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Amateur RADIO

For all two-way radio enthusiasts

Beginners' Workshop: complete the AR80m receiver

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On test: Trio TS670 50MHz transceiver

QUESTIONS & ANSWERS

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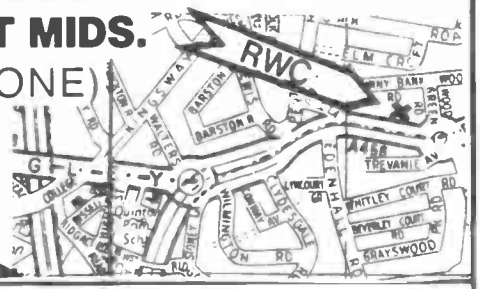

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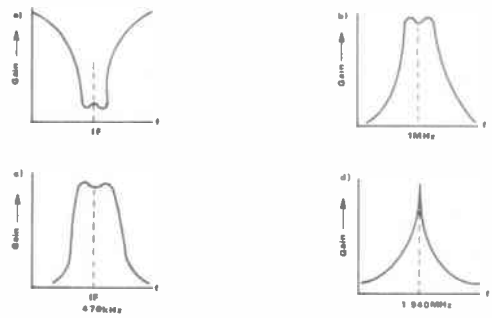

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AC127	0.30	BC183	0.10	BD946	0.75	BFY51	0.21	TIP34B	0.95		
AC128	0.25	BC183L	0.09	BD676	0.65	BFY56	0.25	TIP41A	0.45		
AC128K	0.32	BC184LB	0.09	BD410	0.65	BFY90	0.77	TIP41C	0.45		
AC141	0.25	BC284	0.10	BD434	0.65	BLY48	1.70	TIP42C	0.47		
AC141K	0.24	BC307B	0.15	BD437	0.75	BR100	0.25	TIP47	0.80		
AC142K	0.30	BC208B	0.13	BD438	0.75	BR101	0.45	TIP120	0.80		
AC176	0.22	BC212	0.09	BD660	0.85	BR103	0.25	TIP125	0.65		
AC176K	0.21	BC212L	0.09	BD636	0.85	BR393	0.65	TIP142	1.75		
AC187	0.25	BC212LA	0.09	BD697	0.85	BRC4443	1.15	TIP146	2.75		
AC187K	0.25	BC213	0.09	BD701	1.25	BRY39	0.45	TIP161	2.95		
AC188	0.25	BC213L	0.09	BD702	1.25	BT100A/02	0.85	TIP2955	0.85		
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AD142	0.70	BC214C	0.09	BDX32	1.50	BT116	1.50	TIS91	0.30		
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AF124	0.65	BC264	0.20	BF177	0.25	BU205	1.30	2N3054	0.80		
AF125	0.35	BC309	0.30	BF178	0.30	BU208	1.30	2N3055	0.82		
AF126	0.32	BC301	0.30	BF179	0.34	BU208A	1.55	2N3702	0.12		
AF127	0.65	BC303	0.25	BF180	0.29	BU208D	1.54	2N3703	0.12		
AF139	0.40	BC307B	0.09	BF181	0.29	BU326	1.30	2N3704	0.12		
AF150	0.60	BC327	0.10	BF182	0.29	BU326S	1.50	2N3705	0.30		
AF178	1.95	BC328	0.10	BF183	0.29	BU407	1.34	2N3706	0.12		
AF239	0.48	BC337	0.10	BF184	0.28	BU800	2.25	2N3708	0.12		
AU106	4.50	BC338	0.09	BF185	0.28	BU808A	1.95	2N3733	0.50		
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BC107B	0.11	BC547	0.10	BF198	0.10	MJE2955	1.50	2N4444	1.15		
BC108	0.10	BC548	0.10	BF199	0.14	MJE340	0.40	2N5294	0.45		
BC108A	0.11	BC548A	0.10	BF200	0.40	MJE350		2N5296	0.48		
BC108B	0.12	BC549	0.14	BF241	0.18	MJE520	0.48	2N5298	0.50		
BC109	0.10	BC557	0.09	BF244	0.30	MJE2955		2N5485	0.45		
BC109B	0.12	BC557B	0.09	BF257	0.30	MPSA13	0.30	2N5496	0.95		
BC109C	0.12	BC558	0.10	BF258	0.28	MPSA92	0.30	2SA329	0.95		
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BC117	0.19	BD115	0.80	BF273	0.18	MRF453	17.50	2SC496	0.80		
BC119	0.24	BD124P	0.89	BF336	0.34	MRF454	26.50	2SC931D	0.95		
BC125	0.25	BD131	0.48	BF337	0.29	MRF456	17.50	2SC1096	0.80		
BC139	0.20	BD132	0.42	BF338	0.32	MRF475	2.95	2SC1106	2.50		
BC140	0.31	BD133	0.40	BF355	0.27	MRF477	10.00	2SC1172Y	2.20		
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BC142	0.21	BD136	0.30	BF363	0.66	OC23	1.50	2SC1306	1.40		
BC143	0.24	BD137	0.32	BF371	0.25	OC30	2.25	2SC1307	1.75		
BC147A	0.12	BD138	0.30	BF394	0.19	OC36	2.25	2SC1364	0.50		
BC147B	0.12	BD139	0.32	BF422	0.52	OC42	0.75	2SC1449	0.80		
BC148A	0.09	BD140	0.30	BF423	0.35	OC44	0.75	2SC1678	1.25		
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BC157	0.12	BD166	1.50	BF458	0.33	OC75	0.55	2SC1957	0.80		
BC158	0.09	BD165	0.55	BF597	0.55	OC81	0.50	2SC1969	1.95		
BC159	0.09	BD179	0.72	BFR39	0.23	OC16W	2.50	2SC2026	1.15		
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BC171	0.09	BD202	0.85	BFR88	0.30	R2322	0.55	2SC2091	0.85		
BC171A	0.10	BD203	0.70	BFR90	1.50	R2323	0.60	2SC2098	2.95		
BC171B	0.10	BD204	0.70	BFR91	1.75	R2540	2.45	2SC2166	1.95		
