consists of a 139 page booklet covering the basics of digital electronics together with a special board with a host of built-in features that make rapid circuit assembly and testing possible. Educational Electronics.



External Speakers: Many high quality receivers and transceivers have matching external speakers as add-on extras. The one in the photograph is the SP-230, it matches the TS-830 transceivers. The speaker has switched filters built-in. Lowes.

Headphones: Most of the headphones in this price range are deluxe types and usually of a higher specification. For example the HS-5 pair in the photograph have a frequency response of 150–4000Hz. Lowes.

Star Masterkey: This keyer features full iambic keying together with the facility for semi-automatic keying. It has dot/dash memories, speed ranges from 1–55w.p.m. and selectable positive or negative keying for valved or transistorised rigs. Available from Dewsbury Electronics, this is one of a number of different makes and types of keyers available from dealers.

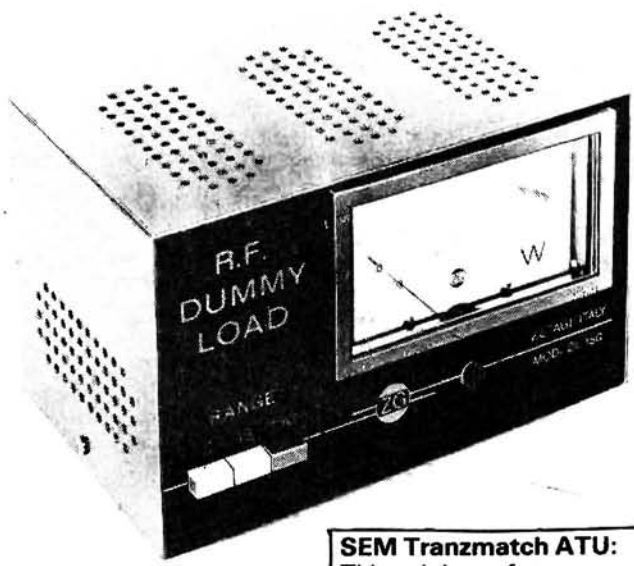
RF Dummy Load: The DL150 has a frequency range of 0·5–500MHz and a maximum power rating of 150W. The v.s.w.r. quoted is 1·15:1. This unit is available from Telecomms.

Receiver ATU: The unit is designed for the general coverage receiver, e.g. the R-600, R-2000 or any short wave receiver.

Automatic Woodpecker Blanker: Most h.f. operators know just how annoying the "Russian Woodpecker" can be. This unit could be the answer. It locks onto the "Woodpecker" within a second or so of its appearance and blanks it out. The circuits adjust automatically and continuously to changing pulse widths and phase changes. Datong.

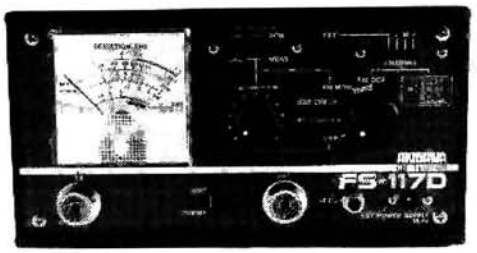
Lightning Arrestors: This unit was originally designed to protect equipment on board military aircraft. The LA-1 will safely bypass to ground 10 or more lightning strikes, according to the manufacturers. This sort of product is often forgotten until it's too late. SMC.

Antennas: Obviously there is a wide range of antennas available in this price bracket. Most local dealers have catalogues or information sheets on the types of antennas they stock.



SWR/Power Meter: The range of this piece of equipment is 1·8–150MHz with a power rating of 20/200W full scale. The unit in the photograph is available from Lowe Electronics but many dealers will have similar products available.

SEM Tranzmatch ATU: This unit has a frequency range of 1·8–30MHz and a matching range of 15–5000Ω.



Power Supplies: The p.s.u. in the photograph is one of a range made by Daiwa. The ranges are all variable—two between 3 and 15V and the third between 9 and 15V. Maximum current ratings are 12, 8 and 5·6A. The first photograph shows the PS120M 12A version which is available from Lowe Electronics. The second photograph shows the DRAE p.s.u. which is one of a range that covers 4 to 24A. Davtrend.

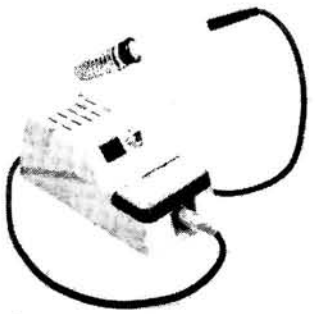
CB Tester: This piece of test equipment will check the 27MHz deviation, power and v.s.w.r. on a CB set. It is called the FS-117D and is available from Telecomms.

Morse Tutor: The Datong Morse Tutor is very well-known throughout the ranks of those who have passed their Morse tests in the past few years. It sends a continuous stream of precision Morse in five character groups which don't repeat. It has both variable speed and variable delay between characters for optimum learning efficiency. You can choose letters only, numbers only or mixed and, with a Morse Key, it can be used as a practice oscillator.

Vibroplex Morse Keys: There is a whole range of these Morse Keys available in this price range. The Vibroplex key is a semi-automatic or "bug" type of key and is available from GW Morse Keys.

MSF Clock Kit: This clock receives the Rugby 60kHz atomic signals and has a 1000km range using its built-in antenna. If you live further away than that there is provision for an external antenna. Cambridge Kits.

External Speaker: Obviously the higher up the market scale, and price scale, your transceiver is, the higher up that same scale its external speaker will be. The two shown here match the TS-940 and TS-930 range of rigs, each has switchable filters.

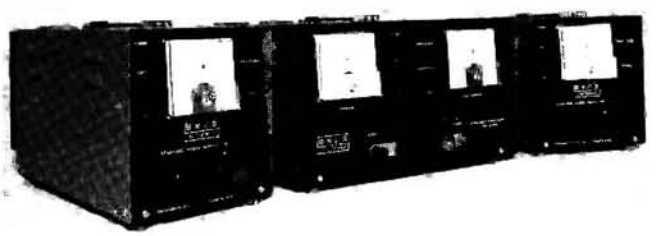


Soldering Irons: The TSCU-1 is a temperature controlled soldering station with an anti-static earth connection to protect m.o.s. devices. By inserting the jack with the special earthing cable in the socket at the side of the unit a connection can be made to a specially made "earth" to eliminate static. The TCSU-D gives an accurate and continuous display of the soldering tip temperature. The temperature can be set by the adjustment knob, which can then be removed to prevent accidental alteration. Antex.

GIFTS GALORE!

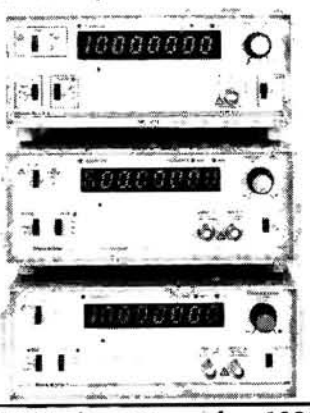
Feeling Flush?

Power Supplies: The power supplies shown here are the 12/25A, 12/40A and the 12/12A. Each has a continuous rated output, over-voltage crowbar circuit, over-current protection, fully r.f. protected and have large current meters. BNOS. The photograph above shows the 24A p.s.u. made by DRAE.

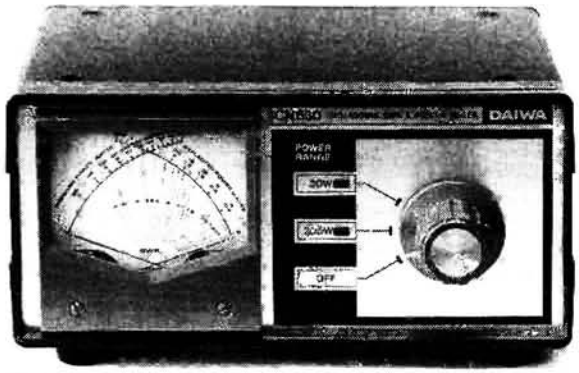


Inductance Bridge: The Nombrex 44, available from Altair, has a range of 1µH to 100H. It has an internal 9V battery and a socket for an external supply.

Frequency Counter: Black Star have the Meteor range of counters, the 100 for 5Hz to 100MHz, the 600 for 5Hz to 600MHz and the 1000 for 5Hz to 1GHz. They have mains input protection, resolution down to 0·1Hz, can be mains or battery operated and have a sensitivity of 5mV.



Power/SWR Meters: The meter in the photograph is the CN630, a 140–450MHz cross-pointer power and s.w.r. meter rated up to 200W.



Morse Keyer: One keyer on the market is this Katsumi MK-1024 which has a 1024-bit memory. Lowes. Another type of sending device is the Datong MK keyboard, a deluxe keyboard sender with memories.

Linear Amplifiers: There are many linear amplifiers available such as this 144MHz 100 watt version from BNOS. It has a continuous rated output, straight-through mode when switched off, positive push-button operation and over-drive protection as just a few of its features. Microwave Modules also have a full range of linears such as the 144MHz 200 watt version shown here.

144MHz Linear Transverter: The Microwave Modules MMT144/28-R could be for those looking for a high performance 144MHz band system. Between 250 and 300mW of 28MHz results in 25W of 144MHz r.f. and so it is a useful piece of equipment.

Local Suppliers' Addresses and Telephone Numbers

Altair Electronics: Bridford, Exeter, Devon EX6 7HT. Tel: 0647 52594
Antex (Electronics) Ltd: Mayflower House, Armada Way, Plymouth PL1 1JX. Tel. 0752 667377
Armon Electronics Ltd: Heron House, 109 Wembley Hill Road, Wembley, Middlesex HA9 8AG. Tel: 01-902 4321
Audio Electronics: 301 Edgware Road, London W2. Tel: 01-724 3564
Black Star Ltd: 4 Stephenson Road, St. Ives, Huntingdon, Cambs PE17 4WJ. Tel: 0480 62440
BNOS Electronics Ltd: Bigods Halls, Great Dunmow, Essex CM6 3BE. Tel: 0371 4677
Bredhurst Electronics Ltd High Street, Handcross, West Sussex RH17 6BW. Tel: 0444 400786
Cambridge Kits: 45(P) Old School Lane, Milton, Cambridge CB4 4BS. Tel: 0223 860150
Data Harvest: See Educational Electronics
Datong Electronics Ltd: Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE. Tel: 0532 552461
Davtrend Ltd: Sanderson Centre, Lees Lane, Gosport, Hampshire PO12 3UL. Tel: 0705 520141
Dewsbury Electronics: 176 Lower High Street, Stourbridge, West Midlands. Tel: 0384 390063
Educational Electronics: 28 Lake Street, Leighton Buzzard, Beds LU7 8RX. Tel: 0525 373666
Electrovalue Ltd. 28 St Judes Road, Englefield Green, Egham, Surrey TW20 0HB. Tel: 0784 33603
G2DYM Aerials: Cobhamden Castle, Uplowman, Tiverton, Devon EX16 7PH. Tel: 03986 215
Glenstar Ltd: Newtown Road, Henley-on-Thames, Oxon RG9 1HQ.
G-Whip Products: 4 Bryn Coed, St Asaph, Clwyd LL17 0DG.
GW Morse Keys: 4 Owen Close, Rhyl, Clwyd LL18 2LQ.
Halbar Aerials: Unit 1, Bury Walk, Bedford MK41 0DU. Tel: 0234 44720
C. M. Howes: 139 Highview, Vigo, Meopham, Kent DA13 0UT. Tel: 0732 823129
JEM Marketing: 180 Princes Avenue, Palmers Green, London N13 6HL. Tel: 01-889 1415
R. A. Kent Engineers: 243 Carr Lane, Tarleton, Preston, Lancs PR4 6YB. Tel: 0774 734998
Lowe Electronics Ltd: Chesterfield Road, Matlock, Derbys DE4 5LE. Tel: 0629 2817
Microwave Modules Ltd: Brookfield Drive, Aintree, Liverpool L9 7AN. Tel: 051-523 4011
Photo Acoustics Ltd: 58 High Street, Newport Pagnell, Bucks MK16 8AQ. Tel: 0908 610625
Random Electronics: 12 Conduit Road, Abingdon, Oxon OX14 1DB. Tel: 0235 23080
SEM: Union Mills, Isle of Man. Tel: 0624 851277
SMC Ltd: SM House, Rumbridge Street, Totton, Southampton SO4 4DP. Tel: 0703 867333
Telecomms: 189 London Road, North End, Portsmouth. Tel: 0705 660036
Ward Electronics: 422 Bromford Lane, Ward End, Birmingham B8 2RX. Tel: 021-328 6070
Wood & Douglas: Unit 13, Youngs Industrial Estate, Aldermaston, Reading. Tel: 07356 71444

CLUB NEWS

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

Avon

Bristol RSGB Group: Colin Hollister G4SQQ (Bristol 508451). Meets 7.30pm in the small lecture theatre, Queens Building, University Walk, Clifton. Nov 25—Home-brew Competition.
North Bristol ARC: Ted Bidmead G4EUV, 4 Pine Grove, Northville, Bristol 7. Meets Fridays, 7pm at SHE Centre, 7 Braemar Crescent, Northville. Nov 8—Junk Sale; 15th—Radio Therapy by G3TCO; 22nd—Sporadic-E by G8UUE; 29th—Semiconductors by Dr J. Wood.
South Bristol ARC: Len Baker G4RZY (Bristol 834282). Meets Wednesdays, 7.30pm in the Whitchurch Folkhouse, East Dundry Road, Whitchurch. Nov 6—BT Morse Tests; 13th—v.h.f. Activity Night; 20th—Club Project.
Gordano AR Group: John Davies G3LJD, 273 Down Road, Portishead, Bristol. Meets 4th Wednesday, 8pm in The Ship, Redcliffe Bay, Portishead.
Shirehampton ARC: Ron Ford G4GTD, 2 Jersey Avenue, St Annes, Bristol. Meets Fridays, 7.30pm at Twyford House, High Street, Shirehampton. Nov 1—Junk Sale; 15th—Transmission Lines for v.l.f. and e.h.t. by GEGB; 29th—Test Equipment by G3HKA.

Bedfordshire

Dunstable Down RC: Philip Morris G6EES (Dunstable 607623). Meets Fridays, 8pm in Room 3, Chews House, High Street South, Dunstable. Nov 8—Receiver Design by G3OSS.
Shefford & District ARS: Alan Little G4PSO (Hitchin 57946). Meets Thursdays, 7.45pm in the Church Hall, Ampthill Road, Shefford. Nov 7—UOSAT Up-date by G4PSO; 14th Static Problems by G6RHL.

Berkshire

Newbury & District RS: M.J. Fereday G3VOW (Newbury 43048). Meets 2nd Tuesday at Newbury Technical College.
Reading & District ARC: Chris Young G4CCC, 18 Wincroft Road, Caversham, Reading. Meets alternate Tuesdays, 8pm at the White Horse, Peppard Road, Emmer Green, Reading. Nov 12—Smith Charts by G4RZP; 26th—Construction Contest Judging; Dec 10—AGM.

Cambridgeshire

Cambridge & District ARC: Brian Davey G4TRO (Cambridge 353664). Meets Fridays, 7.30pm at the Coleridge CC, Radegund Road, Cambridge.
Greater Peterborough ARC: Frank Brisley G4NRJ (Peterborough 231848). Meets 4th Thursday, 7.30pm at the Southfields Junior School, Stanground, Peterborough. Nov 28—Electromagnetic Compatibility by G3HCQ.

Cheshire

South Cheshire ARS: Nick Gutten G6ICW (Crewe 60062). Meets 2nd & 4th Mondays, 8pm at the Victoria Club, Gatefield Street, Crewe. Nov 11—Mass Spectrometry by G8DTT.
Chester & District ARS: Alan Warne G4EZO (Chester 40055). Meets 2nd, 3rd, 4th & 5th Tuesdays, 8pm at the Chester RUFC, Hare Lane, Vicars Cross, Chester. Nov 4—Quiz Night; 12th—Radio Astronomy by Dr Spencer of Jodrell Bank.

Clwyd

Alyn & Deeside ARS: G. Cook GW4RKX (Deeside 66066). Meets alternate Mondays, 8pm at the Shotton Social Club, Shotton Lane, Shotton. Nov 4—Barbeque.
Rhyl & District ARC: Melfyn Allington GW1AKT (Nantglyn 469). Meets 1st & 3rd Mondays, 7.30pm in the Mona Hotel, Market Street, Rhyl. Nov 18—Computer Demo.

Cornwall

Cornish RAC: N. Pascoe G4USB (Falmouth 40367). Meets 1st Thursdays, 7.30pm in the Church Hall, Treleigh. Nov 7—Junk Sale; Dec 5—Christmas Party. Computer Club meets 2nd Monday. Nov 11—The Apple Macintosh; Nov 25—Constructors Workshop.

Cumbria

Eden Valley RS: Alison Telford G4XPO, Ivy House, Culgaith, Penrith. Meets 3rd Thursdays, 7.30pm in the Kings Arms, Temple Sowerby, on the A66. Nov 21—Antennas for DX by G4AFU.

Devon

Torbay ARS: Brian Wall G1EUA, 48 Pennyacre Road, Teignmouth. Meets Fridays & last Saturdays, 7.30pm at the EEC Social Club, Ringslade Road, Highweek, Newton Abbot. Nov 23—Moonbounce Techniques by G4DGU.