BC172	0.10	BD222	0.46	BFT42	0.55	RCA16334	0.80	2SC2314	0.80		
BC172B	0.10	BD223	0.89	BFT43	0.55	RCA16335	0.80	2SC2371	0.35		
BC172C	0.10	BD225	0.48	BFW61	0.80	S2060D	0.95	2SC931D	0.95		
BC173B	0.10	BC232	0.55	BFW92	0.55	SKE5F	1.45	1SD234	0.80		
BC174	0.09	BD233	0.55	BFX29	0.30	TIP29	0.40	2SD325E	1.55		
BC174A	0.09	BD234	0.35	BFX84	0.25	TIP29C	0.42	3N211	2.95		
BC177	0.15	BD235	0.49	BFX85	0.25	TIP30C	0.43	3SK88	0.95		
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CME1426GH	45.00	D14-181GM50	55.00	M23-112GW	55.00	SE4/D-P7	45.00
CME1428W	39.00	D14-182GH	55.00	M23-112KA	55.00	SE42BP31AL	55.00
CME1523W	39.00	D14-200BE	55.00	M23-112LD	55.00	SE42BP31	55.00
CME1431GH	39.00	D14-200GA/50	55.00	M24-120GM	55.00	SE5Fp31	55.00
CME1431W	39.00	D14-200GM	75.00	M24-120LC	55.00	T937	55.00
CME202GH	45.00	D14-210GH	75.00	M24-120WAR	55.00	T948N	55.00
CME2024W	45.00	D14-270GH/50	75.00	M24-121GH	55.00	T948H	55.00
CME2325W	45.00	D14-310W	110.00	M28-12GH	55.00	V4150LC	55.00
CME3128W	45.00	D14-320GH/82	55.00	M28-13LC	49.00	V5004GR	59.00
CME3132GH	45.00	D14-340GH/KM	45.00	M28-13LG	49.00	V5004LD	59.00
CME3156W	45.00	D14-340KA	45.00	M28-13GR	49.00	V6001GH	55.00
CRE1400	25.00	D16-100GH	55.00	M28-131GR	55.00	V6007DP31	59.00
CV429	59.00	D16-100GH/65	59.00	M28-133GH	55.00	V6008GH	59.00
CV1450	35.00	D16-100GH/67	55.00	M31-101GH	55.00	V6034WA	59.00
CV1526	19.00	D16-100GH/79	59.00	M31-182GR	55.00	V604CLA	59.00
CV2185	19.00	D16-100GH97	55.00	M31-182GV	53.00	V6048J	49.00
CV2191	19.00	D16-160GH	59.00	M31-184W	55.00	V8052GR	55.00
CV2193	19.00	D21-10GH	55.00	M31-184GH	55.00	V8064BP31	55.00
CV5119	55.00	DB7.36	35.00	M31-184P31	55.00	V6064CLA	55.00
CV5320	55.00	DB7.36	55.00	M31-186W	55.00	V8069GH	55.00
CVX389	55.00	DG7.5	55.00	M31-190GH	55.00	V6070P31	49.00
D9-110GH	39.50	DG7.32	45.00	M31-190GR	55.00	V7016A	55.00
D10-210GH	45.00	DH3.91	55.00	M31-190LA	55.00	V7030	59.00
D10-210GH66B	55.00	DH7.91	45.00	M31-191GV	55.00	V7031GH	59.00
D10-230GH	35.00	DP7.5	35.00	M31-220W	59.00	V7031/67A	59.00
D10-230GM	35.00	DP7.6	35.00	M31-270GY	55.00	V7035A	49.00
D10/293GY/90	55.00	DN13.7B	35.00	M31-271P31	55.00	V7037GH	45.00
D13-30GH	49.50	F16-101GM	75.00	M31-271GW	55.00	V8004GR	55.00
D13-47GH/26	99.00	F16-101LD	75.00	M31-271W	55.00	V8006GH	55.00
D13-47GH	55.00	F21-130GR	75.00	M36-141W	75.00	V8010A	55.00
D13-51GL/26	55.00	F21-130LC	75.00	M36-170LG	75.00	VCR139A	11.50
D13-61GM/26	55.00	F31-10GH	75.00	M38-103GR	55.00	2BP1	9.00
D13-450GH/01	55.00	F31-10GM	75.00	M38-120W	55.00	3BP1	11.50
D13-471GH/26	55.00	F31-10LC	75.00	M38-120WA	55.00	3DP1	11.50
D13-600GM	99.00	F31-10LD	75.00	M38-121GHR	55.00	4EP1	30.00
D13-610GH	59.00	F31-12LC	75.00	M38-121LA	55.00	3H/OBM	55.00
D13-611GH	59.00	F31-12LD	75.00	M38-122GW	55.00	3WP1	15.50
D13-611GM	59.00	F31-13GR	75.00	M38-140LA	55.00	5BP1	9.00
D13-630GH	59.00	F31-13LD	75.00	M38-142LA	55.00	5BHP1	30.00
D14-150GH	75.00	F31-13LG	75.00	M38-341P31	55.00	5BHP1FF	30.00
D14-150GM	75.00	F41-123LC	185.00	M38-344P39	55.00	5BHP31	30.00
D14-172GH/84	59.00	F41-141LG	185.00	M40-120W	59.00	5CP1	10.00
D14-172GR	55.00	F41-142LC	185.00	M43-12LG/01	55.00	6EP7/S	39.00
D14-172GV	55.00	M7-120W	19.00	M44-120LC	55.00	13BP1	13.50
D14-173GH	55.00	M14-100GM	45.00	M44-120GR	55.00	13BP4	17.50
D14-173GM	59.00	M14 100LC	45.00	M50-120GH	55.00	17DWP4	25.00
		M17-151GVR	175.00	M50-120GR	55.00	32J/1085	69.00
		M17-151GB	175.00			86D/88B/89D/89L	15.00
						1273	39.00
						1584	39.00
						1844	45.00
						55451GM	75.00
						9442E1	80.00
						95447GM	75.00
						95449	75.00
						7709631	79.50