Dorset

Flight Refuelling ARS: Doug Wilkes G8ZLH (Bournemouth 570894). Meets Sundays, 7.30pm at the FR S&SC, Merley Park Road, Merley. Nov 3—Open Forum; 10th—The Real Hobby by G8VFH; 24th—AGM; Dec 1—Technical Topics by G4WHO.
Poole RAS: Phil Dykes G4XYX, 68 Egmont Road, Poole. Meets last Wednesdays, 7.30pm at Poole College, North Road, Poole. Nov 27—Good c.w. Operation.

Dumfries & Galloway

Maxwelltown ARC: Trig Rodgers GM4NNC, 5 Elder Avenue, Lincluden, Dumfries. Meets 1st and 3rd Wednesdays, 8pm in the Tam O'-Shanter Inn, Dumfries. Nov 20—RSGB film.

Dyfed

Aberporth RAC: Frank Thomas GW6RDR (Cardigan 87274). Meets Thursdays, 7pm in Building 17, Royal Aircraft Establishment, Aberporth. RAE & code tuition available.
Carmarthen ARS: A.F. Dowling GW3GUE (Carmarthen 83460). Meets 2nd & 4th Fridays, 7.30pm in the Carmarthen Boat Club, The Quay, Carmarthen. Nov 24—Radio Rally at St. Peters Civic Hall, Nott Square. S22 talk-in.

Essex

Braintree & District ARS: David Willicombe G6CJA (Braintree 45058). Meets 1st & 3rd Mondays in Room 1, Braintree CC, Victoria Street, Braintree. Nov 18—Junk Sale.

Fife

Glenrothes & District ARC: Anne Edmondson GM4TCW (Glenrothes 744449). Meets Wednesdays & Sundays, 7.30pm at Provosts Land, Leslie. Nov 20—Open Night & Dinner at the Crown Hotel, Main Street, Thirton. Entrance £2 with raffle and traders there. RAE & c.w. at Balwearie High School, Kirkcaldy on Mondays & Fridays.

Glamorgan

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

Greater Manchester

West Manchester RC: T. Chapman G6YIO, c/o Club Address. Meets Wednesdays, 8pm at the Astley & Tyldesley Miners Welfare, Meanley Road, Gin Pit Village, Astley Nov 20—Radio Rally at Pembroke Halls, Walkden (free parking).
South Manchester RC: Dave Holland (061-973 1837). Meets Mondays & Fridays, 8pm at the Sale Moor CC, Norris Road, Sale.

Gwynedd

Merion ARS: Ken Judge GW4KEV, Tyddyn Mawr, Arthog. Meets 1st Thursdays, 7.30pm at the Dolserau Hall Hotel, Dolgellau. Nov 7—"Eye of the Wind" with slides.

Hampshire

Basingstoke ARC: Dave Burleigh G4WIZ (Tadley 5185). Meets 1st Mondays, 7.30pm at the Forest Rings CC, Sycamore Way, Winklebury, Basingstoke. Nov 4—Constructors Competition; Dec 2—Christmas Social.
Fareham & District ARC: Brian Davey G4ITG (Fareham 234904). Meets Wednesdays, 7.30pm in Room 12, Porchester CC, Westlands Grove, Porchester. Nov 6—Circular Polarisation for v.h.f. by G6XHR; 20th—Receivers by G4ITF.
Farnborough & District RS: Peter Taylor G4MBZ (Farnborough 837581). Meets 2nd & 4th Wednesdays, 7.30pm at the Railway Enthusiasts Club, Access Road, Hawley Lane, Farnborough. Nov 13—AGM; 27th—Chairmans Evening.
Three Counties ARC: K.D. Tupman G6WWE (Petersfield 66489). Meets alternate Wednesdays, 8pm in the Railway Hotel, Liphook. Nov 13—Victorian Microwaves by G3SSJ; 27th—Amateur Radio Awards by G3JFF.
Winchester ARC: Robert Stone G4FPC (Winchester 64747). Meets 3rd Saturdays, 7.30pm at the Log Cabin, Stockbridge Road, Winchester.

Hereford & Worcester

Bromsgrove & District ARC: Norman Westwood G4NYH (Bromsgrove 73847). Meets 2nd & 4th (constructional) Fridays, 8pm at the Avoncroft AC, Bromsgrove.
Worcester & District ARC: D.W. Batchelor G4RBD (Worcester 641733). Meets 1st & 3rd Mondays, 8pm at the Oddfellows Hall, New Street, Worcester. Dec 2—Resonance by G3LBS.

Hertfordshire

Verulam ARC: Hilary Claytonsmith G4JKS (St Albans 59318). Meets 2nd & 4th Tuesdays, 7.30pm at the RAFA HQ, New Kent Road, St Albans. Nov 26—Digital Filters by G8FUL.

Welwyn Hatfield ARC: Dave Fairbanks G0AII (Welwyn Garden 326138). Meets 1st & 3rd Mondays, 8pm at the Knightfield Scout HQ, Welwyn Garden City. Nov 18—Project Evening; Dec 2—AGM.

Highland

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

Humberside

Hull & District ARS: Cliff North G4PEP (Hull 77249). Meets Fridays, 8pm at the West Park RC, Walton Street, Hull.

Isle of Man

Isle of Man ARS: Anthea Matthewman GD4GWQ (Douglas 22295). Meets 8pm, Mondays —Howstrake Hotel, Onchan; Tuesdays—Peveril Court Hotel, Ramsey; Thursdays—Tynwald Inn, St Johns; Fridays—Perwick Bay Hotel, Port St Mary.

Kent

Biggin Hill ARC: Bob Senft G0AMP (Farnborough 57848). Meets 3rd Tuesdays, 8.30pm in St Marks Church Hall, Church Road, Biggin Hill. Nov 19—The Work of the RIS.

Darenth Valley RS: Sheila Hillman (Orpington 26951). Meets twice monthly Wednesdays, 8pm in Crockenhill Village Hall, between Orpington and Swanley.

Dartford Heath DF Club: Peter Sharman G8DYF (Greenhithe 844467). Meets pre-hunt Tuesdays, 9pm at the Horse & Groom, Leyton Cross, nr Dartford. Nov 10—DF Hunt.

West Kent ARS: Nigel Peacock G4KIU (Tunbridge Wells 33586). Meets Fridays, 8pm at the AEC Annex, Quarry Road, Tunbridge Wells. Nov 15—Junks Sale; Dec 6—Annual Dinner at the Star & Eagle.

Medway ARTS: Tony Faram, 6 Regent Street, Gillingham, Kent. Meets Fridays, 7.30pm in No. 1 Hall, St Lukes Church, King William Street, Gillingham.

Lancashire

Bury RS: Miss C.J. Ashworth G1PKO (061-764 5018). Meets Tuesdays, 8pm at the Mosses Community Centre, Cecil Street, Bury. Nov 12—RSGB Region 1 rep G3XSN visits the club.

Fylde ARS: Frank Whitehead G4CSA (Lytham St Annes 737680). Meets 1st & 3rd Tuesdays, 7.30pm at the Kite Club, Blackpool Airport. Nov 19—Junk Sale; Dec 3—Construction Competition.

East Lancs ARC: Stuart Westall G6LXU (Great Harwood 887385). Meets 1st and last Tuesdays, 7.30pm at the Conservative Club, Cliff Street, Rishton. Nov 5—Constructors Evening; Dec 3—AGM.

Morecambe Bay ARS: W.E. Delamere G3PER (Heysham 52659). Meets Mondays, 7.30pm in the canteen on Luneside Eng. Co., Mill Lane, Halton. Nov 11—RTTY Mailbox by G1GRP; 25th—RTTY.

Preston ARS: George Earnshaw G3ZXC (Preston 718175). Meets 2nd & 4th Thursdays, 7.45pm at the Lonsdale Club, Fulwood. Nov 21—Motor Sport by G4PLB.

Skelmersdale & District ARC: Gordon Crowhurst G4PZY (Ormskirk 894299). Meets Thursdays, 7.45pm at the Beacon Park Centre, Skelmersdale. Nov 7—Home-brew Exhibition; 21st—Microwaves on the Cheap by G6HXL. Other weeks h.f. and RTTY activity nights.

Skelmersdale Radio, Electronics & Computer Club: Joe Singleton G4WJR, 3 Willow Drive, Skelmersdale. Meets Wednesdays, 8pm at the Royal British Legion, Liverpool Road, Skelmersdale.

Leicestershire

Welland Valley ARS: Judith Bay G6OFZ c/o WVARS, POB 16, Market Harborough. Meets Mondays, 7.15pm at the Welland Bank CC, Market Harborough.

Lincolnshire

Lincoln SW Club: Pam Rose c/o Club Address. Meets 3rd Wednesdays, 8pm at the City Engineers Club, Central Depot, Waterside South, Lincoln. Nov 27—Test Equipment by G3MGX.

London

Acton, Brentford & Chiswick ARC: George Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London W3. Meets 3rd Tuesdays, 7.30pm at the Chiswick Town Hall, High Road, Chiswick, London W4. Nov 19—Members Problems Discussion.

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

Southgate ARC: Bob Snary G4OBE, 12 Borden Avenue, Enfield. Meets 2nd Thursdays, 7.30pm at St Thomas' Church Hall, Prince Georges Avenue, Oakwood, London N14.

Wimbledon & District ARS: George Cripps G3DDW (01-540 2180). Meets 2nd and last Fridays, 8pm at the St John Ambulance HQ, 124 Kingston Road, Wimbledon, London SW19. Nov 8—Junk Sale; 29th—Wire Antennas by G4MVS.

Merseyside

St Helens & District ARC: Alan Riley G6MXT (051-430 9227). Meets Thursdays, 7.30pm at the St Helens ITC, Water Street, St Helens.

Wirral & District ARC: Gerry Scott G8TRY (051-630 1393). Meets 2nd & 4th Wednesdays, 8pm at the Irby Cricket Club, Mill Hill Road, Irby.

Middlesex

Echleford ARS: Peter Coleson G4VAZ (Sunbury 83823). Meets 2nd Monday and last Thursdays, 7.30pm in the Hall, St Martins Court, Kingston Crescent, Ashford. Nov 11—Junk Sale; 28th—Constructional Evening.

Radio Society of Harrow: Dave Atkins G8XBZ (Rickmansworth 779942). Meets Fridays, 8pm at the Harrow Arts Centre, High Road, Harrow Weald. Nov 15—The BBCs World Service by the BBC Engineering Unit; 29th—Junk Sale.

Northumberland

Border ARS: Mrs S.P. Jones G1IUK (Berwick-upon-Tweed 305465). Meets 1st & 3rd Fridays, 8pm at the Tweed View Hotel, Berwick-upon-Tweed.

Nottinghamshire

Mansfield ARS: Angela Fisher G1DZH (Mansfield 652812). Meets 1st Fridays & 3rd Tuesdays at the Victoria Social Club, Princess Street, Mansfield. Nov 19—Junk Sale; Dec 6—Buffet/Disco.

ARC of Nottingham: Ian Miller G4JAE (Nottingham 232604). Meets Thursdays, 7.30pm at Sherwood CC, Mansfield Road, Nottingham.

Oldham ARC: Kath Catlow G4ZEP (061-624 7354). Meets Thursdays, 8.30pm at Moorside CC, Ripponden Road, Oldham. Nov 14—X-Ray Equipment and Techniques by G1GZK.

Worksop ARS: Carole Gee G4ZUN (Worksop 486614). Meets Tuesdays, 7.30pm at the Sub-Aqua Club, The Maltkins, Gateford Road, Worksop. Nov 12—Memories of Amateur Radio by G3AUZ; 26th—Memorial Cup Time.

Oxfordshire

Vale of White Horse ARS: Ian White G3SEK (Abingdon 31559). Meets 1st & 3rd Tuesdays, 7.30pm in the Upstairs Meeting Room, Waterwitch, Cockroft Road, Didcot.

Shropshire

Telford & District ARS: Tom Crosbie G6PZZ (Telford 597506). Meets Wednesdays, 8pm at the Dawley Bank CC, Bank Road, Dawley. Nov 6—Microwaves by G8MWR; 13th—m.w. DXing by G6PZZ; 20th—Sweden by G3IMP; 27th—Project 90, a Top Secret Development by G6XUF.

Somerset

Yeovil ARC: Eric Godfrey G3GC (Yeovil 75533). Meets Thursdays, 7.30pm at the Recreation Centre, Chiltern Grove, Yeovil. Nov 14—Crime Prevention and Security by a police rep; 21st—Secret Listeners video; Dec 5—A Visit to China Video.

Staffordshire

North Staffs ARC: David Morgan (Stoke-on-Trent 332657). Meets Mondays, 8pm at the Harold Clowes CC, Dawlish Drive, Bentilee, S-o-T.

Strathclyde

Ayr AR Group: R. D. Harkness GM3THI (Ayr 42313). Meets alternate Fridays, 7.30pm at the Wellington Leisure Centre, Wellington

Square, Ayr. Nov 1—At Home; 15th—Computers by GM4HCO; 29th—Fables and Fancies by GM4RSJ.

Suffolk

Ipswich RC: Jack Toothill G4IFF (Ipswich 44047). Meets 2nd and last Wednesdays, 8pm in the Rose and Crown, 77 Norwich Road, Ipswich. Nov 13—The RSGB by G4FRX; 20th—Annual Social; 27th—Local Repeater Group.

Surrey

Coulsdon ATS: Alan Bartle (01-684 0610). Meets 2nd Mondays and last Thursdays, 7.45pm in St Swithuns Church Hall, Grovelands Road, Purley. Nov 11—High Voltage Engineering by G6AHR; 30th—The Bazaar; Dec 9—AGM.

Sutton & Cheam RS: Alan Keech G4BOX, 26 St Albans Road, Cheam, Surrey. Meets 3rd Fridays, 7.30pm at the Downs LT Club, Holland Avenue, Cheam. Nov 15—Film by G6MKC.

Sussex

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

Crawley ARC: Dave Hill (Crawley 882641). Meets 2nd and 4th Wednesdays, 8pm at the United Reform Church, Ifield Drive, Ifield. Nov 16—Junk Sale.

Horsham ARC: Peter Head G4LKW (Horsham 64580). Meets 1st Thursdays, 8pm in the Girl Guides HQ, Denne Road, Horsham.

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

Worthing & District ARC: Roy Jones G4SWH, c/o WADARC, POB 599, Worthing. Meets Wednesdays, 7.30pm in Lancing Parish Hall, South Street, Lancing. Nov 6—The West Indies by G3SXE, also—converting CB rigs to 28MHz f.m. by G4XRU.

Warwickshire

Atherstone ARC: Roy Fuller G6YQU (Chapel End 393518). Meets 2nd and 4th Mondays in the Physics Lab, Atherstone Upper School, Long Street.

Rugby ATS: Kevin Marriott G8TWH, 41 Foxon's Barn Road, Brownsover, Rugby. Meets Tuesdays, 7.30pm in the Cricket Pavillion, BTI Radio Station, (B Building Entrance), on the A5. Nov 5—Fireworks and Barbeque.

Stratford-on-Avon & District ARC, David Boocock G8OVC (S-on-A 750584). Meets 2nd and 4th Mondays, 7.30pm in the Baptist Church, Payton Street, S-on-A. Nov 11—Surplus Sale (Venue Unsure); 25th—Home-brew Equipment.

West Midlands

South Birmingham RS: Tim Scrimshaw G8RGQ (021-459 8312). Meets 7.45pm in the West Heath CC, Hampstead House, Fairfax Road, West Heath, Birmingham. Nov 6—AGM.

Coventry ARS: Robin Tew G4JDO (Coventry 73999). Meets Fridays, 8pm in the Baden Powell House, 121 St Nicholas Street, Radford, Coventry. Nov 1—Film Night; 8th—Sausage and Mash Supper.

Mirfield RC: C. Marks G4ZPJ, 63 Alvis Walk, Chelmsley Wood, Birmingham. Meets Wednesdays, 7pm at the Mirfield CC, Yockelton Road, Lea Village, Birmingham.

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

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

Cover Date	Deadline	For events from early
February 86	Nov 15	January 86
March	Dec 15	February
April	Jan 15	March

Wolverhampton ARS: Keith Jenkinson G1OIA (Wolverhampton 24870). Meets Tuesdays, 8pm at Wolverhampton Electricity S & SC, St Marks Road, Chapel Ash, Wolverhampton. Nov 19—Aerial Circus and Secret Listeners Videos; 24th—d.f. Hunt 11am from car park at Tettenhall Rock.

Wiltshire

Blackmore Vale ARS: Bailey G1GRG, 11 Brines Orchard, Templecombe, Somerset. Meets 2nd and 4th Tuesdays in The Bell and Crown Inn, Zeals. Nov 12—Safety in the Shack.

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

Yorkshire

Maltby ARS: Ian Abel G3ZHI (Rotherham 814911). Meets Fridays, 7pm in the Church Building, Church Lane, Maltby. Nov 1—Open Forum; 8th—Smoke Detectors by G4BVV; 15th—Three Mini Lectures; 22nd—Video; 29th—Meteor Scatter by G6OYL.

Spen Valley ARS: Tim Clough G4PHR (Mirfield 499397). Meets Thursdays, 8pm in the Old Bank WMC, Mirfield. Nov 7—Microwave Operation by G4SDX; 21st—Talk by Region Rep G4EJP.

Todmorden & District ARS: J. Gamble G6MDB (Todmorden 2494). Meets 1st and 3rd Mondays, 8pm in the Queen Hotel, Todmorden. Nov 4—Talk by BT Rep.

Wakefield & District RS: Walter Parkin G8PBE (Wakefield 378727). Meets alternate Tuesdays, 8pm in Ossett CC, Prospect Road, Ossett. Nov 12—Home-brew Equipment Display.

White Rose ARS: Steve Clark G4YEK (Harrogate 884481). Meets Wednesdays, 8pm at Moortown RUFC, Moss Valley, King Lane, Leeds. Nov 13—Technical Topics for Beginners by G3TDZ; 27th W5LFL Space Mission Video; Dec 4—Junk Sale.

NEWS

Operation under Supervision . . .

Following our News item on Crossband operation (August, page 18), several ongoing instances of confusion have been brought to our attention. Printed below is the definitive response from Mr. N. Heriz-Smith of the Department of Trade and Industry, Waterloo Bridge House, concerning the use of Morse by Class B licensees.

"There are currently two ways in which a Class B may use Morse, viz by obtaining a letter of variation or by using a Class A's station under supervision.

1. *For a Class B Licensee to use Morse at his/her own station.* He/she must first obtain a variation of his/her licence by applying to the Radio Society of Great Britain (RSGB) who administer these variations on our behalf. In these circumstances the Class B licensee is able to use Morse without supervision but is restricted to those frequencies above 144MHz for which he/she is licensed. Further restrictions include the need for the licensee to identify his/her callsign in telephony at the beginning, end and at regular intervals during any contact. He/she may not operate at any other location under the terms of this notice of variation, ie, unsupervised.

2. *For a Class B Licensee to use Morse at the Station of a Class A Licensee* and in the frequency bands usually reserved for Class A licensees (which, of course, also include those above 144MHz) the class B licensee must be under the direct supervision of the Class A licensee and use that station's callsign.

I think you will see that it is clear from the above that a Class B licensee's notice of variation applies solely to his/her use of Morse at his/her own station, and within existing regulations as to frequencies and, you will note, callsign identification through telephony. This does not, of course, exclude the Class B licensee from also using Morse under the direct supervision of a Class A licensee at the Class A licensee's own station and using the Class A licensee's callsign, under the terms of the Class A licence as has always been the case. The experiment enabling Class B licensees to use Morse from their own station on Class B frequencies would not be expected to alter in any way the conditions of use of a Class A station".

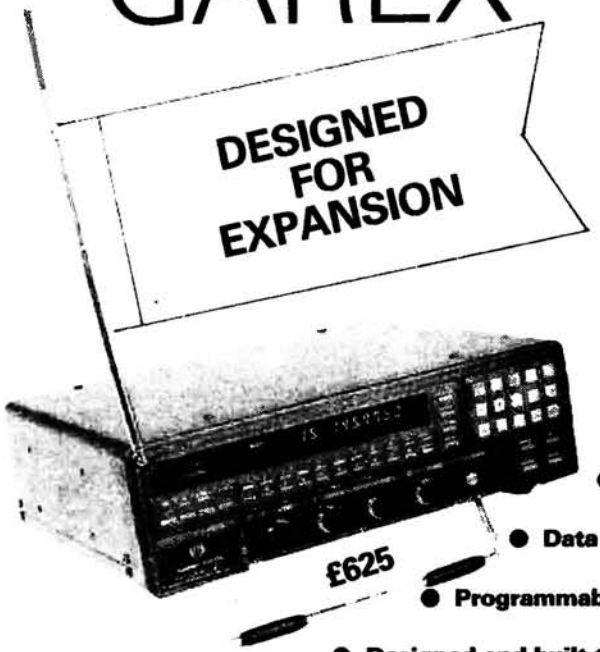
Readers requiring further information on amateur licensing can contact the RRD on their general enquiry line. Tel: 01-275 3316.

Equipment Sale

Several items of radio equipment belonging to the late Charles Molloy are to be sold and include the following: Siemens h.f. RX, 255–525kHz and 1·5–30MHz. Type 1017, 15kHz–1·6MHz. BC314D. Echophone EC1B. Hallicrafters S27. Realistic DX150A. Eddystone EB36. Realistic DX160. GEC BRT400, 150kHz–30MHz. AVO oscillator (all wave). Digitec d.c. voltmeter. Honest FC5M frequency meter. SEM audio multi-filter.

Interested parties should make offers to: ***Ted Davies, G4OOT, 12 Norbury Close, Crossens, Southport, Lancs. Tel: (0704) 24454.***

GAREX THE SCANNER SPECIALISTS



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* 25-550MHz and 800-1,300MHz
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The Versatile Scanner

* 60-180MHz (no gaps) and 380-520MHz
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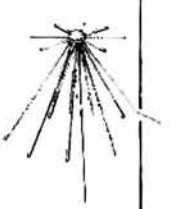
We have in stock a large range of secondhand scanners that have been checked by us and they all have a three month warranty. It is impossible to list them all here as the stock situation is constantly changing so please write or 'phone for the latest details.

SCANNER HIRE
We are now able to offer a scanner hire service to professional users, please write for further details.

DON'T FORGET THE ANTENNA!

All receivers need a good antenna and the ideal one for a scanner is the REVCONE, a 16 element discone. Made in Britain by Revco, a company that has been manufacturing quality antennas for the last 25 years, the REVCONE covers 50-500MHz, is extremely well made and very good value at just **£27.45**



PRE-AMPLIFIERS
As broadband antennas normally have little or no gain, it is often desirable to boost the signal. A pre-amplifier mounted at the masthead is the best solution because it not only amplifies the weak signals that may have been lost in the feeder cable, but it also does not amplify the noise generated in the cable.
The Revco PA2 in-line pre-amplifier covers 20 to 700MHz with a gain of approximately 18dB yet costs just **£49.95**
We also stock the Mutek BBBA500u broadband pre-amp which is very well made and is intended for use at the receiver's input. Power requirement is 12V d.c. at a few mA **£32.00**

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ON THE AIR

AMATEUR BANDS

by Eric Dowdeswell G4AR

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

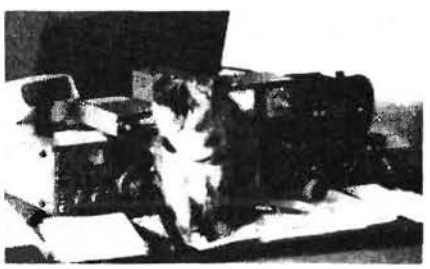
There must be a number of readers who use the 14·1MHz beacon system to evaluate propagation conditions. The scheme is run by the Northern California DX Foundation and the latest beacon to join in is LU4AA which will key for one minute every 10 minutes in the 0008 time slot, following ZS6DN/B. This is the first such S. American beacon and it will be joined soon by HK4LR/B in Medellin. It will key in the time interval 0009, after LU4AA.

The order of keying on 14·1MHz is 4U1UN/B, W6WX/B, KH6O/B, JA2IGY/B, 4X6TU/B, OH2B, CT3B, ZS6DN/B, the new LU4AA and HK4LR/B. Each beacon transmits the same one minute c.w. message consisting of four nine-second dashes at power levels decreasing from 100W to 100mW.

DX Bands

Andy Durrant (Aldershot, Hants) has been very busy on the h.f. bands with his FRG-8800, FRT-7700 a.t.u. and an inverted-V designed for 7MHz. Catches around 3·8MHz included HK5ISX, ZS5ABY, NP4P (Navassa Is), 4X4JO and YB0JH. On to 7MHz and a good log, in spite of QRM from BC stations, with TZ6WC (QSL DL4BC), TR8IG (QSL N6CW), YA3ACA for a rare one, CN2AQ, 9Y4BA, LU8DJV, PT2MOM, and 4X6KF—all around midnight. The 14MHz band came up with PY2ZJ, TR8IC, TZ6FE, YB3ADL, A71AD, A92EM, AP2MQ, C55DL, EA8BS, EA9QV, FM4DR, FY5YE, J73CB, J88BK and KH6WU, 5B4NC/P, 5Z4DU (QSL K1RX), 7X2LS, 8P6BX and 901JW, said to be in Zaire.

Mike Willgoss G4XRR in Weymouth, Dorset, braved the noise on 7MHz to work 7X2LS, 9H1EU, CN2AQ with ZL4IG and ZL4BC as "gotaways", with his 400W rig and G5RV antenna up about 15m. On a patchy 28MHz band he worked PY5NW, IS0XRI, CT1KN, YV5JEM, LU1DJU, and some PYs. The antenna on 28MHz is a two-element quad. Mike is looking forward to the release of the 50MHz band, using an FTV-901 transverter.



The set-up at G4AR with 2nd op Sheba in attendance! Left is the TS-530S for the h.f. bands surmounted by a Datong speech processor and c.w. filter unit; centre downwards is an s.w.r./power meter, FT-790R for 430MHz and FT-480R for 144MHz; to the right downwards are a 50W 430MHz linear, 100W 144MHz linear and Heathkit electronic keyer; extreme right is the antenna rotator for the 144 and 430MHz band beam antennas—a 9-el Tonna and 18-el Jaybeam respectively

Tom Blamey (Tonyrefail, Mid-Glam) has started an RAE course and will not be able to listen very much in coming months. He runs an Icom IC-720A and Daiwa CNA1001 a.t.u. and found VP8QP and 3X0HAB (QSL DL8CM) on 21MHz. Down to 14MHz and C53EK, KA4JRY/TT8, W4HHB/5N3 (QSL KI4JG), XJ3FGL (Canada), ZC4MR, 5Z4DJ (QSL G4NJP), 6W1NQ (QSL DL1HH) and 9X5BJ. Best wishes with the RAE, OM.

Phil Dykes G4XYX of Poole, Dorset, continues with his QRP work and did well with between 1W and 3W output on 7MHz c.w. and a "low" dipole antenna, working among others, DL3LBP, EA1DKB, HB9DCW, I2SPU, LA3FEA, OE7YQW, OZ4JU, SM3ACV, SP3FDD, UA3LEV, UA9MEA, UP1BZO and YU2CHI. Phil wonders what the /X after several YU calls signifies.

Robert Parsey BRS85875 (New Malden, Sy) has an FRG-7700 and a.t.u. fed from a 60m-long antenna and caught CP1MW, KP2AD and ZL3ACH along with many other ZLs around 0545-0630Z on 3·5MHz. Up to 21MHz and C53EK (QSL POB2596, Banjul), JY5ZM (QSL WA3HUP), VQ9YR (QSL KA4SPA), XT2BR (QSL POB116, Ouagadougou) and 3X0HAB (QSL DL8CM).

Melvyn Dunn BRS86500 lives in Grimsby with his FRG-7700 and 40m-long antenna and logged CN2AQ (QSL POB 40, Tangier) on 3·8MHz. On 7MHz it was JA2BAY, VU2DVP, 4X6LD and RB1IRO. Logged on 14MHz were P29FG, 5V7RW (QSL WB4LFH), TZ6FE (QSL DL4BC), FM4DR (QSL F6FNU), HI8LAR (QSL POB404, Santo Domingo), 6Y5NR, TU4RK, TI2IY (QSL POB329, Costa Rica 2070), and PJ8DFS.

Dick Stanbridge BRS31879 (Leiston, Suffolk) has a Trio R-2000 and AT-1000 a.t.u., a half-size G5RV and a Datong active antenna. Starting on 1·8MHz the log shows EA3VY, UA9OCR, UB5NQ and a rare one in W7AWA/OY. On to 3·5MHz and CP8IH, KP4AAQ, LU4LAV, PT7CB, ZL2BT, 6Y5NR and 9Y4KB, with just OA4BJU and 3X0HAB on 7MHz.

Graham Powell (Pontypridd, Mid Glam) owns a Trio R-2000 plus KX3 a.t.u and used a 20m-long wire antenna, to log C53EW and 4X6IF/P on 21MHz, KP2AH and TI2CC on 14MHz and HK1CX and VO1CM on 7MHz.

Michael Sargeant (Bolton, Lancs) has a Panasonic DR49 receiver with a low level wire antenna 20m-long and sticks to 14MHz. He logged A22BW in Botswana, J5WAU, VE8RCS, VQ9RM on Diego Garcia, YB4FW, ZP5ASD, ZS6CDJ, 5Z4MR, 6O2LT, 6W1CK, 9M2EE and 9V1WF.

In contrast **David Palmer** stuck to 7MHz in his new QTH in Bury St Edmunds, Suffolk, and he has some new gear too, a Trio R-1000 plus a.t.u. and a 20m-long antenna fed at the centre with open wire feeder, 7m a.g.l., an ideal antenna for any of the h.f. bands. He collected CN2AQ, FM5WE, HK1HHX, TR8DH, TU2MA, VU2DVP, YB4FW and 3D6BQ. David is hard at it learning the Morse code and hopefully it won't be too long before he sends in some c.w. logs, which are most welcome from any readers.

David Richardson G1OEN of Peterborough has spent some time on the 144MHz band but did not neglect h.f. entirely. With his FRG-7 and "short piece of wire hanging round the ceiling" he logged OD5NJ, I2DMK/ID9, OH0MA on Market Reef, TK5UC and YB4FW on 14MHz. It was just C31LBL (QSL EA3DDP) on 28MHz.

John Kojan writing from St Cyprien in France has not had much time for listening to his FRG-7700 and a.t.u. plus 12m-long loft wire but did manage HC8E on the Galapagos Islands, 5Z4MR and VP2EZ, all around 2200Z, on 14MHz.

Logs of DX heard on the h.f. bands are most welcome and should reach me by the 15th of the month. A sample log sheet is available from me in return for an s.a.e.

VHF Forum

The middle weeks of September provided extensive tropo openings throughout Europe with many ducted QSOs taking place on the 144, 430 and 1296MHz bands.

On 27 August LX1BK/A and EA1KC were being worked by a few G stations although I could not hear them myself, both on c.w. ON6CK/LX came up briefly on 30 August on s.s.b. again working Gs. In the 144MHz contest on 7/8 September GJ4ICD was very busy and when I worked him (serial number 1004) he said that he was being sponsored to the tune of £2 per QSO—all in aid of a local boys home. I gathered that in future GJ4ICD will only be operational on 430 and 1296MHz.

While agreeing with my previous comments on the importance of height on v.h.f. a letter from **John Wollaston G6JOE** (Southport, Merseyside) points out that his QTH is only 3m a.s.l. with a 9-element Tonna at 12m a.g.l. He runs an FT-726R with a 100W BNOS linear and in the 7/8 September contest he worked, among others, F6ZYT/P, GI4VIP/P, GM4RAH/P, GD4IOM/P, GW3YZD/P, and EA1RCA/P, all in the space of 33 minutes. Later John also worked GJ4ICD and PI4VLI/P. Many HB9 portable stations were worked at good strength in the UK.

The news of the release of a permanent band allocation at 50MHz will be welcomed by most amateurs but I'm wondering if it will be hedged around with irksome limitations such as power output levels and times of operation. I think the comparatively low activity on the WARC 10MHz band is due to the restrictions placed upon it. Some DX

including the US and Canada has already been worked on the current 50MHz band and sporadic-E propagation is said to be better when sunspot activity is low—it could hardly be lower than it is at present. Multi-hop sporadic-E is another phenomenon on 50MHz which should give rise to some excellent DX.

DX by means of meteor scatter will also come into its own on 50MHz and since it does not depend upon solar activity or magnetic disturbances it should prove an interesting mode. However ms activity tends to rise to a maximum at around 0600 local time with a minimum about 1800 local whilst the earth is turning into any meteor showers and out of them in the evening. There are millions of bits of meteoric rubbish coming into the earth's atmosphere every day so it is not necessary to rely upon the periodic meteor showers for communication over long distances. The recently installed GM beacon GB3RMK on 50·060MHz is being regularly heard in southern UK by this mode with "bursts" ranging from single c.w. characters up to complete callsigns.

RTTY

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

by Ron Ham BRS15744

During the 30-day period prior to September 10, **Norman Jennings**, Rye, copied RTTY signals from 3 countries on 3·5MHz, 5 on 7MHz, 33 on 14MHz, 10 on 21MHz and 3 on 28MHz, including Europe, Japan, Scandinavia, South Africa, South America and the USSR. "The QSO between YB2BLI and UZ2FWA at 1530 on September 6, on 14MHz, came through perfectly, just out of the blue," writes Norman. He was also pleased to log VE7DQA in British Columbia on September 4 and "good old VU2VIM", on the 8th. "RTTY observations during this period have been very rewarding, with good copy from several more exotic locations in addition to the usual west European prefixes," writes **Len Fennelow G4ODH**, Wisbech, after logging stations in Greenland and Indonesia in the RTTY and AMTOR modes, respectively. In addition to the 28 countries he logged on RTTY between August 12 and September 11, Len copied AMTOR signals from G, DL, PA and SM on 3·5MHz, DL on 7MHz and EA8, G, F, DL, PA, I, W, YB5 and 9K2 on 14MHz.

Among the interesting stations that I received during the period were the IT9DLN Mailbox on 14·080MHz at 0902 and VU2VIM working a DJ at 1843 on August 24, OE3HGB/YK in the Golan Heights in QSO with OE2SNL at 0805, LA3WA, Harstad, 250km north of the Arctic circle at 1945 and PZ5ES from Surinam at 1958 on the 25th. At 0845 on September 1, I copied a colossal signal from VE8RCS in Alert, working into Germany. This station is located some 450 nautical miles from the North Pole and we published his QSL card in our August issue (page 59, Fig. 1).