VIDEO SPARES

HEADS

2HDS £29.50

Suitable for Ferguson 3V00, 3V01, 3V06, 3V16, 3V22, 3V23, 3V24, 3V29, 3V30, 3V31, 8903 and many JVC, Akai, Nordmende, Telefunken

4HDS £32.95

Suitable for National Panasonic NV333 340, 2000, 3000, 7000, 7200 7500, 8170, 8400, 8800, 8610F, 8620. Blaupunkt RTV 100E, 200 202, 211, 222, 322, RTX100, 200, 224

P8HS £39.50

Suitable for Sony C5, C6, C7, 8000, 8080 Toshiba V5470, V8600, V8700.

NEW

★ Video head cleaning tape (VHS Auto Wet/Dry) £6.50

★ Video Head Aerosol Cleaner £9.85

★ Video Copying lead and connector kit 'ZV' £7.95

VIDEO BELT KITS

Akai VS 9300/9500/9800	£3.75
Ferguson 3V 16	£4.50
JVC HR 3330/3600	£4.50
JVC HR 3360/3660	£4.50
Panasonic NV 300	£4.00
Panasonic NV 2000B	£3.75
Panasonic NV 3000B	£3.75
Panasonic NV 7000	£3.50
Panasonic NV 8600B/8610B/V011	£3.75
Sanyo VTC 5500	£3.75
Sanyo VTC 9300	£3.75
Sanyo VTL 9300P	£3.90
Sharp VC 6300	£3.75
Sharp VC 8300	£3.75
Sharp VC 9300	£3.75
Sony SL 3000B	£3.75
Sony SL 8000/8080	£4.50
Sony SL C7/J7	£4.00
Toshiba V7540	£4.50