During a sporadic-E opening at 2038 on August 17 I received RTTY signals from both HB9GS and HB9ORV in QSO on the 28MHz band and soon after, signals from stations in Belgium and France appeared on 21MHz. "It takes us 30 days to operate 70 countries on RTTY. But we are a single RTTY licence station in UA2 area," said UZ2FWA to a JA at 0942 on September 9, on 14MHz. This particular Russian station was very strong with me and he made some interesting QSOs.

Our monthly list of RTTY countries received, Fig. 1, was compiled from the logs of **Dave Coggins**, Knutsford, Len Fennelow, Norman Jennings and my own log and it is good to see a total of 53 countries on the list, covering 5 of the world's continents. There must have been a good path to South America on 14MHz, because on several occasions signals from Brazil, Chile, Maranhao, Surinam and Venezuela were copied In these days of computer software and dedicated boxes designed to work in conjunction with a good quality communications receiver RTTY is now a relatively simple matter and can provide both the licensed amateur and s.w.l. with another most interesting aspect to amateur radio, especially around 14·090MHz, where most of the DX comes up. Although the majority of amateur RTTY transmissions are sent at 45 baud, don't give up if you find a print that you cannot resolve, try switching the speed on your terminal unit, it may well have been sent at 50 baud, or faster, or in the reverse mode. A last-minute letter from Peter Lincoln, Aldershot, dated September 15, reads: "Have just copied SW2NU on 14·086MHz, 0950GMT, calling CQ. This is a special callsign for 2300 years of Thessaloniki."

Readers wishing to join the British Amateur Radio Teleprinter Group (BARTG) and get the latest gen from their quarterly magazine, *DATACOM*, should write to Pat and John Beedie GW6MOJ/GW6MOK, Ffynnonlas, Salem, Llandeilo, Dyfed, Wales.

Country (Prefix)	Band (MHz) 3·5	7	14	21	28
Austria (OE)		X	X		
Balearic Is (EA6)			X		
Belgium (ON)	X	X	X	X	
Brazil (PY2)			X		
Br. Columbia (VE7)			X		
Bulgaria (LZ)				X	
Canada (VE)			X		
Canary Is (EA8)			X	X	
Ceuta & Melilla (EA9)			X		
Channel Is (GJ,GU)	X				
Chile (CE)			X	X	
Cyprus (5B4)			X		
Czechoslovakia (OK)			X		
Denmark (OZ)	X		X		
England (G)	X	X	X		
Finland (OH)			X		
France (F)		X	X	X	
Germany (DF,DJ,DK,DL,DM)	X	X	X	X	X
Greece (SV)			X		
Greenland (OX)			X		
Holland (PA)	X	X	X		
Hungary (HA)			X	X	X
India (VU)			X		
Indonesia (YB)			X		
N. Ireland (GI)			X		
Israel (4X4, 4Z4)			X		
Italy (I)		X	X		
Ivory Coast (TU)			X		
Japan (JA,KA)			X		
Kuwait (9K)			X		
Malta (9H)			X		
Maranhao (PR8)			X		
Nigeria (5N)			X	X	
Norway (LA)			X		
Oman (A4)			X		
Poland (SP)			X	X	
Portugal (CT1)			X		
Rumania (YO)			X		
Sardinia (IS0)			X		
Scotland (GM)	X	X	X		
Sicily (IT9)			X		
Singapore (9V)			X		
South Africa (ZS6)			X		
Spain (EA)		X	X	X	
Surinam (PZ)			X	X	
Sweden (SM)	X		X	X	X
Switzerland (HB9)		X	X	X	X
Syria (YK)			X		
USA (K,N,W)			X		
USSR, (UA,UB,UK,UT,UZ)		X	X	X	
Venezuela (YV)			X		
Wales (GW)	X				
Yugoslavia (YU)			X		

Fig. 1 ▶

SPACE & SATELLITES

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

by Pat Gowen G3IOR

Skilful manipulation of OSCAR-10 has permitted it to survive the eclipse period, which peaked to 1 hour 47 minutes on 21 and 22 August. The battery temperature reached a minimum of −20°C on these dates thirty minutes after the eclipse, but it did not freeze. Frequent and numerous changes have been made to the transponder schedule to conserve power and permit magnotorquer orientation optimisation of both sun-angle and black body warming. Antenna earth pointing has been the least concern, but soon that too should start to improve. The schedule proposed from 15 October onward is to have the transponder on Mode "B" from Mean Anomaly 40 to 119 inclusive, on Mode "L" from 120 to 136; "B" again from 137 to 220, and only the beacon on from MA221, through Perigee (MA256 or 0) to MA39.

Computer Programs

A number of readers have enquired of a source for the GM4IHJ Spectrum 48K (or Spectrum Plus) satellite tracking programs that we have been referring to in these pages. Paul Newman, G4INP, offers these to both members and non-members of SARUG, the Sinclair Amateur Radio Users Group. A self-addressed stamped envelope to 3, Red House Lane, Leiston, Suffolk, IP16 4JZ, UK with your request will result in a list of the main ones available, with their nominal cost. Any proceeds above the costs of tapes, photocopies, postage and packing will be made available to provide programs to those who cannot obtain Western currency so that they may have availability also.

Satellite	OSCAR 9	OSCAR 10	OSCAR 11	RS 5	RS 7	RS 8
Epoch Time	85246·93745735	85247·19525784	85232·59699710	85243·56076621	85243·47009352	85247·09340232
Inclination	97·6360°	26·2970°	98·1882°	82·9574°	82·9546°	82·9555°
RAAN	236·4520	121·2022°	298·1117°	263·9791°	258·7687°	264·9463°
Eccentricity	0·0002795	0·5968260	0·0014571	0·0007805	0·0021565	0·0019573
Arg of Perigee	21·9374°	42·2090°	28·7100°	274·4090°	197·6318°	329·0407°
Mean Anomaly	338·1993°	350·9733°	331·4918°	85·6075°	162·4260°	30·9495°
Mean Motion (r.p.d.)	15·27554250	2·05856520	14·61986136	12·05054235	12·08694994	12·02954566
Decay Rate (r/d²)	$1{\cdot}57e^{-05}$	$-2{\cdot}3e^{-07}$	$6{\cdot}6e^{-07}$	$3e^{-08}$	$3e^{-08}$	$4e^{-08}$
Epoch Rev	21725	1676	7844	16298	16346	16312
SMA (km)	6858·228	26105·421	7061·983	8033·836	8017·685	8043·188
Anom Period (min)	94·268338	699·516343	98·496146	119·496696	119·136756	119·705269
Apogee (km)	484·932	35309·565	698·963	1682·901	1658·763	1686·360
Perigee (km)	481·098	4148·777	678·383	1670·360	1624·182	1654·874
Beacon (MHz)	145·825	145·810	145·826	29·451	29·501	29·502

Satellite	NOAA–8	NOAA–9
Epoch Time	85243·34391232	85237·34328795
Inclination	98·6631°	98·9519°
RAAN	263·0079°	190·9484°
Eccentricity	0·0015555	0·0014654
Arg of Perigee	251·9296°	268·2094°
Mean Anomaly	108·0191°	91·7391°
Mean Motion (r.p.d.)	14·22467685	14·11379087
Decay Rate (r/d²)	$3{\cdot}5e^{-07}$	$1.99e^{-06}$
Epoch Rev	12448	3609
SMA (km)	7192·309	7229·975
Anom Period (min)	101·232528	102·027869
Apogee (km)	844·241	883·272
Perigee (km)	821·866	862·082
Beacon (MHz)	137·5MHz	137·5MHz

Table 1

Dr Martin Sweeting G3YJO and XYL Christine G6APF fitting the solar array panels to UOSAT-OSCAR-11 for the last time, just prior to mating UO-11 to the Delta launch vehicle for lift-off

To update your computers, Table 1 shows the latest sets of Keplerian elements, including the Weathersats, courtesy NASA and AMSAT.

Phase IIIC DX

The DX capability of a satellite link depends upon the limits of stations with mutual satellite visibility, i.e. the satellite itself should "see" both areas simultaneously to permit line of sight access to both ends of the link. The Phase III satellites are designed for placing so that the apogee of 36 000km stays at an inclination of 57 degrees, but, Phase IIIA did not get into orbit, and Phase IIIB (now OSCAR-10) fell far short of the intended inclination, and is now at apogee in the Southern Hemisphere.

Phase IIIC should achieve the intended orbit, and will maintain its apogee at 57 degree North inclination as our earth rotates beneath the eleven hour ellipse, giving a very different perspective of view than our current OSCAR-10. Hanspeter Kuhlen, DK1YQ, of AMSAT-DL, has produced a series of views of earth as will be "seen" by Phase IIIC, which permit a comprehensive realisation of the mutual communications possible.

In Fig. 1, the satellite is at apogee over the Hebrides, 57N and 8W, virtually overhead for most of the UK, when North and South America, Europe, Africa and Asia are all in range simultaneously. The satellite is over Labrador, 57N, 60W, in Fig. 2 whilst Fig. 3 places it over Siberia at 57N, 280W (80E) when North West Australasia comes into the picture. The UK will be able to access Phase IIIC at all apogees, even when the satellite is opposite us at 180 degrees West longitude.

Monitoring Weathersats

Following last months listing of some of the frequencies on which satellites could be monitored, and stimulated by Terry Weatherley's series on Weather Satellites, here is a list of all the satellites known between 136 and 138MHz, supplied by Greg Roberts, ZS1BI, of the Capetown Observatory. Those who do not possess wide coverage v.h.f. receivers but use a 144 to 28MHz converter or transverter will find that by tuning to the appropriate 21MHz i.f. frequency (e.g. for NOAA-7 on 137·770MHz tune 21·770MHz) an adequate signal can often be heard. If the i.f. output is tuned to 21MHz and the front-end peaked at 137MHz, signals are extremely strong. A 144MHz Yagi will track the orbiters well with a surprisingly good performance, although 7MHz off the design frequency.

Not quite a Million?

First reports on the findings of the probe that plunged into the tail of Comet Giacobini Zimmer indicate that the tail is mainly composed of gas rather than the dust that would have produced such a splendid meteor display as earth went through the track on 9 October. As this column is being written in mid-September, only you observers will know the outcome.

The European Space Agency probe *Giotto* (named after Florentine painter Giotto di Bondene who saw Halley's Comet in 1301 and included it as the star of Bethlehem in his work on the birth of Jesus Christ) was launched from Kourou on 2 July. It is planned to approach within 500km of the nucleus of Halley's Comet on 13 March, 1986, but the spacecraft may well be destroyed by the dust surrounding the cometary head. The £80 million satellite will carry ten separate packages to study the interaction of the solar wind and the comet's atmosphere. Colour photographs will be taken of the meeting, sensors will try to capture dust (some finer than smoke) and attempts will be made to analyse the elements, molecules and isotopes that make up the nucleus and atmosphere structure.

NASA, due to Federal budget cuts on scientific research, have regrettably had to cancel their proposed probe, but some 200 scientists from 87 Institutions of all ESA nations will be taking part.

Anti-Satellite Tests

No, for a change, we are not referring to those who run excess power to the satellites, but to the recent American military A-SAT tests claimed by the media to have commenced in February.

Fig. 1: Phase IIIc apogee at 57°N, 8°W over the Outer Hebrides

Fig. 2: Apogee over Labrador at 57°N, 60°W

Fig. 3: Apogee at 57°N, 280°W (80°E) over Siberia

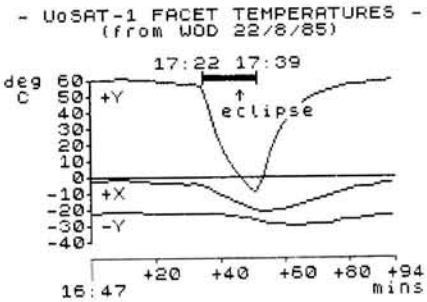


Fig. 4: UOSAT-1 facet temperature (from WOD 22/8/85)

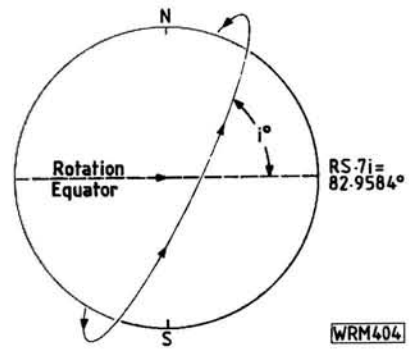


Fig. 5: Orbit of RS satellite around the earth showing "i", the angle of inclination to the equator. The time taken for a complete orbital revolution is called the period, and the point and time when the satellite crosses the equator on the ascending node (north going) is called the EQX, given in time UTC (GMT) and degrees west of the Greenwich Meridian

Satellite Name & No.	Inclination in Degrees	Period in Minutes	Perigee (km)	Apogee (km)	Frequency (MHz)
EGRS 1	69·9	103·3	906	924	136·800
Transit	89·8	106·2	1017	1081	136·650
Tiros 10	98·5	100·3	730	817	136·230
EGRS 7	89·8	167·5	3673	3697	136·800
ERS 15	89·8	167·6	3681	3699	136·440
ERS 20	32·8	2829·6	8604	111229	136·260
Isis 1	88·4	127·9	574	3490	136·410
EGRS 13	99·7	107·2	1068	1127	136·800
OV5-3 (ERS26)	32·9	3115·2	16923	111636	136·380
Timation 2	70·0	103·3	899	925	137·380
S69-4?	70.0	103·3	902	929	137·410
Nimbus 4	99·5	107·1	1086	1098	136·500
Isis 2	88·2	113·5	1355	1422	136·410
Shinsei	32·1	113·1	873	1868	136·694
Exp 45	3·6	323·7	301	18176	136·830
US DoD	70·0	104·8	938	960	137·080
Geos 3	115·0	101·7	826	935	136·320
Ariabat	50·7	95·2	516	543	137·440
Sret 2	62·8	737·8	513	40825	137·530
Synphonie B	4·8	1435·2	35731	35846	136·800
Sirio 1	0·8	1436·2	35795	35783	136·140
Meteosat 1	3·5	1436·1	35731	35843	137·080
Jiki'ken	31·2	429·7	236	24731	136·695
Corsa B	29·9	92·5	391	401	136·725
Bhaskara	50·7	93·3	431	441	137·230
NOAA 6	98·6	101·0	797	815	136·770
Kiku 3	28·2	563·7	322	32128	136·112
Astro 1	31·3	96·1	546	598	136·725
Meteosat 2	0·0	1436·2	35787	35792	137·080
NOAA 7	99·0	101·9	836	856	137·770
Bhaskara 2	50·6	94·9	502	524	137·260
Marecs A	0·6	1436·1	35772	35805	137·170
Meteor 2-8	82·5	104·0	936	958	137·850
NOAA 8	98·7	101·2	802	826	136·770
Rohini 3	46·6	95·5	388	829	137·400
Meteor 2-10	81·2	101·2	749	885	137·400
Meteor 2-11	82·5	104·1	945	962	137·300
ECS-2	geostationary orbit				137·140

In fact, the very first test was conducted in October 1970, fifteen years ago! The upper stages of the rockets that flew NOAA-3/4/5 and OSCAR-8 have all been "zapped" and the final stages of those that carried UOSAT-1, UOSAT-2 and the IRAS satellites are now lined up as future targets.

Space Station Blues

Although the NASA Space station is some years away from construction, design and planning are already firming up. The orbit proposed is a 500km, 28·6 degree inclination, dictated by economics. It is the easiest groove for big payloads launched from Florida into earth orbit, and a compromise to allow good gravity gradient stabilisation for zero energy costs. This is not good news for the UK, as the footprint has only 22 degrees radius. The result of a 28·6 degrees inclination plus 22 degrees radius equals 50·6 degrees North or South maximum limit, so it will be a horizon scraper for the Channel Isles and SW UK only—the rest of us will not see it, nor have it above our radio-horizon.

Your Experiment Please

The National Space Institute is offering a prize for the best essay of up to 750 words on a project based on a space experiment. Send your detailed and realistic experiment explanation to Space-up 85, *National Space Institute, West No. 203, 600 Maryland Avenue SW, Washington DC, 20024, USA* to reach them by 15 November 1985.

Spaceline

British Telecom are running a three minute topical recording on space happenings, but consisting of mainly non-amateur activity so far. Dial 01-246 8055 for your update.

UOSAT Eclipse

Harold Meerza has been closely following the behaviour of both UOSAT OSCAR-9 and 11 and has discovered that whilst OSCAR-9 had eclipses every orbit throughout 1984 and 1985, early September saw it in continuously illuminated orbits for the first time. He has been studying the WOD (Whole Orbit Data) that is collected and stored by UOSAT-1 throughout an orbit and then downlink dumped when required. The results of the +X, +Y and –Y facet temperatures, over a whole orbit from 1647 UTC on 22 August, are shown in Fig. 4. The notable drop in the +Y solar panel temperature from 60°C to almost –10°C when eclipse commenced is clearly demonstrated. It appears that OSCAR-9 is in a "flat-spin" with only the +Y panel getting most of the Sun, the +X rather less. Despite this, the signal from the 145·825MHz beacon seems as strong and as steady as ever!

Harold points out that (according to the *IERE Journal* of Aug/Sept 1982, page 425) the current temperature, which actually reached 63°C at the end of August, is

well above the 50°C limit for the measuring thermistor, so some non-linearity may be present.

Radio Sputniks

Leonid Labutin regularly reports via both the 14·280MHz, 1000UTC, Saturday European AMSAT Net and the following SPUTNIK net, the latest situation on the RS Satellites, both present and future.

RS-5: is suffering from a weak battery condition, but has nevertheless held up well during the September period of continuous sunlight. The codestore memory loading and its re-transmission have consequently been giving a few problems, but both functions appear to work well in non-eclipse periods. The ROBOT facility has been in use on many weekend mornings and all appears to be functioning well on this mode, with many stations making QSOs despite the problems caused by those who block the uplink by persistently using 145·825MHz for f.m. simplex contacts. The transponder has been on for most of the time except Wednesdays, and all is well here.

RS-7: has a better battery, and has been on as a transponder continuously (other than the Wednesday off-day) except for use in the ROBOT mode most Saturdays and Sundays.

RS-8: still has its battery in excellent condition, but again the command decoder has shifted, and despite almost continuous effort by RS3A to command any of the various modes on, has refused to accept the instructions. Nothing has been heard from RS-8 since the beginning of August. It is generally believed that the cause may be the degradation of the depletion layers of the solid state components of the command decoding circuitry by the harsh radiation (some 1 000 000 000 rads per year) that it receives in its orbit through the lower Van-Allen belt. Although the outlook for RS-8 looks rather bleak at this time, efforts to command will continue.

RS-9: due to a few minor problems, is a little behind schedule, and work is still proceeding on trying to complete the satellite for the proposed joint launch. If it cannot be finalised and fully tested before the launch date, then it may have to fly alone on a later schedule.

RS-10: is finished and fully tested, and works perfectly, with the final launch integration procedure now underway. The latest information on the launch date indicates that the beginning of 1986 now the most likely time, with mid-January a good possibility. Your scribe seized the opportunity to make some RS QSOs before the eclipse started again on 1 October. The log shows contacts with HG5CQ, UW3AQ, SP9DH, OK3AU, UA6BEC, UL7DD, G3CAG, RW3AA, HG7KPL, EB8QC, UA0OB, YO9CN, YU5CEF, UL8CWN, RB5QU, TF3XUU/8, UV9FB, RB5IRF, UA2FL, SM5DDL, UA9FWB, F9EA, UL7CBP, HG5AM, UA1AWT and quite a few more W's and general Europeans.

Bill Kelly has been ardently listening as usual, and has heard many of the previous, additionally listing UA3ZDI, OE1RMR, F9IIO, SP3DR, GU4RAF, GU5FOR, UW3CX, 15YT, FB8SA, G3CGF, UA4CBR, YU1AFL, DJ8TJ, GM5OR, DJ8NY, LZ1NA, FE6GOY, SM7BYU, OE1LM, and UA0BW. Bill is delighted with the capability of his new Icom ICR71E, and finds both the quietness and the improved selectivity (down to 10kHz) invaluable.

Getting Started on Satellites

The following notes are the first part of a series for the strict beginner.

Each satellite has a given "period". This is the time, in minutes and decimal minutes that it takes for a satellite to perform a complete orbit around the earth—from crossing the terrestrial equator Northbound, over the point closest to the North Pole, then Southbound via the opposite equator to the point nearest the South Pole and Northbound again back to the equator.

Each satellite also has an "inclination", which is the angle, in degrees, of the path of the orbit to the earth's equator, Fig. 5. The RS and UOSAT Satellites all have a reasonably circular orbit, in other words their height above earth is fairly constant, but they have an "apogee", which is the highest point in km above earth and a "perigee", the point closest to earth.

With a circular orbit, the speed of the satellite is fairly constant, thus it overflies an equal distance over earth in a given time, regardless of where it takes place. This is dictated by the gravitational pull of earth being balanced by the outward centripetal force due to the forward motion imparted at launch. A slight drag brought about mainly by the friction of earth's outer atmosphere, increasing markedly closer to the earth, will gradually cause the satellite to drop into a lower, hence more frictional orbit. As the circumference of the orbit decreases, the satellite period will also decrease, causing a decay which will eventually bring the satellite into the denser atmosphere closer to earth and cause the satellite to burn up like an incoming meteor. This effect is quite noticeable on the UOSAT pair OSCAR-9 and 11 at around 500km up, very marked on the ISKRA series at 350km, but negligible on the RS series at the 1600km mark.

The satellite orbit can be visualised as a fixed path in space with the earth at the centre rotating once every 24 hours. Thus, the surface of earth is changing under the satellite orbit by some 360 degrees every 24 hours, or turning at 15 degrees every hour. The RS series have a period of approximately two hours, thus, in the two hours that it takes the satellite to orbit the earth, the earth will have revolved beneath the path by two twenty-fourths of 360 degrees, in other words, 30 degrees further East. If the first pass of the satellite came over the equator at 0 degrees longitude, the second would be at 30 degrees West, the next at 60 degrees West and so on. Each "EQX" (equator crossing) would take the satellite further West by the "increment", e.g. the longitude increase in degrees and decimal degrees. You would expect, with 15 degrees earth rotation per 60 minutes, that the increment would be exactly one quarter of the period, but this is not so!

If we take the exact RS-7 period of 119·19617096 minutes and divide it into the increment of 29·92588942 degrees, we get 0·2510641—not 0·25 exactly. This is because the earth does not revolve 365 times in a non-leap year. If the earth did not rotate we would still see one dawn, a mid-day, a sunset and in fact one day per year, as the earth goes round the sun once every year and this would appear that we had turned once on our axis. Thus, "solar" time and "sidereal" time differ, and account for our anomaly.

More on this topic in part 2, but for now enough to say that each successive Northbound pass of the satellite will take it roughly further to your West by a degree increment approximately one quarter of the time it takes for the next orbit, e.g. close to 120 minutes in the case of RS-7, until the track eventually is below your horizon. After the earth has turned enough, it will next appear again to your East descending from North to South, as we are now "on the other side" of the orbit path.

VHF BANDS

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

by Ron Ham BRS15744

"What is there to say in these days of the quiet sun?," asks **Ted Waring**—Bristol. He, like **Cmdr Henry Hatfield** in Sevenoaks and **Patrick Moore** in Selsey, found no sunspots despite observations. "No spots visible between August 12 and 31," writes **Bob Anderson** from Johannesburg. However, using his spectrohelioscope, Henry located 5 small filaments and a few quiescent prominences at 1010 on August 25 and similar conditions again 1140 on September 6.

I was beginning to think that this month's solar report would be short until another letter reminded me that disturbances can occur without sunspots being present, after all they are not the only

source of activity on the sun. It is a variable star and by now we should have learnt to expect anything.

"My magnetometer detected stormy conditions on August 12, 13, 18. 19 and September 1," writes **Ron Livesey**—Glasgow. As auroral co-ordinator for the British Astronomical Association Ron had received reports of a big auroral storm on the night of August 12/13 from Leo Enwright in Ottawa, the Royal Dutch weathership *Cumulus* and from many parts of Scotland. "This event took the form of glows, arcs, rayed arcs, ray bundles and veils," said Ron. He added, "British observations ranged from 2200 to 0045, but Leo Enwright did not see it until between 0230 and 0600, when Canada had rotated in turn with the earth's spin and so he was below the active auroral storm, which, of course, is generally centred on the sun-earth magnetic pole-observer line."

Roger Stapleton, St Andrews University Observatory, told Ron about the effect that this aurora had on radio communications at the time. Cumulus also observed odd activity on the nights of 18/19, 19/20, 22/23 and 23/24. The Meteorological Office at Wick airport reported aurora from 2110 to 2135 consisting of a double arc, with rays, on the night of August 31/September 1.

Sporadic-E

During the last of the 1985 sporadic-E events I counted 14 strong signals from east-European f.m. broadcast stations between 66 and 73MHz at 0810 on August 15 and 18 such stations at 1920 on the 17th. In St Leonards-on-Sea, **Harold Brodribb** logged 8 of these at 1815 on the 14th, a massive 43 at 1705 on the 17th and 21 at 1105 on the 18th. It is interesting to note how conditions can change rapidly during a sporadic-E opening, especially when Harold tells us that by 1810 on the 17th his high count of stations was down to 13.

The 50MHz (6m) Band

Early on September 10 **Gordon Pheasant** G4BPY, Walsall, worked G5GX in Hull and G4HFO in Cornwall. Then at 1030 on the 13th, when he was near Salisbury, he made contact with G3UFS in Lancing thereby chalking up a new station on 50MHz and his 71st QSO with the list of UK permit holders. He also heard signals, via meteor scatter, from the 3 UK 50MHz beacons and logged G2AOK, G3ENY, G6XM and G3OBD by normal means. As of September 14 **Norman Hyde** G2AIH, Epsom Downs, had received signals from 60 of the 100 50MHz permit holders including stations in GI, GM and GW.

The 28MHz (10m) Band

"A rather quiet month this time,"—Gordon Pheasant, "A very quiet period except for August 18,"—**Ted Owen**, Maldon, "Good opening to Europe on the 18th,"—**Bill Kelly**, Belfast and "28MHz has been quiet here but opened up nicely on the 18th,"—**Graham Powell**, Pontypridd. All typical of the remarks in your letters about the general conditions. However, using his Trio R-2000, a.t.u. and long wire antenna between 1146 and 1304 on the 18th Graham received 10 stations from Holland, 3 from Germany, G4XME/P and GI4ONL in the UK. "In spite of my meagre beacon log, I observed two good openings on 28MHz," writes Norman Hyde after hearing signals from DL, EA, F and GM during the late afternoon of August 17. At a similar time on the 27th Norman was alerted to a Scandinavian opening by a very strong signal from the Norwegian beacon LA5TEN. It proves once again what a valuable propagation aid the international beacon service provides.

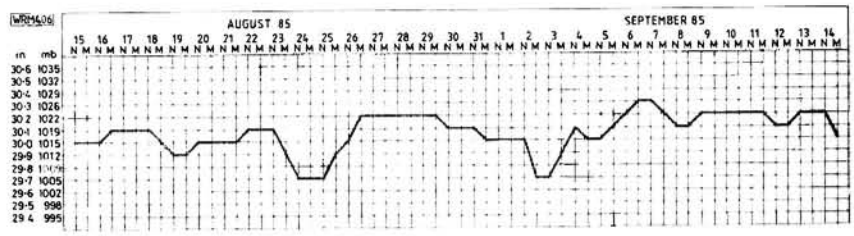


Fig. 1 ▲

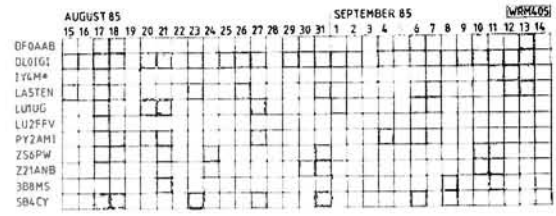


Fig. 2 ▶

During the evening of the 17th I copied c.w. signals from stations in France, Germany, Hungary and Italy and then from Spain around 0900 on the 18th. At 0852 on August 31 I heard only two signals in the 28MHz band, one was the beacon LA5TEN at 569 and the other was LA3ED calling a G at 599. During the month prior to September 9 **Filip Rogister** ON1BRL (Overijse) listened out at the c.w. end of the band in practice for his Morse test and heard stations from CT1, DL, EI, G, HA, I, LB, LZ, RB5, SM, UR2, YO, ZS, 6W2CK (Senegal) and PU2LOK—a QRP station on 28·045MHz. Turning to s.s.b. he logged H3RB/MM in the Atlantic Ocean, 6W1NQ, GM4VWV on f.m., PY2FKQ in Brazil and stations from Ireland, Scandinavia, Spain and the USSR. At 1940 on September 6 **Fred Pallant** G3RNM in Storrington made a poor, about RS41 both ways, QSO with HG6ZB.

In Knutsford, **Dave Coggins** logged ZP5MJO on August 17, DK, EA, G, GW, SM, SP, UA6 and Y53 on the 18th, EA, YU and G on the 25th, G and YU on the 26th, DK and I on September 4 and EA6 on the 11th.

Peter Lewis G4VFG (Ivybridge) has used a home-brew and modified horizontal VU2ABQ antenna during the past year and has worked 26 international prefixes, ranging from Gibraltar to Scandinavia, USA to USSR and Ireland to Sicily.

"It would be appreciated if any G station hearing the LA beacon LA5TEN on 28·237MHz, could perhaps call CQ LA on 29·600MHz during the winter months," writes **John Ball** LA0EM. This is because an experimental, remote control, station LA8OR is operational in Oslo (JO59IW) at 50m a.s.l. Input/output frequencies are 29·600/145·250MHz and 145·250/29·600MHz and the beacon keeper is Tom LA4LN. Transmitter output at 144MHz is 1W and at 28MHz is 5W, access is by 1750Hz tone burst. The licence for the present installation expires on December 31, but let's hope it gets renewed and the experiment continues.

Propagation Beacons

"Surely we must be scraping the bottom of the solar trough now! This is the worst report I have compiled this year," writes **Len Fennelow**. He adds, "the unexpected occurred on September 10, when a faint, but nevertheless copiable signal came from Z21ANB, a beacon I have not heard since June 28. There must be some significance in this because I also received the South African 14MHz beacon ZS6DN on September 7, 8, 9 and 10 and also RTTY copy on the 9th, on 14MHz, from ZS6JR." It is both interesting and important to put these associated events together.

John Coulter in Winchester heard a new beacon on 28·245MHz at 1322 on September 11, EA3VHF sending "QTH BB15D". He also reports previously hearing G4VNR and GU3HFN calling IY4M on August 17. Although the appearance of this Italian beacon was sparse its signals were also heard by others.

Billy Kelly and Gordon Pheasant heard the German beacon DF0THD on August 18 and September 5 respectively. Filip Rogister logged a new South American beacon PY2GOB on August 17, 18, 20,

21, 27, 29, 30, September 1, 3, 4, and 7. He writes, "Most of the beacons logged this time were from South America which I could hear around 599 on some days." Filip also heard LU2FM on the 27th. My thanks to all those mentioned in this section, as well as Henry Hatfield, whose dedicated observations have enabled me to prepare our 28MHz beacon chart, Fig. 2.

Between August 15 and September 14 John Coulter logged the 14MHz beacons CT3B and 4U1UN daily, on all days except September 9 and 10 he heard OH2B and the beacon 4X6TU was only missing on August 21. He heard W6WX between September 4 and 10 and ZS6DN between September 4 to 12 inclusive.

A similar report, made up to September 11, of these beacons on 14·100MHz came from Len Fennelow who had a few less daily entries than John but added the reception of W6WX on August 16, 26 and September 1. "My new 5-element beam for 50MHz became operational this week," writes Len talking about the 2nd week in September. He then logged a steady signal daily from the RSGB headquarters beacon GB3NHQ, as I did. "GB3SIX is audible on most days up to mid-morning via meteor scatter," writes Norman Hyde, who, with Gordon Pheasant heard signals from the Gibraltar beacon ZB2VHF on August 17, 21, 25, 27, 28, September 1, 2, 3, 4, 6 and 7.

Both **Chris van den Berg** and I, at approximate distances of 318 and 67km respectively, received signals almost daily from the RSGB beacon at Wrotham on 144·925MHz. In Aldershot **Peter Lincoln** used the Wrotham signal to try his horizontal Datong AD-370 antenna. Despite the claimed response of up to 100MHz the received signal was as clean as with a Yagi and possibly stronger. Having tried it on other transmissions he found the results were similar. However, it was very poor on vertical signals, but Peter had borrowed an AD-270 for vertical signals.

Beacon signals are ideal for checking antennas because of their constant signals from a fixed location and Peter has shown the importance of getting the antenna polarity, vertical or horizontal, correct for the incoming signal. With these tests in mind, Peter plans to give this antenna a try on Band I during the 1986 sporadic-E season.

Chris van den Berg logged signals from the beacons in Belgium ON4VHF on 144·985MHz during the good tropo conditions on August 29, 30 and 31; France FX3THF 144·905MHz on the 29th and Germany DL0PR 144·910MHz on the 31st. **Paul Burnett** G1DAT (Cleveland) has begun plotting the signal strengths of the Angus beacon GB3ANG 144·975MHz, which he can just hear at his QTH when conditions are flat. Dave Coggins writes, "The Cornish beacon GB3CTC 144·915MHz, puts in an occasional signal at my QTH, but GB3ANG and GB3VHF are audible every day."

Tropospheric

The readings of our monthly atmospheric pressure chart (Fig. 1) were taken at noon and midnight from the master chart on the Short and Mason barograph installed at my QTH, the figures have been slightly rounded. In Cleveland, Paul Burnett's records for August show peaks around 1017mb on the 18th and 23rd and from a low of 992mb on the 24th through 1018mb on the 27th to 1025mb on the 29th. In Maldon, Ted Owen's instrument showed peaks of 1025mb on the 27th and 28th, 1026mb on the 29th and September 9 and 1027mb on September 10 and 11.

Chris van den Berg received signals almost daily from the 144MHz repeater in Norfolk GB3NB on R1 during the period indicated in Fig. 2. **Simon Hamer**, New Radnor, said, "French 144MHz simplex booming in on September 7." I heard a DJ mobile working through the Hampshire repeater GB3SN R5 at 2044 on the 28th and signals via the west Devon repeater GB3WD R4 at 2153 on September 12."