TAPE HEADS

Mono Head	1.50
Auto Reverse	3.50
Stereo Head	2.95

ELECTRO-OPTICAL

9677M	22.00
P4231BAM	19.00
XP1002	29.00
XP1117M	24.00
XP42040	35.00
9524H	22.00

DIODES

AA119	0.08	BY210-800	0.33	1N23B	2.95
BA115	0.13	BY223	0.90	1N23C	2.95
BA145	0.16	BY298-400	0.22	1N23ER	2.95
BA148	0.17	BY299-800	0.22	1N23WE	2.95
BA154	0.06	BYX10	0.20	IN4001	0.04
BA156	0.15	BYX36-150R		IN4003	0.04
BA157	0.30		0.20	IN4004	0.05
BAX13	0.04	BYX38-600R		IN4005	0.05
BAX16	0.06		0.60	IN4007	0.05
BB105B	0.30	BYX55-600	0.30	IN4148	0.02
BT151	0.79	BYX71-600	1.10	IN4448	0.10
BY126	0.10	BZX61	0.15	IN5401	0.12
BY127	0.11	BZY96	0.10	IN5402	0.14
BY133	0.15	BZY95C300	0.35	IN5403	0.12
BY164	0.45	CS46	4.50	IN5406	0.13
BY178	1.20	CS10B	8.45	IN5407	0.16
BY179	0.63	OA47	0.09	IN5408	0.18
BY182	0.55	OA90	0.06	ITT44	0.04
BY184	0.35	OA91	0.06	ITT923	0.15
BY199	0.40	OA95	0.06	ITT2002	0.10
BY206	0.14	OA202	0.10		
BY208-800	0.33	1N21DR	2.95		

BASES

B5D	5.50
B7G	0.25
B7G SKTD	0.25
B8G	0.35
B8H	0.70
B9A	1.50
B9ASKTD	0.40
B9G	0.75
B10B	0.20
B13B	0.50
B14A	3.00
12 Pin CRT	0.85
Nuvistor	2.95
Octal	0.35
SK610	35.00
UX5	1.75
Valve Can	0.30
8 Pin Dil	0.14
14 Pin Dil	0.18
16 Pin Dil	0.17
18 Pin Dil	0.18
Socket for 813	0.50

WIREWOUND RESISTORS

4 Watt 2R4-10K	0.20
7 Watt R47-22K	0.20
11 Watt 1R5-15K	0.25
17 Watt 1R-15K	0.30

ZENER DIODES BZX61 0.15

6V2 7V5 8V2 9V1 10V
11v 12V 13V 15V 16V
18V 20V 22V 24V 27V
30V 33V 36V 39V 47V
51V 56V 68V 75V

THERMISTORS

VA1040	0.23
VA1056S	0.23
VA1104	0.70
VAT8650	0.45
VA1097	0.25

BZY88 0.07

2V7 3V 3V3 3V6 3V9 4V3
4V7 5V1 5V6 6V2 6V8
7V5 6V2 9V1 10V 11V
12V 13V 15V 18V 20V
24V 27V 30V

BATTERIES

7V Power Mike batteries TR175 £2.25 ea other prices on request

LINE OUTPUT TRANSFORMERS

DECCA 100	7.95
DECCA 1700 MONO	8.95
DECCA 1730	8.95
DECCA 2230	8.25
GEC 2040	8.95
GRUNDIG 1500	18.45
GRUNDIG 5010-6010 2222 5011-6011	13.45
ITT CVC20	8.20
ITT CVC30	8.25
PHILIPS G8	8.50
PHILIPS C9	6.99
PHILIPS G11	13.39
PYE 725	10.95
RBM T20A	12.40
TANDBERG 90	11.15
TELEFUNKEN 711A	11.15
THORN 1590	9.50
THORN 8000	8.20
THORN 9000	9.95
THORN 9800	22.40
THORN MAINS TRANSFORMER 3000/3500	8.70

SOLDERING EQUIPMENT

25W Antex Iron	4.59
Weller Instant Heat Gun	11.30
240V Weller Marsman	4.74
½ Kilo Solder 60/40	6.95

EHT MULTIPLIERS

ITT CVC20	6.35
ITT CVC30	6.35
PHILIPS G8 550	6.96
RANK T20A	6.91
THORN 3000/3500	7.57
THORN 8500	5.50
THORN 9000	6.00
UNIVERSAL TRIPLER	5.45

REPLACEMENT ELECTROLYTIC CAPACITORS

DECCA 30 (400-400/350V)	2.85
DECCA 80/100 (400/350V)	2.99
DECCA 1700 (200-200-400-350V)	3.55
GEC 2110 (600/300V)	2.25
ITT CVC20 (220/400V)	1.80
PHILIPS G8 (600/300V)	2.25
PHILIPS G9 (2200/63V)	1.19
PHILIPS G11 (470/250V)	2.35

POTENTIOMETERS

STANDARD VERTICAL POTS	0.12
MIN VERTICAL POTS	0.12
STANDARD HORIZONTAL POTS	0.12
MIN HORIZONTAL POTS	0.12
CONVERGENCE PRE-SETS	0.30
SLIDERS LOG	0.48
SLIDER LINEAR	0.48