On August 12 **Andy Stafford** G4VPM in Paignton worked GB2XJ on the Lizard on both 144MHz and 430MHz giving him a new square for 1985 on v.h.f. and an all time new square on u.h.f. Andy heard an early evening c.w. CQ on 144MHz from EI9Q on the 14th. He turned his beam toward Eire and worked him on both 144 and 430MHz gaining another new square and country on u.h.f. "Things livened up," said Andy. His log shows, G8XVJ (Warrington) worked on both bands on the 17th, EA1CYE on both bands on the 18th and G0ASN/P (Essex) on u.h.f. on the 23rd. The haul continued with EA1BLA, F6DDV and EI5PK worked on v.h.f. and F6APE on u.h.f. on the 27th. Next morning on v.h.f. he added German and Italian but the best came on September 1. This was when his QSO with G4SBH, from Torquay (YK square) chalked up the 100, all in about 2 years. His totals of 49 squares and 15 countries on v.h.f. and 25 squares and 9 countries on u.h.f. between January 1 and September 5 this year shows his dedication.

"There was a really good lift for the contest on September 7 and 8, with plenty of French portables and north coast EAs," writes Peter Lewis G8VFG. He worked 60 stations himself and said that friends in Paignton made contacts with HB0 and LX and another local had a QSO with a French station in Corsica. "A couple of good days when everyone enjoyed themselves," said Peter.

During the 1296/2300MHz contest on August 18 Norman Hyde operated portable from a site on Epsom Downs. On the 1·3GHz band, between 0700 and 1130GMT, he made 17 contacts on s.s.b. His best DX was with G4CBW in Newcastle-under-Lyme, who gave him RS55 and G4NVA/P, 10km south of Sheffield with a report of RS54. Norman used a Microwave Modules transverter with 2 watts output, driven by a TR-7010 with a 23-element Yagi mounted about 1m above the roof of his Mini.

Band II

At 1900 on August 19 **David Heale** of Bolton, using a JVC PC150 stereo radio recorder with its own telescopic antenna, heard strong signals from several stations that he cannot normally receive, such as Viking Radio. He is puzzled by a broadcast station, which appeared to be American, giving the callsign WGIS around 102MHz. Dave recorded a short piece of a programme which included references to "5000 dollars only, next Tuesday on your WGIS." It could have been from AFN in Germany as I see in the *WRTVH* that they have transmitters in Mannheim on 101·9MHz, Kaiserslautern on 102·2MHz and Stuttgart on 102·4, all in stereo.

At 0620 the 18th Harold Brodribb logged a Belgian station at Egem on 98·6MHz. Then at 1300 on the 21st he heard 19 French stations including Culture, Inter and Musique, some from Abbeville and Caen. He counted 8 strong French stations and 7 weaker ones plus Radios Kent and London on the 24th as well as a lot of interstation interference and a few French signals on the 27th. At 0925 on the 28th he logged over 25 French stations in Band II then at 1345 he heard Arabic or Indian speech, pop music, French speech and classical music from about 6 stations between 104 and 107MHz. On the 29th Harold identified Radios Cymru and 2CR and refers to "excellent reception" of 3 French stations, Caen, Dieppe and Paris; then Leglise and Brussels from Belgium at 0621 on the 31st. Harold's extensive letter includes the reception of 10 French stations on September 2. Between the 7th and 11th, using a Roberts 505 portable and adjusting the polarity of its telescopic antenna he identified a wide variety of French stations from Amiens, Boulogne, Caen, Lille and Normandie. As the weather improved in early September Graham Powell heard strong signals from France Culture, Inter and Musique between 0957 and 1105 on the 7th and 8th. He also logged a weak transmission from Radio France Armonique around 103MHz.

I logged strong French signals between 98 and 101MHz while using the Band II radio section of my TVR5D in Ashdown Forest at 1130 on August 30 and again at Ranmore Common in Surrey at noon on September 10. From the home QTH, around 0800 on the 12th, I found the band full of foreign stations as well as many interstation warbles.

9H-Falcon Results

Our congratulations to 4X4MH, YU2EZA and SV1OE on taking the first 3 places in the 1985 9H-FALCON CONTEST organised by the 9H VHF/UHF/SHF GROUP, PO Box 31, Valletta, Malta. This event took place on the 144MHz band between 0001GMT on June 1 and 2400GMT on the 15th. Details of the 1986 competition are available by sending IRCs to the Group's contest manager 9H1CD. "In all, fifteen countries took part, EA, DL, G, I, IS0, OE, OK, OZ, PA, SP, SV, YO, YU, Y22 and 4X and the competition was keen," said 9H1CD.

He managed the event and told me that the 9H Group have decided to issue a special award for licensed amateurs and s.w.l.s who have worked or heard 9H stations on the 144MHz band. Contacts dating back to January 1 1973 will count toward "The 9H VHF Award", so with this good news readers, start checking your old logs, but exclude any QSOs made via repeaters, satellites and transponders. Applications for this award should consist of a signed log, indicating the different 9H stations worked (or heard in the case of an s.w.l.), the date and time reports were exchanged, three US dollars and sent to The Awards Manager, at the above address. Applicants in Zone 1 require 20 QSOs to qualify, 16 in Z2, 12 in Z3, 8 in Z4 and 4 in Z5, the latter zone includes the UK.

All Reports in by the 15th of the month

TELEVISION

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

by Ron Ham BRS15744

Although TVDX is not in abundance during the winter months, do keep a daily check at the lower end of Band I for brief sporadic-E and longer period F2 openings. The latter type is identified by smeary pictures coming from greater distances than via sporadic-E. Also watch Band III, IV and V for tropo DX, especially when your barometer is reading high and the weather is fine, cold and clear and finally, write and tell me about it.

Band I

"As expected sporadic-E declined fast after mid-August," writes **Harold Brodribb**, St. Leonards-on-Sea, after logging pictures from Hungary on Ch. R1 49·75MHz at 1810 on the 14th, weak signals on Ch. R1 at 0810 on the 17th and test cards from Norge Hemnes and Melhus on Ch. E2 48·25MHz at 1115 on the 18th. Harold, using an ex-military RL85 receiver and dipole antenna, tuned in the sound from stations using Chs. E2 53·75MHz, R1 56·25MHz and R2 65·75MHz. Readers with such sets can also look for sound signals on Chs. Ia 59·25MHz, E3 60·75MHz and E4 and Ib on 67·75MHz. The latter can present a problem during big disturbances. Around 1125 on the 14th, **Neil Purling**, Hull, received pictures on Ch. R1 from the USSR and saw the NPORPAMMA logo, a Soviet TV Clock showing 3 hours ahead of GMT and the HOBOCTN news caption. "The Russian pictures were practically noise free," said Neil. At 1850 on the 17th Neil watched news, sport and weather from Hungary and at 1905, saw their clock and MTV-1 ident on Ch. R1. He also found a news programme on Ch. E2 and at 1920 an episode of *The A Team* appeared. During this event, at midday, I saw pictures of musicians on Ch. E2 and at 1920, athletics and running in a sports programme on Ch. R1. At 1415 on the 31st, Neil received a test card from Spain scribed TVE-1 on Ch. E2 and enclosed with this report the photographs of the test cards he received from Finland, Fig. 1 and Sweden, Fig. 2, during a sporadic-E opening on July 26.

Early on the 15th, I found a sports programme mixing with cartoons on Ch. R1. **Gordon Pheasant** G4BPY, Walsall, received Spanish TV on Chs. E2, 3 and 4 during the evening of the 17th. The end of season sporadic-E continued the following day and between 0820 and 1036 he logged an unidentified programme on Chs. R1 and R2, pictures from Spain on Chs. E2 and E4 and a test card scribed +PTT SRG1 from Switzerland on Ch. E2. A cartoon was seen again on Ch. E2 at 0645 on the 27th and a test card from RTVE, Spain on Ch. E2 at 1114 on September 4. Between August 15 and 19 **Simon Hamer**, New Radnor, received pictures from Albania RTS, Austria ORF, Czechoslovakia CST, Finland YLE-1, Germany Grunten, Hungary MTV, Italy RAI, Norway Gulen, Greipstad, Melhus and Steigen, Poland TVP, Sweden SVT, USSR TSS and Yugoslavia JRT and saw the captions BPEMR, HIRADO, PRAHA, TELEGIONALE and TELEDARIO, as well as subtitled films from Albania, Norway and Sweden.

Tropospheric

According to your reports and with an eye on the atmospheric pressure chart (shown in VHF Bands), it seems that conditions were most favourable for tropo DX on a few days around August 20, 29 and September 10 when continental pictures were received in many parts of the UK in Bands III, IV and V. At 1250 on August 21, Harold Brodribb received a test card from RTL Luxembourg and Ch. E7 and RTBF-1, Wavre, Belgium on Ch. E8 and at 1350 on the 28th, he logged RTL again and at 1818 he found negative pictures from France on 17 spots in the u.h.f. band. On checking the u.h.f. band at 0900 on the 29th he found a strong test card from S4C at Wenvoe on Ch. E47 in addition to several negative pictures from France.

I logged weak unidentifiable pictures on Chs. E8 and E10 around 2030 on the 21st and 22nd respectively and a test card from Holland, PTT NED-1 on Ch. E4 at 0846 on the 23rd and 0812 on the 29th. Both Harold and I saw signals from Belgium on Ch. E8 and Holland on Ch. E4 on the 31st. While at a high spot in Ashdown Forest using my Plustron TVR5D with its own telescopic antenna, at 1130 and 1737 on the 30th, I received several negative pictures on the u.h.f. band and saw the caption *Les Affaires*. On arrival home, I was not surprised to see co-channel interference on the local BBC and IBA pictures. Between September 9 and 11, Harold received strong pictures in Band III from Belgium and Germany and identified cartoons from Wavre on Ch. E8 and the captions ARD, ZDF, Videotext and Fur Alle, from Germany on Ch. E9. At 0845 on the 10th, I logged the captions ARD and ZDF on Chs. E8 and E10 and a football match, in strong colour, on Ch. E10 at 2227 on the 11th. Around 1100 on the 11th, **Alan Taylor**, Coventry received RTBF-1 on Ch. E8 and Harold found several negative pictures in the u.h.f. band from Abbeville, Le Havre, Lille and Neufchatel.

SSTV

Although conditions were generally quiet in August, **Lester Curno**, Bude, copied 34 SSTV signals around 14·230MHz including stations in Bulgaria, Canada, Holland, Hungary, Poland, Spain, Sweden, Switzerland and the USA. "A lot of these pictures were only seen intermittently because of QRM and QSB," said Lester, who also saw the captions, "NAME IS ANDERS", "QTH MORA HW COPY", "DE HB9DBQ", "QTH ZURICH", "ANT 4ELE BEAM", "NAME FRANK", "QTH SANTADER NORT SPAIN", "NAME ECKARD 45 YEARS" and "SSTV WRASSE + PHILIPS CAMERA". "I found CJ4YCR quite active on 3·5MHz with pictures of his Collie dog," writes Lester, adding, "At 0807 on the 10th, I received excellent pictures of a block of flats, with balconies, windows, steps and bushes clearly visible from DK8SV."

Over the past two years, **Bob Valder G4XCA**, Peacehaven has been receiving pictures from Europe and the USA with his home-built G3WCY SSTV receiver. Bob is a keen home constructor of equipment and a member of BATC and BARTG. In Bristol, **Henry Winter BRS40276**, is very pleased with the Drae SSTV converter which he purchased last July for his Yaesu FRG-7700 communications receiver. From purchase until the end of August, Henry copied pictures, on 14MHz, from stations in Brazil, Bulgaria, Finland, Holland, Germany and Jersey, and between September 4 and 7 inclusive, he received signals from DK3UG working into Italy, I3XQW working into France, KC0BF working into Yugoslavia, LA4R into Italy, SP7FUZ, W4CVS and YU5XFU calling CQ and W1GUE in QSO with a G. I received SSTV pictures, on 14MHz from I1CEL during the morning of August 15 and captions from stations in Yugoslavia and Sweden, spoilt by QSB at 2054 and 1115 on the 23rd and 24th respectively.

Report from India

"There are an estimated 5 million television sets in India with a captive nightly audience of nearly 50 million. In comparison, only 13 million viewers go to the cinema daily. About half the TV sets are concentrated in Metro towns, but with the low power transmitter now beaming out to cover half the country's population, the growth rate of TV sets is expected to be 3 million annually in the next two years," writes **Major Rana Roy** from India. Rana has been a keen student of television for some years and his DXTV reports and photographs are always interesting to his fellow readers of this column.

In his letter on August 16, he reported sporadic-E disturbances, affecting their Chs. 2 and 3 in Band I, occurring during the early morning of July 27, the afternoons of July 1 and 25 and the evenings of June 30 and July 2, 20 and 22. Among the strong

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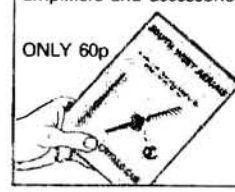

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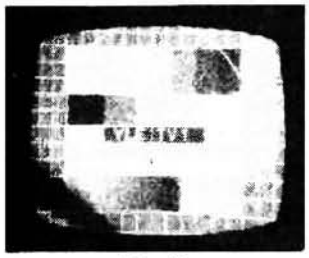


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

pictures he received from the USSR were a newscaster, Fig. 3, seen on June 30, a caption at the end of a programme about dancing, Fig. 4, at 1527 on July 1 and at 1530, Rana watched a documentary about people of Asian Russia, Fig 5, possibly the borders of Mongolia. This programme finished at 1550 and another cyrillic caption, Fig. 6, appeared. During these evenings, Rana saw ballet, cycle racing, a Chinese feature film, a caption from a Russian feature film in Cinemascope, Fig. 7, news, some high ranking officials attending a function, Fig. 8, a film about iron and steel making in the USSR and plenty of Russian sport. At times he also received pictures from Dubai.

"We had a fairly good tropo on July 18 and watched an American serial film between 2045 and 2130 and news in Urdu from 2130 to 2200. Between 2200 and 2300 we saw adverts for Pepsi Cola, a hair tonic and Suzuki motor cycles, followed by a programme about songs and a drama serial from 2230 to 2345," writes Rana, after watching Pakistan TV on Ch. 10 in Band III. During another tropospheric opening on July 27, Rana again received pictures from Pakistan TV on Ch. 10 and at 2200 he watched a programme of songs composed by the person in Fig. 9. This programme finished at 2300 and adverts, Fig. 10, filled the screen for the next ten minutes and for the following 50 minutes he watched an American serial, in colour, called *The Andros Target* (Fig. 11). The intensity of this opening is proved by the clarity of these pictures from Pakistan and especially their announcer, Fig. 12, seen at 2352. Pictures from Pakistan were again received on July 29 and at 2230, Rana saw an ident from Karachi TV on Ch. 5.

MW BROADCAST BAND DX

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

by Brian Oddy G3FEX

One of the factors which is often overlooked when considering medium and long wave reception is the nature of the listening location. High levels of electrical interference and screening by metal-framed buildings can prevent weak signals from being heard.

Patrick Healy of Cork, Ireland, has just returned from a visit to Crosshaven, which is about 24km from Cork City, and says "I was amazed to find the difference this short move made to my radio reception. I received many stations which are inaudible in Cork due to local interference." His advice is always to take your receiver with you on a trip or holiday.

Fig. 1

With a modern battery operated receiver and a simple loop antenna, I feel this may prove to be a very good idea for many listeners living in cities and towns.

DX Report

Note: all frequencies in kHz: time UTC (GMT)

Transatlantic DX: Even though conditions for transatlantic DX during the summer months are usually poor, keen DXers continue to hunt for these signals during the night and produce some interesting

results. The DX signals heard have been a little more consistent during August and early September and a number of stations from Canada have again been received.

From the USA, **Graham Powell** of Pontypridd received WINS 1010 at 0308, WHN 1050 at 0359, WNEW 1130 at 0255 and WQXR 1560 at 0241. These stations are all located in the New York area. From Boston the familiar call of WMRE—the "memory station"— was heard on 1510 rather later, at 0413. Philadelphia's WCAU 1210 was logged at 0233 and a signal from another well-known station, WBAL of Baltimore, appeared on the band at 0355. Washington DC was heard, too, at 0314, from WTOP on 1500.

Graham has been using his new Trio R-2000 receiver, a KX-3 a.t.u. and a 20m long wire to hunt for the DX and is pleased with the results. From Canada his log includes CJYQ 930 from St. John's, Newfoundland, around 0230 and CHER 950 from Sydney N.S at 0303. About an hour later signals from Moncton NB CKCW 1220 appeared, along with CKYQ 610 in Grandbank and CHYQ 670 Mustgravetown, both from Newfoundland. Tuning even lower down the band Graham found VOCM 590 from St. John's at 0411.

The only signal heard from South America by Graham was Radio Capital 1040 San Paulo, Brazil, at 0204.

Bill Kelly of Belfast has once again been busy on the band. His interesting report of signals from the USA includes reception on two nights of WHN 1050 around 0350, WCAU 1210 on three nights around 0300 and WMRE 1510 also on three nights around 0325. At this time WTOP 1500 from Washington DC was also well received.

From Canada CJYQ 930 came in well on three nights between 0300 and 0500 from St. John's.

A consistently good signal from S. America was Rio el Mundo 1220 at 0400 on four nights. A station on 810kHz announced itself as Radio Cuba at 0350. This station may be CMJE.

Dave Mayhew of Yapton, Sussex, has been searching for more m.w. DX using his Satellit 1400 with loop antenna. He was delighted to hear (and record) signals from ZDK on 1100 at 0030 located in Antigua (this station mentioned the name "Greenville Radio"). The Caribbean has been coming in well and Dave heard a Caribbean beacon on 1610 at 0100 every night during the first two weeks of September!