SPARES & AIDS

HEAT SINK COMPOUND	1.00
FREEZE IT	0.95
SOLDA MOP	0.64
SWITCH CLEANER	0.85
WD40	1.25
PUSH PUSH MAINS SWITCH (DECCA, GEC, RANK, THORN ETC)	1.02
PYE IF GAIN MODULE	6.99
ANODE CAP (27KV)	0.69

PUSH BUTTON UNITS

DECCA ITT CVC20 6 WAY	7.95
ITT CVC5 7 WAY	10.19
PHILIPS G8 (550) 6 WAY	14.49

VARICAP TUNERS

ELC1043/05 MULLARD	8.85
ELC1043/06 MULLARD	8.85
U321	8.25
U322	8.25

20MM ANTI SURGE FUSES

100MA-800MA	15p each
1A-5AMP	12p each

20MM QUICK BLOW FUSES

100MA	8p each
200MA-5AMP	5p each

STRAIGHT & LEVEL

HIGH-POWER RESISTOR

A new HVR series of high-voltage high-power resistors has been announced by the CGS Resistance Company.

The thick film resistor element has minimum inductance and negligible capacitance, allowing the resistors to operate at high frequency and withstand significant voltage surges.

The resistors can operate up to 125kV. Good humidity protection is afforded by their conformal resin coating. Connection may be made via steel tabs, silver rings or brass bushes.

The HVR series is ideal for applications in lasers, RF power and X-ray equipment, high-voltage power supplies, high-voltage probes, and dummy loading.

Power ratings are from 5 to 50W in air (10 to 100W in oil). Values available are from as low as 500 ohms (ideal for high-frequency dummy loading applications), up to 1 gigaohm. Tolerance on value is typically ten per cent, with five per cent and one per cent selections available.

For further information contact: *The CGS Resistance Company Ltd, Downley Road, Havant, Hants PO9 2NL. Tel: (0705) 453611.*

AUDIOBRIDGE

WPO Communications have announced the introduction of a Mk II version of their audiobridge, designed as an operating aid for the visually handicapped radio amateur.

The instrument comprises a frequency independent power and SWR meter for use over 1.8-30MHz at RF powers of up to 400W PEP, but with the addition of a voltage controlled audio oscillator driven by the forward or reflected rectified voltage from the metering circuits. This enables the unsighted operator to adjust his transmitter for optimum power output and best SWR by audio means only.

The unit is battery driven (PP3) and is housed in a durable case, size 12 x 13 x 4cm. RF input and output is by UHF (SO239) connectors and there are only two operating controls used, making operation easy. The unit can be left in circuit at all times, is supplied ready built and tested and priced at £48 including VAT + P&P.

Complementing the audiobridge is the company's talking frequency meter. This is designed to assist unsighted amateurs in determining their transmit frequency, although the unit can be used for any of the applications a normal frequency counter could be put to, including frequency readout under difficult operating conditions. It covers 500kHz to 150MHz (minimum) in two ranges, with a resolution of 100Hz between 500kHz and 30MHz, and 1kHz between 30MHz and 150MHz.

Speech is of good quality through its own built-in speaker, and the meter features either manual or automatic repeat operation, with selectable 2, 4 or 6 digit groups of figures spoken. The unit has high sensitivity at HF, reverse polarity plus input protection. It operates from a 12V external supply and is supplied ready built and tested. The unit is priced at £179 including VAT + P&P.

Further information on the audiobridge and talking meter can be obtained from: *WPO Communications, 20 Farnham Avenue, Hassocks, West Sussex BN6 8NS. Tel: (07918) 6149.*

CIRKIT CATALOGUE

The new autumn edition of the Cirkit catalogue, containing 128 pages of components for the electronic hobbyist, was published in early September at the cover price of £1.15. It is available by post from Cirkit or over the counter at high street newsagents, and features many new products.

The publication coincides with the commissioning by Cirkit of the latest IBM36 series computer, with sophisticated custom designed software, which the

All the latest news, views, comment and developments on the amateur radio scene

company hope will streamline stock control and order processing towards planned improvements in the company's service to its customers.

Introduced for the first time in the autumn catalogue is the WPO range of kits. Also highlighted is a low-price offer on modems and interface units designed for the Amstrad computer. A new printer at a similar price is also included.

Adding to the wide choice of electronic tools from leading manufacturers featured in the catalogue, Cirkit have now also introduced an expanded range of the latest Weller soldering irons and Xcelite products.

The new Cirkit catalogue is fully illustrated with photographs and line drawings plus detailed product information, and the selection of books for the constructor has been increased.

When placing four individual orders of £15 or more from the catalogue, readers can on each occasion take advantage of a £1 discount voucher.

For further information contact: *Cirkit Holdings plc, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111.*

AUDIO AMP KIT

A complete single-channel audio amplifier kit, designed for high performance professional sound reinforcement or home audio systems, is now available from Electronic and Computer Workshop Ltd (ECW). It provides 240 watts of music power into a 4 ohm load.

The kit, no K2587, features MosFET power transistors and is supplied with a toroidal power supply and a large heatsink. The amplifier is fully protected against thermal overloads and features automatic quiescent current compensation. In addition, the output circuit is completely safe against short circuits.

The kit is graded at difficulty level 3, and should cause no difficulty for those who have experience of circuit assembly and the use of a fine-tipped soldering iron. Once assembled, only two circuit adjustments are required, using an ordinary multimeter.

Total harmonic distortion is quoted at 0.05% and frequency response is 20Hz to 20kHz ±0.1dB. Damping factor is 200 and the signal-to-noise ratio is 100dB. Input sensitivity is 800mW.

The kit is priced at £172.48, including P&P and VAT.

For further information please contact: *Electronic & Computer Workshop Ltd, 171 Broomfield Road, Chelmsford, Essex CM1 1RY.*

NEW HAND-HELD

ICS Electronics Ltd, of Arundel, West Sussex, have been appointed the exclusive UK distributor for a new range of hand-held and mobile transceivers from Alinco International Ltd of Japan.

The initial product to be introduced is a hand-held transceiver, the new ALM203E 2 metre hand-held transceiver. This push-button, keypad operated transceiver is housed in a robust high impact plastic/cast aluminium case.

Included in the price is a 400mAH Nicad battery pack to give 3W output, an ac battery charger, a belt clip and antenna and hand strap as well as various attractive features, one of which is a built-in S-meter.

The unit is priced at £209.00 inc VAT (plus 2.50 P&P), and is available direct from: *ICS Electronics Ltd, PO Box 2, Arundel, West Sussex BN18 0NX. Tel: (024 365) 590.*

SHORT CIRCUIT-PROOF TRANSFORMER

A range of miniature transformers is now available from Avel-Lindberg. They incorporate an internal PTC (positive temperature coefficient) device which automatically breaks the primary circuit if the transformer becomes overloaded. The advantage of this system, as opposed to normal fuses, is that the transformer will revert to normal operation as soon as the transformer has cooled sufficiently to allow the PTC to return to its conducting state.

A single primary winding for operation at 240V, 50/60Hz is provided and single secondary windings of 6, 8, 9, 12, 15, 18 and 24V, and dual windings of 6, 8, 9, 12, 15 and 18V, are available. The transformers with single secondary windings are all rated at 1.0VA and those with dual secondaries are rated at 2.0VA.

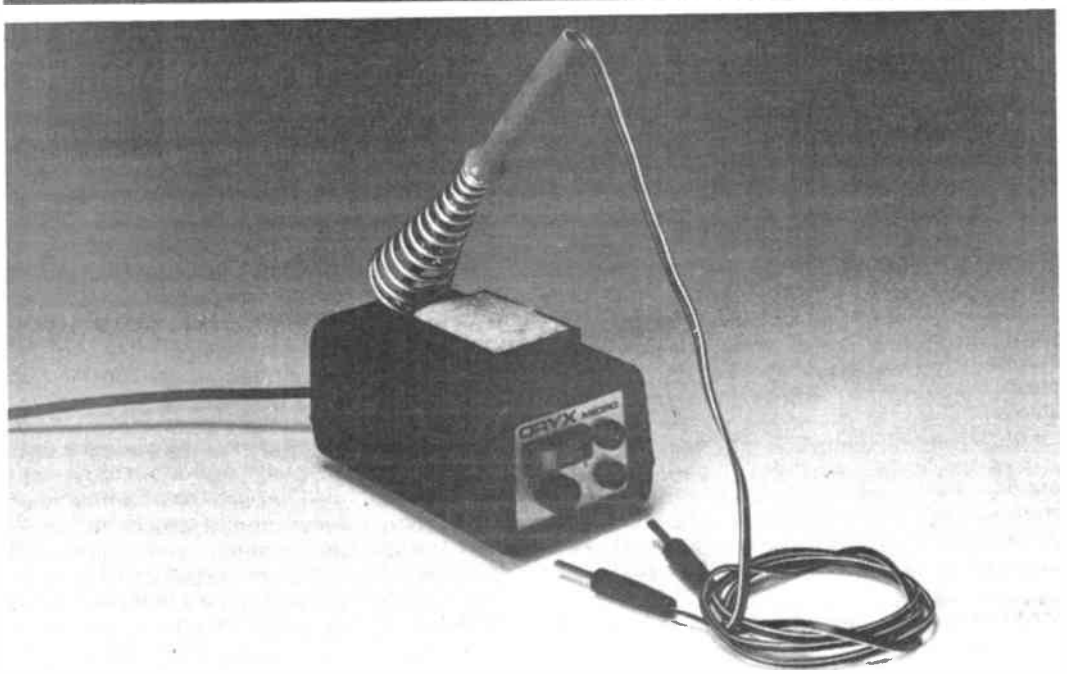
The overall dimensions are 44mm x 37mm and the height is only 33mm. Mounting is by direct soldering to the printed circuit board and extra rigidity can be achieved by inserting self-tapping screws through holes moulded into the thermoplastic case.