Cuba, too, has been received. CMBF on 950 was noted at 0130. From South America, Radio Globo 1220 was heard at 0030 with a football match but Radio Continental 1120 was rather weak at 0100.

Signals from Newfoundland's CJYQ 930 were received around midnight most nights and, turning his loop towards the USA, Dave found WBZ 1030 from Boston and WCAU 1210 Philadelphia, both at 0100.

Other DX: Darren Taplin of Tunbridge Wells has been monitoring the band during the evening. His log includes Radio Algiers 981 at 2000, Radio Sweden's new transmitter 1179 at 2100, Radio Berlin International 1359 at 2115 and RAI 846 at 2303.

A DX programme has been noted by **Alan Merritt** of Abingdon from Radio Prague, Czechoslovakia 1287 on Wednesdays at 2145. Alan also logged RAI but later, at 0005.

Newcomer **Chris Hughes** of Helston, who reported his first m.w. DX as Manx Radio 1368 ("On the Air" October *PW*), has now received their QSL card. This station has been heard too by **Margaret Sadler** of Leeds. Her detailed m.w. log mentions Radio Ljubljana, Yugoslavia 918 as a good signal at 2339. She listened to a programme of chamber music from Radio Prague 1287 at 2328 one evening.

Another listener who enjoys Radio Prague's programmes is **Martyn Whyte** of Edinburgh. He has just had the good fortune to obtain a Yaesu FRG-8800 receiver. His log includes Manx Radio, Radio Sweden International and Radio Polonia, Warsaw 1503.

An interesting letter from **Paul Rawdon** of Wellington, New Zealand, details Medium wave DX QSL cards he has received for reception earlier in the year of TWR Monte Carlo 1467, SER Spain 1584, Luxemburg 1440, West Germany 1593 and Vatican Radio 1611. Congratulations Paul!

TWR Monte Carlo, Monaco 1467 was just one of the many stations heard by **Alan Williams** of Helston. His log records Radio Algiers on 254kHz long waves as well as the 981kHz signal. Radio Finland was logged on 963 at 1830.

Bill Kelly noted in his log Arabic from Morocco on 864 at 0130 and he heard another weak signal from a station using Arabic on 1090; he thinks this may have been from Saudi Arabia.

Local Radio DX

BBC Radio Jersey's signal 1026 has been heard in Edinburgh by Martyn Whyte, which is certainly a long haul! ILR Radio Wyvern, Worcestershire, 1530 has been received by him, too. Bill Kelly has also heard this one over in Belfast! Another long distance signal heard by Bill was ILR Invicta Sound, East Kent 603 at midnight.

Graham Powell has been hearing Scotland's Radio Forth during the Edinburgh Festival period and managed to get three requests played on successive Monday nights around 2230!

Using a Vega receiver, **Bert Trickey** of Bristol has logged ILR's CBC Cardiff 1359, Gwent Area 1305, Radio West 1260, Wiltshire Radio 1161, Severn Sound 774, also BBC Radio Bedford 1161, Radio Devon (Torbay) 1458 and, naturally, Radio Bristol 1548!

ILR Radio Forth 1548 is a good signal all the year round at night, according to **John Court** of Birmingham. He also reports daytime reception of BBC Radio Bedford 1161. BBC Radio Solent know him well, he says, for he keeps winning "Rock" records from them!

At his new listening post in Helston, Chris Hughes has been hearing ILR's Plymouth Sound 1152 and Swansea Sound 1170.

Darren Taplin has been receiving ILR's Saxon Radio (Bury St. Edmunds) 1251, Chiltern Radio (Luton) 792 and 828, Hereward Radio (Peterborough) 1332 and Radio Orwell (Ipswich) 1170 from whom he has received their QSL/sticker—see Fig. 1. Also heard were BBC's Radio Norfolk on 855 and 873, Radio Bedfordshire 630, Radio Cambridgeshire 1026 and Radio Guernsey 1116.

BBC Radio Guernsey 1116 has also been heard by Alan Williams. Other BBC stations received were Radio London 1458, Radio Manchester 1458, Radio Bristol 1548, Radio Sussex (Brighton) 1485 and Radio Devon (Torbay) 1458; also heard was DevonAir Radio (Occombe) 954.

Using a Sony ICF-2001 receiver and a TV coaxial cable for an antenna at his temporary location in Crosshaven, Ireland, Patrick Healy found he could hear ILR's Plymouth Sound 1152, Radio West (Bristol) 1260, CBC Cardiff 1359, DevonAir Radio 666* and 954 and Swansea Sound 1170*, also, BBC's Radio Guernsey 1116 and Radio Bristol (Taunton) 1323. (Only those marked * can sometimes be heard at his normal address in Cork using a loop antenna: all the other stations are inaudible there!)

Medium Wave Circle

This Club, devoted to medium wave radio DXing, is seeking new members. The Club issues a magazine *Medium Wave News* eight times a year. For full details of membership, which is open to anyone interested, write to the Secretary, Edward Baker, 69 Alderley Way, Cramlington, Northumberland NE23 9UQ.

QSL Addresses

BBC Radio Cornwall: Phoenix Wharf, Truro, Cornwall TR1 1UA.

BBC Radio Kent: 30 High Street, Chatham, Kent ME4 4EZ.

BBC Radio Norfolk: Norfolk Tower, Surrey Street, Norwich NR1 3PA.

BBC Radio Jersey: Broadcasting House, Rouge Bouillon, St. Helier, Jersey.

SW BROADCAST BANDS

Reports as for Medium Wave DX, but please keep separate

by Brian Oddy G3FEX

For the newcomer s.w.l.: When the signal from a distant transmitter arrives at the receiving antenna, a tiny voltage is set up in the antenna as the r.f. fields pass by. Although this "induced" voltage is very small (usually only a few microvolts, where 1 microvolt is one-millionth part of a volt) it will have a waveform which is an exact replica of that generated by the transmitter. By attaching the antenna to a suitable receiver the tiny signal voltage can be amplified and converted to intelligible audio.

In practice, many thousands of different tiny signals may be present at the antenna from numerous transmitters and it is the incredible job of a receiver to select the particular signal required, keep it "tuned in" for long periods of time, amplify it and smooth out any level changes due to fading, as far as possible, and then "demodulate" the signal to recover the original audio—all without wasting signal energy or adding noise to it!

No wonder, then, that professional communications receivers are extremely complex for they set out to do all this—and more—with perfection! They have always been the standard of excellence and, needless to say, they are very expensive. Apart from the cost, they also need to be used by an expert who knows how to operate them and, of course, require a good antenna system to ensure the best results!

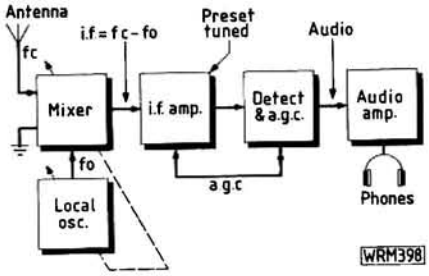
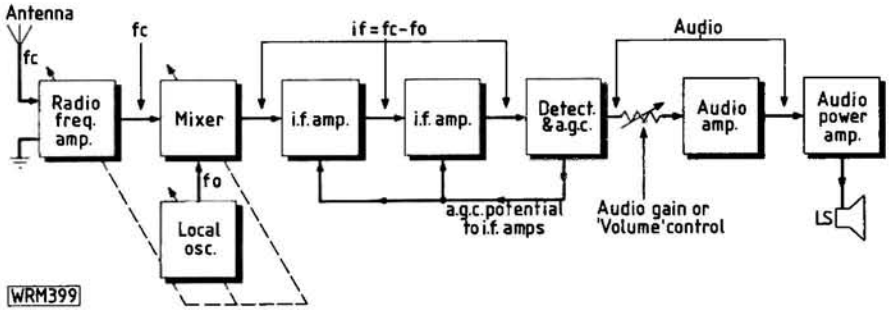


Fig. 1a: A basic superhet receiver. Note the a.g.c. potential derived from the signal level (it varies the ◀ gain of the i.f. amplifier)

Fig. 1b: A practical single-conversion superhet receiver. Note the i.f. amplifier tuned circuits are pre-set at the factory to the chosen ▼ frequency



So where does the newcomer s.w.l. fit into all this—does he need to spend hundreds of pounds on a receiver? Fortunately, no! These days there are many receivers which are capable of providing much enjoyment for keen listeners, on both the medium-wave and short-wave bands. These sets may be quite inexpensive and certainly cheaper than one could build for the money.

Most of these receivers are transistorised portable types which include a built-in telescopic "whip" antenna and have the major short-wave bands spread across the length of the dial in a number of wave bands, e.g. 14m, 31m, 19m etc., corresponding to the internationally agreed broadcast bands (See page 59, August *PW*). One such receiver advertised in *PW* small ads. is the Vega 206, which costs £24.

Obviously, these receivers have certain limitations but they may not be too serious. For example, the receiver may gradually drift off the station, over a period of time, but this can be overcome by an occasional adjustment to the main tuning knob. The calibration on the dial/scale may not be dead accurate but this can be overcome, to some extent, by using a logging scale (details of this will be revealed in a future "newcomer s.w.l."). Some lack of "selectivity" may exist, allowing the "sidebands" from an unwanted station to interfere with a wanted signal (see *PW* November 1985). Another problem is that "image" signals may appear on the bands—again this will be explained later. Having said all that, the receivers are capable of giving excellent reception of many Broadcast stations all over the world, as proved by the reports published in *On the Air*!

Receivers of this type are called *superheterodyne* receivers (superhet for short) and the basic principles behind their design are interesting. As the frequency of a transmitted signal is increased the tiny carrier signals at the receiving antenna become more difficult to process due to losses occurring in the receiver circuits. A superhet receiver overcomes these problems by converting the tiny high frequency carrier signals to a much lower frequency which can then be more easily amplified and processed.

When two frequencies are fed into a mixing device it can be shown that "sum and difference" frequencies are generated. By mixing an incoming carrier signal (fc) with a locally generated oscillation (fo), fc + fo and fc–fo are produced. If the different frequency fc–fo is selected then, effectively, a lower frequency results. This is called the *intermediate frequency* (i.f. for short) —see Fig. 1. If the local oscillator tuning and the incoming signal circuit tuning is "ganged", a constant i.f. difference results.

This lower frequency replica of the original antenna signal is led to an i.f. amplifier which can be sharply pre-set tuned at the factory to the chosen intermediate frequency, to provide both amplification and *selectivity*. The i.f. then passes into a *detector* or *demodulator* circuit. The audio output from this is amplified to drive a loudspeaker (or headphones).

A portion of the signal present at the output of the i.f. amplifier is used to provide an *automatic gain control* (a.g.c.) potential to vary the gain of the i.f. amplifier(s) as the signal strength varies due to fading.

These general principles are the basic building blocks used in most modern receiver designs. Various extra design features may be added to produce more complicated receivers, such as the semi-professional portable sets which sell for between £100 and £300. A popular example of this type of receiver is the Grundig Satellit 1400SL.

Radio Nederlands have just published their *Receiver Shopping List (8th Edition)* which is available free—it's an excellent guide. Send to: **Media Network, Radio Nederlands, P.O. Box 222, 1200JG Hilversum, Holland,** for your free copy today!

Conditions on 21 and 25 MHz

(Note: Frequencies in MHz: Times in UTC=GMT).

Due to our present position in the 11-year sunspot cycle, conditions on the 25MHz (11m) band have remained very poor. The BBC transmissions on 25·650 continue between 0900 and 1330 daily.

Paul Price of Merthyr Tydfil has been checking this band but his log only mentions these BBC transmissions. A very weak signal has been heard at times on 25·620 by **Alan Williams** of Helston, Cornwall, which may be Radio Moscow. **Bill Kelly** of Belfast has continued his listening watch on the band but without results, except for the BBC signals.

Conditions on the 21MHz (13m) band have been slightly better during late August and early September. **Philip Rambaut** of Macclesfield has been making a special study of this band and has sent along a very comprehensive log of stations heard during daylight hours. His log includes FEBC Philippines 21·515 at 0900, Saudi Arabia 21·495 at 1010, BBC Ascension Island 21·660 at 1025, Radio Berlin International DDR 21·540 at 1115 and RDP Portugal 21·700 at 1420.

The *Happy Station*, Radio Nederlands, from their Madagascar transmitter 21·485 was received well by **Margaret Sadler** of Leeds at 0830. She listened to their programe *Mail Call* using her Grundig Satellit 1400S receiver.

Graham Powell of Pontypridd has been checking out his new Trio R-2000 receiver on this band and received excellent signals from Radio RSA, South Africa 21·535 from 1300 onwards. Another interesting station was Radio Japan via Moyabi, Gabon relay transmitter 21·550 at 1500. Graham found the UAE Radio Dubai 21·605 signals to be clearer than BBC 2 on m.w. at 1030! Paul Price mentioned this station in his log too and **Bert Trickey** of Bristol using his Vega receiver heard them on their other frequency of 21·695 at 1035. Bill Kelly says "there is an interesting series of programmes on stamp collecting on Saturdays at 1345 from Dubai on 21·605". Bill's log includes BRT Belgium 21·810 at 1300.

Key:
fc = incoming carrier frequency
fo = local oscillator frequency
i.f. = fc-fo = constant difference frequency
Note — i.f. can also be fo-fc if local oscillator is higher than fc

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Using a DX150A receiver plus 25m long wire, **Darren Taplin** of **Tunbridge Wells** also heard the NHK Gabon relay, 21·550 at 1500, Vatican Radio 21·725 at 1430 and Radio Sweden International 21·570 at 1400 were also mentioned in his log.

15 and 17MHz

"I still find the 17MHz (16m) band the most interesting" says **Peter Mills** of Sherborne. Many DXers feel this band has a lot to offer, with signals from all continents being audible at various times during the day. One of the more popular stations is All India Radio 17·875 at 1015. Margaret Sadler enjoyed their intriguing programme *Treasures of the Sea*. Other stations of interest in her logs were Radio Pakistan 17·660 with news in English at 1005, Radio Nederlands, via their Bonaire transmitter in the Netherlands Antilles, and the ever popular station from latitude 00°, HCJB of Quito, Ecuador 17·790 at 2130. Graham Powell heard their programme called *Morning in the Mountains* 17·890 at 1330—a very apt title for their station is located high in the Andes mountains. A QSL card received from HCJB by **Stephen Roberts** of Urmston, Manchester illustrates a bus mounted on rail wheels, called an "Auto ferro", which travels on one of the world's most fascinating rail trips—a 12 hour journey from Quito to Duran near Guayaquil!

Chris Hughes of Helston has been enjoying programmes from Radio Canada International 17·875 at 1900, which beams its signal to Europe at this time.

The path between Australia and the UK has improved in the mornings on this band and the 17·715 signals have been well received by **Simon Hamer** of New Radnor from 0620. His log also mentions them late in the evening too, on 17·795 at 2348.

Radio Japan via the Gabon transmitter 17·865 has been heard by **Keith Fernie** of Ossett, West Yorks from 0700. Peter Mills has been enjoying excellent reception of Radio RSA 17·780 from Johannesburg at 1500.

On the 15MHz (19m) band, signals have been received from all continents. This band has continued to provide excellent reception of Radio Australia in the late evening on 15·160, 15·240 and 15·320 at 2348 for Simon Hamer.

Using his Panasonic DR28 receiver, **Bill Stewart** of Lossiemouth has been hearing KYOI from Saipan, N. Mariana Islands, 15·190 at 0815, AFRTS with CBS News at 0900 on 15·400, UAE Dubai 15·320 at 1630 and Radio RSA with German 15·185 at 1730.

Margaret Sadler mentions Voice of Nigeria with English News 15·120 at 0930 and Alan Williams received this station at 1805. Radio Canada International 15·325 is a popular station on this band and was the first station **Alan Merritt** of Abingdon heard when he switched on his new Vega 206 Mk II receiver! Paul Price noted WYFR 15·566 at 1752 and WINB 15·145 at 2300 in his extensive log and **Stuart Stephens** of Bridgend, along with Peter Mills, received Radio Habana, Cuba 15·300 at 2130. Bert Trickey has heard SLBC Sri Lanka 15·425 at 1320 and the Voice of Vietnam 15·010 at 1825, a station which has also been received by newcomer s.w.l. **Michael Sargeant** of Bolton, Lancs, using a Panasonic DR49 radio with a Datong AD370 active antenna.

The 13MHz Band

Alan Merritt and Simon Hamer report RUV, Iceland on 13·797 with a programme especially for Icelandic fishermen, at 1230. Radio Nederlands will use 13·770 from 29 September, 1985 to S.W. Asia from their Flevo transmitter at 1430.

Radio Moscow continues to use the band on a number of frequencies and Keith Fernie has received their QSL for a transmission on 13·705MHz.

The 11,9,7 and 6MHz Bands

Conditions on these bands have been good. Radio Australia has been well received on all of these bands. Graham Powell reports that their signal is excellent on 11·910 at 0610. Simon Hamer enjoyed their 9·580 transmission at 1500: **Reg Billing** of Rochester heard them at 1630 on 7·205, as did Darren Taplin. Their 6·035 signal is extremely good and has been reported by many readers—this is certainly a signal for newcomer s.w.l. to look out for around 1900.