The maximum operating temperature is +40°C above ambient, the insulation is to Class E and these transformers conform to IEC 65 Class 2, BS 415 Class 2 and VDE 0551 Class 2.

The use of a PTC to achieve short circuit protection enables the regulation to be kept to a minimum and makes the transformer very suitable for full wave and bridge rectifier circuits, particularly as the dual secondaries can be operated in series or parallel. Each transformer is subjected to a 5000V ac proof test.

For further information contact: *Avel-Lindberg Ltd, South Ockendon, Essex RM15 5TD. Tel: (0708) 853444.*

STRAIGHT AND LEVEL



MICRO PSUs

New fixed voltage units have been designed to feed the Oryx micro range of soldering irons. Available in output voltages of 6-12-24 and rated at 25 watts, these units may also be used for general purpose power supply needs. The solder stand is removable.

Inputs available are 115-220 or 240 volts, and each unit is presented in an attractive case measuring approximately 130mm long by 75mm wide by 60mm high. Both inputs and outputs are designated at the point of ordering and cannot be varied by the user.

Also new from Oryx is the series FS1 fume extract system. This totally self-contained unit does not require any expensive extraction facility. Competitively priced and very versatile, the FS1 can be purchased as a complete station with a choice of two irons, or as power supply/pump unit only for use with other suitable irons. Housed in a strong metal box, this compact unit is an ideal bench station.

Output is 24 volts at 50 watts, with 115/220/240 volt inputs.

For further information contact: *Greenwood Electronics, Portman Road, Reading RG3 1NE. Tel: (0734) 595843.*

BBC SOFTWARE

A new piece of software for the BBC computer which is aimed at the amateur radio enthusiast has been devised by J Melvin G3LIV of Newcastle.

Many manufacturers of amateur radio gear are now supplying a data input socket on their equipment. The interfaces can be purchased from these companies but these are quite expensive, and G3LIV and his son, G8UEE, noticed that there seemed to be no readily available software.

This was the inspiration behind the production of a range of software to allow the BBC computer to drive receivers and transceivers with fitted data input sockets. Existing interfaces or the Melvin's own interface may be used.

The first program is for the Yaesu 757GX transceiver. This allows complete control of the equipment with many extra facilities supplied by the program.

Up and down cursors can select frequency steps of 10Hz, 100Hz, 1kHz, 10kHz. Left and right cursors give 1MHz steps. There is control of fitted A/B VFOs, direct keyboard frequency entry, and 300 memory storage, with over-write or recall facility.

In fact, this program will allow the owner of the equipment to check 300 station frequencies in a matter of seconds.

Programs currently being considered are for the FT9600, FRG8800, FT980, and others in the Trio range. Readers should indicate their interest and the Melvins will work on the most popular request.

The Yaesu program is available on disc (£9.50) and will shortly be produced on ROM (£12.00). The price of the interface is still to be finalised, but should be in the region of £25.00.

Further information can be obtained from: *J Melvin G3LIV, 2 Salters Court, Gosforth, Newcastle, Tyne and Wear NE3 5BH. Tel: (091) 2843028.*

PACKET RADIO MODEM

In their continuing endeavour to promote and foster Packet Radio, the Sydney Amateur Digital Communication Group have commenced development of a complete Australian designed amateur Packet Radio system.

Rather than enter into conflict with various groups that have purchased semi-commercial equipment, the SADCG have set their design objectives around a system that will satisfy most groups. The TNC has improved software, handling both Vancouver V2 and ARRL AX25 version 2, allowing multiple digipeating. This TNC will be available in December.

Currently the SADCG have just completed design of a high performance AFSK radio modem board based on the AMD7910 world modem chip. This modem provides both CCITT and Bell modem frequencies. It is tailored for use on UHF, VHF and HF voice grade channels and incorporates a PTT watch dog timer. The AMD7910 was selected because of its ability to handle noisy conditions as found on HF and satellite operations.

This modem will interface via RS-232/V24 to a TNC or computer. It can also be interfaced to amateur transceivers.

The circuit has the option to generate a DCD signal from either the external squelch signal from the radio or internally generated DCD from the 7910, or both.

The radio modem printed circuit board, together with construction information, is available for $22, post free, from: *SADCG, PO Box 231, French's Forest, NSW 2086, Australia.*

20MHZ OSCILLOSCOPE

New from House of Instruments is the Trio CS-1021, a 20MHz dual-trace oscilloscope which has an accuracy of ±3%.