Radio HCJB's 11·925 service to Australia and the Pacific has been heard by **Tim Shirley** of Bristol at 0830. All India Radio 11·620 at 1930 is a popular signal and Radio Pakistan 11·675 at 1600, Radio Beijing 11·600 at 1730, Radio Bangladesh, Dhaka, 11·555 at 1820, Radio Damascus, Syria 12·085 at 2005 and Radio RSA 11·900 at 2100 are just a few of the interesting 11MHz band signals; while REE Spain 9·630 at 0630, Radio Afghanistan 9·665 at 1900, Radio Baghdad 9·610 at 2037, Radio Cairo 9·805 at 2115 and the Voice of Vietnam 10·040 at 2010 feature in most 9MHz band logs.

Another newcomer **Robert Taylor** of Edinburgh, using his new Toshiba RPF11L receiver with whip antenna logged ORF Vienna 9·770 at 1245 as one of his first stations and Margaret Sadler heard VOFC Taipei, Taiwan 9·600 at 2218 for the first time and listened to their program *People at Work*.

Some of the 7MHz (41m) signals logged include Radio Tirana 7·065 at 0635, Radio Polonia, Warsaw 7·285 at 1830, Voice of Israel 7·410 at 2245 and Radio Nigeria 7·225 at 0400. Margaret Sadler heard BBC Masirah Island, Oman 7·135 at 0052 and on 6MHz (49m) logged BBC Antigua, West Indies 6·195 at 0908 and BBC Kranji, Singapore 6·195 at 0915.

By careful listening on these bands much DX can be heard. Newcomer Michael Sargeant found Radio Uganda on 5·026 at 2045.

A QSL card from SWABC Namibia 3·270 has been received by Graham Powell. His log mentions Radio Centrafrique CAR 5·035 at 2239, NBCRS Sudan 5·039 at 2058, Radio San'A Yemen 4·853 at 1935, LNBS Lesotho 4·800 at 2110 and ELWA Liberia 4·760 at 2223.

Albert Fisher G4VHB of Heston, Hounslow found the Radio Uganda signal poor but was surprised at the excellent signal from Radio Transkie on 3·930. Albert heard Chinese on 4·865 and many unidentified signals too.

Radio RSA South Africa 3·230 at 0320, Radio Botswana 4·820 at 0345 and Radio Zambia 4·910 at 0415 were all heard by "Old Timer" Bill Kelly. A regular listener to Gabon, Africa No. 1 4·810, **Fred Pallant** of Storrington says he particularly enjoys the W. African music from this station; Bill Stewart, however, prefers their Sports news in French at 2130!

The Cape Verde Islands 3·930 may have been heard by **John Parry** G4AKX of Northwich, Cheshire. He finds the Radio Botswana signals on 3·354 are very strong 30mins before sunset.

Using an FRG-7700 plus Codar pre-amp and 45m long wire, **Edward Stone** of Kingston-on-Thames says he has received weak signals on two occasions from FIBS, Port Stanley, Falkland Islands 2·380 at 0430 and UAE Dubai 3·355 has been heard at 0400.

Extensive logs from Tim Shirley include Radio Norte, Bolivia 4·939 at 0225, (QSL received), Radio Andina, Peru 4·995 at 0345, Ondas del Meta, Columbia 4·885 at 0220, Voz del Cinaruco, Columbia 4·865 at 0332, Gabon, Africa No. 1 4·810 at 1833. Tim says QSLs take at least three months from South America.

Margaret Sadler, heard Radio Kiev 5·164 at 2341, Radio Centrafrique 5·035 at 2250, Radio Uganda 5·027 with news and weather in English at 1923, Radio Sutatenza, Columbia 5·095 at 2320, MBC Mauritius 4·855 at 1845 and All India Radio 3·905 at 2350.

Please note: Many Broadcasters will change their frequencies and times of transmission in November, to account for seasonal changes in Ionospheric conditions.

Station Addresses

Radio SWA: Box 321 Windhoek, 9000 Namibia, South West Africa.

Deutsche Welle, Postfach 100444, D-5000 Koln 1, Federal Republic of Germany.

Radio HCJB: Casilla 691, Quito, Ecuador, South America.

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"My QTH is on the backside of Stuttgart."

... heard by G4WTL on 14MHz

"The station wanting a signal report, you're about half scale."

... heard on S20 by G6NOL

"You're not lighting up any l.e.d.s, but you are 5 and 9 here. I can't receive the repeaters because I've only got ten watts going out."

... heard on 144MHz by G4YYA

Did you hear about the amateur who was told he couldn't get permission to set up a special event station on Brownsea Island, because Brownsea Island is in Poole Harbour, and the amateur licence says you can't operate in a harbour!

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GENERAL INTEREST

PRODUCTS

KINDLY NOTE/ ERRORS AND UPDATES

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memories in seconds, hard copy printouts and so on, so it is no wonder that other manufacturers have added this feature to their sets. The SX-400 can be fitted with an RS-232 port, the Yaesu FRG-9600 has a socket on the back for the Yaesu interface and the new AOR AR-2002 also has a socket that allows their own interface to be plugged straight in.

It seems that computer control is here to stay and it would appear that the next steps forward in scanning will be made not by the manufacturers improving the hardware, but by programmers developing customised software to control the receiver in exactly the way that the customer wants it to be controlled.

The Law

America is the true home of scanning, probably because their lawmakers appear to have a more liberal attitude than ours. Their philosophy seems to be to allow the individual to do almost anything, unless there is a good reason not to. This means that the American radio enthusiast can legally listen to transmissions from the police, fire and ambulance services as well as from aircraft, taxis, buses, gas, water and electricity company vans and so on. It is even possible to buy an

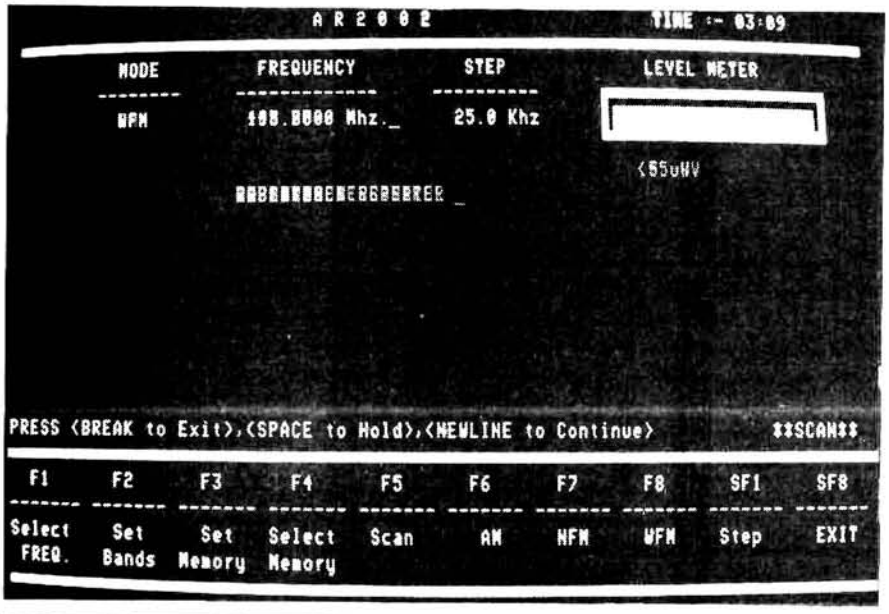
assortment of publications that list the frequencies that are used by these services as well as those of the CIA, FBI and various other government departments. Some states prohibit the use of scanners covering police frequencies in vehicles, but apart from that there are very few laws controlling their use. It's hardly surprising that they sell so well in America.

Here in Britain the position is very different. The various Wireless Telegraphy Acts make it illegal to listen to anything at all, except authorised broadcasting stations and licensed radio amateurs, unless you are in possession of the appropriate licence. There is a fee for operating a television receiver and we pay this by buying a television licence. Quite a few people also have a British CB licence and this allows them to use the British CB system. There are also licences for the aircraft and marine bands available to people who can show a genuine requirement to use or listen on them. Some press agencies and meteorological services will issue letters of authority to enthusiasts wanting to receive their transmissions for experimental purposes.

There is a popular misconception that we are allowed to listen to any transmissions as long as we do not divulge the contents of anything we hear. This is not so. There is a part of the Act that prohibits us from divulging information but this only applies to transmissions that we may have tuned into accidentally, which is all too easy to do in this country because various public services still use part of the v.h.f. broadcast band 88–108MHz for their radio communications. My self-seeking car radio is always stopping on these stations and when it does, I am obliged to immediately retune it otherwise I would be breaking the law.

I often receive letters from readers who would like to know some of the "interesting" frequencies. Although our laws do not specifically make it illegal to publish this sort of information, it could be construed as encouraging others to break the law. For this reason it is *PW* policy not to print details of spot frequencies used by radio services which enthusiasts cannot legally listen to. Please do not write in asking for such frequencies. If you want to know which parts of the spectrum have been allocated to various services, HMSO will shortly publish *The UK Frequency Allocation Table*, ISBN 011 51 38 196.

To those of us who have been playing with scanners almost since their inception, the recent advances in scanner design have proved to be expensive, I now own four! Be warned—scanning is addictive. ***PW***



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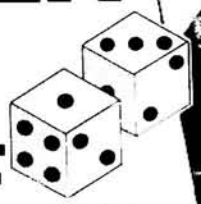

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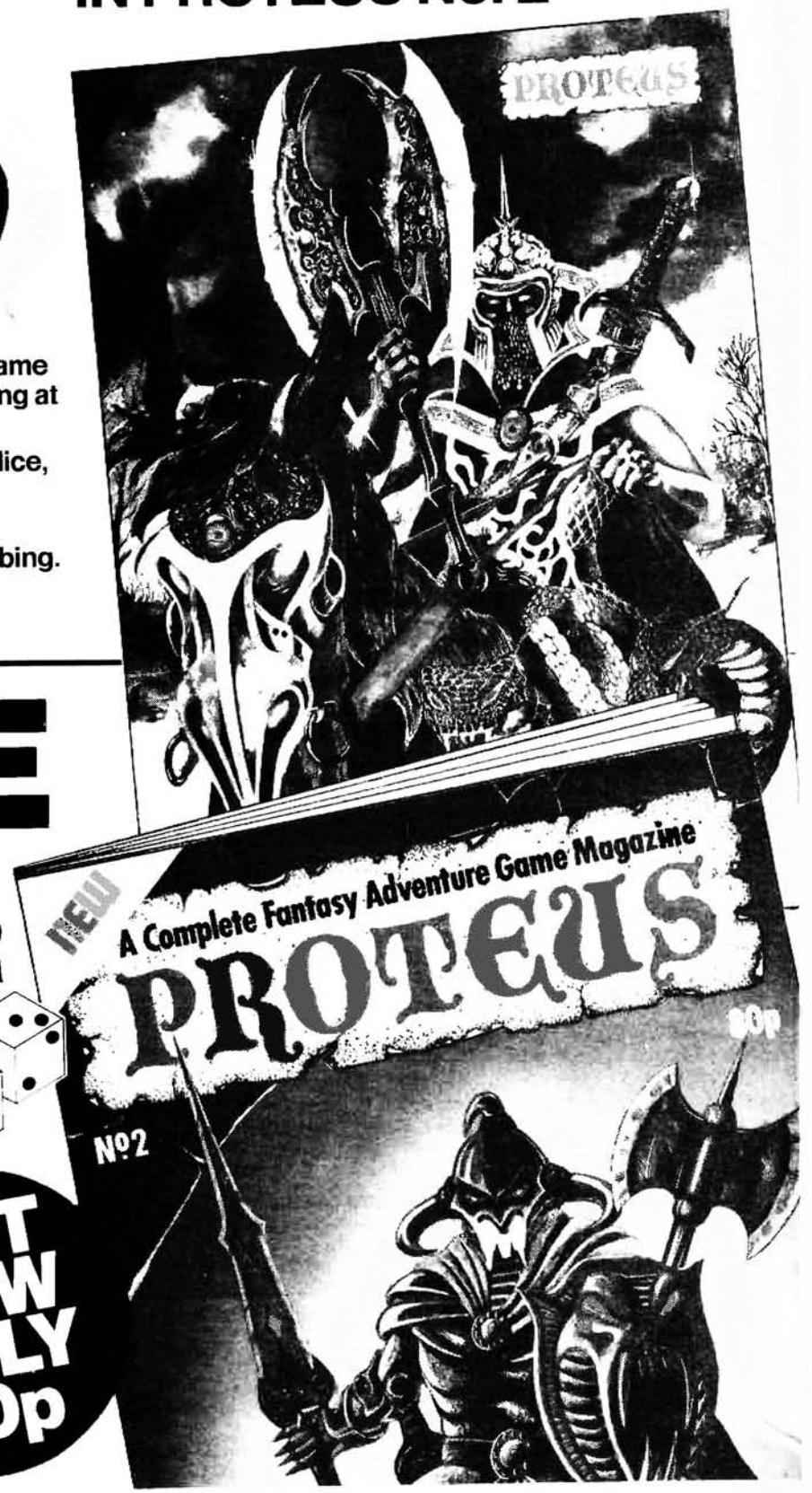

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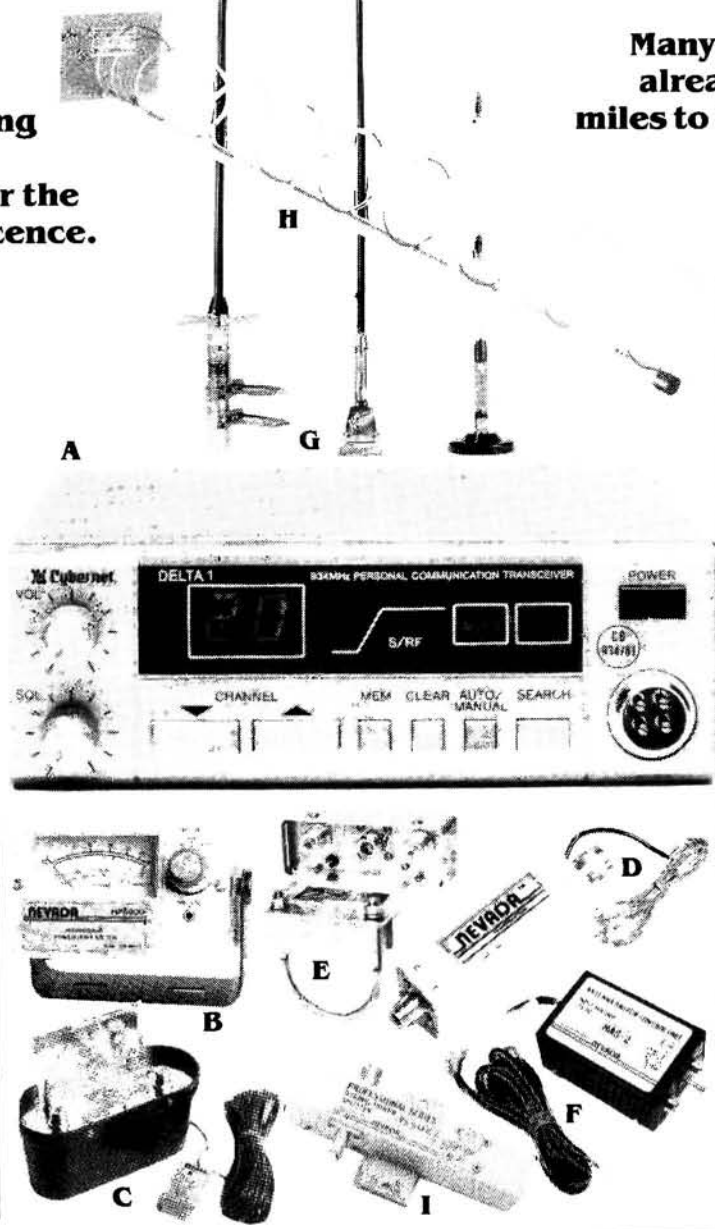

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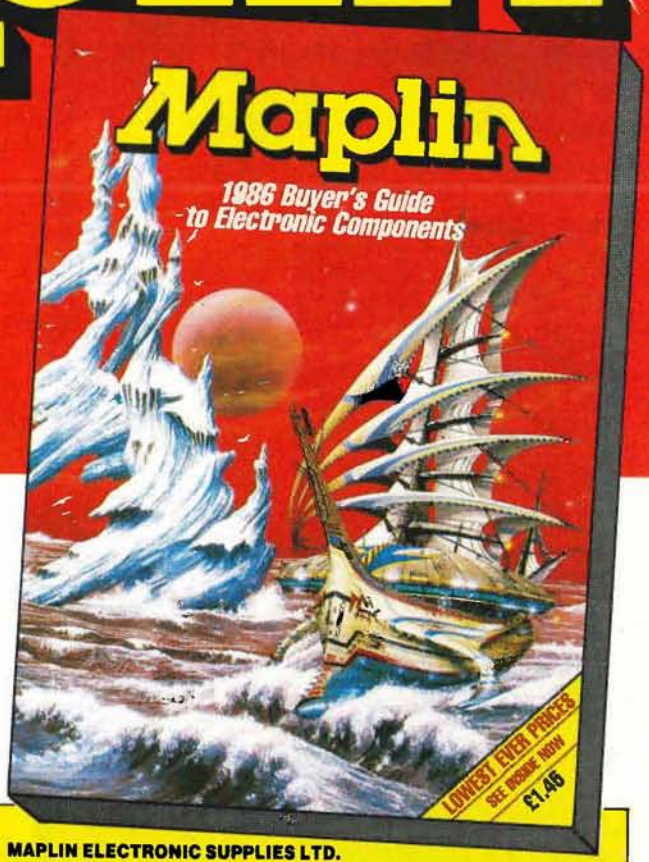

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