The CS-1021 has a 150mm rectangular high-intensity cathode-ray tube (CRT) with an approximate accelerating potential of 2kV, which ensures a bright display and high resolution and eliminates parallax-caused reading errors. The X-Y display mode is useful in measuring phase differences of two input signals.

The vertical axis sensitivity is continuously settable by means of an attenuator from 1mV/div to 5V/div, the former range being particularly suitable for observing complex, low level waveforms.

Other features of the oscilloscope include a continuously variable sweep time from 0.5s/div to 0.5μs/div in 19 ranges, a sweep expansion function which allows detailed study of a part of a waveform, and a V mode which uses the input mode to select the trigger source.

For further details contact: *House of Instruments, Raynham Road, Bishop's Stortford, Herts CM23 5PF. Tel: (0279) 55155.*

STRAIGHT & LEVEL

BALUN

New from G2DYM, manufacturers of anti-TVI trap dipoles, is a balun to match an unbalanced output of a transmitter or input of a receiver to a balanced anti-TVI 75 ohm twin feeder.

It incorporates a changeover switch to allow use with either a dipole or trap dipole or a Marconi 'T' for 160m, shipping, long and medium waves. The balun has a rating of 1.5 to 30MHz/500W PEP, SSB or CW.

The switched balun matching unit with Marconi 'T' facility costs £19.50; the same balun without the Marconi 'T' facility costs £17.00, £1.50 postage and packing for both models.

More details can be obtained from: *G2DYM, Uplowman, Tiverton, Devon EX16 7PH. Tel: (03986) 215.*

INTELLIGENT MULTIMETER

Electronic Brokers has recently introduced the Thurlby 1905a 5½-digit intelligent multimeter, which has facilities for computing and data storage.

Incorporating, as standard, dc and ac voltage, dc and ac current, resistance, and diode test ranges, the instrument has all the functions and capabilities of a conventional bench multimeter combined with a scale length of ±210,000 counts and a maximum resolution of 1μV, 1mΩ and 1nA, and a 0.015% basic one year dc accuracy.

The model 1905a also has a set of computing and data storing functions which are easily carried out by a simple and consistent entry sequence combined with clear LED display prompt and a logical keyboard arrangement.

Programs available include linear scaling with offset, percentage deviation, limits comparison and logarithmic measurements.

Up to 100 readings at any required time interval between 3 readings per second up to 1 reading every 2 hours can be stored by the multimeter.

A recall sequence allows any reading to be brought back to the display whenever required.

For more details contact: *Electronic Brokers Ltd, 140-146 Camden Street, London NW1 9PB.*

XTRA STICKY

The newest product from Loctite, Super Glue Xtra, is now available from STC Electronic Services.

This thixotrophic adhesive has a gel consistency which allows the user to apply it to overhead or vertical surfaces and to porous materials such as wood, ceramics and cork.

Super Glue Xtra will join a variety of materials including metals, rubbers and rigid plastics. It is available in both 3gm and 20gm tubes.

For further details contact: *The Tool Group, STC Electronic Services, Edinburgh Way, Harlow, Essex CM20 2DF. Tel: (0279) 26777.*

AUTO RCL METER

Electronic Brokers has introduced the Philips PM6303 RCL meter, which automatically determines the value, electric dimension and, equivalent circuit of passive components to an accuracy of ±0.25% ±1 digit over a wide range. The measured value, together with the corresponding dimension and the equivalent circuit graphics are easily read on a large 18mm, 4-digit liquid crystal display.

Connection of a component to be tested is carried out easily and rapidly using either a two or four wire connector or an optional test attachment.

Less than a second after attachment, the component's measured value, its effective dimension, and its equivalent circuit are clearly displayed on the LCD.

Apart from using the auto mode, it is possible to select from a maximum of nine differing parameters (D, Q, Rp, Rs, Z, Ls, Lp, Cs or Cp and Cs – 2V bias) using only two push-buttons.

For further information contact: *Electronic Brokers Limited, 140-146 Camden Street, London NW1 9PB.*

DIGITAL MULTIMETER

The Monacor DMT-700, from Croydon Discount Electronics, is a pocket-sized (67×112×25mm) 3½-digit LCD digital multimeter.

It has thirteen ranges, as follows: 0-1kV dc (four ranges); 0-500V ac (two ranges); 0-200mA dc (three ranges); 0-2kΩ (four ranges).

There is effective overload and transient protection on all ranges, over-range indication on each range, and full auto-polarity operation.

The company believes that the multimeter's handy size, and the fact that it is devoid of superfluous ranges, makes it a practical investment for both the electronics enthusiast and the engineer.

It comes boxed with battery, fuse, test leads and instruction manual, and costs £29.95. Further information is available from: *Croydon Discount Electronics, 38 Lower Addiscombe Road, Croydon, Surrey CR0 6AA.*

ATU UPDATE

ATUs UK, of Cap Co Electronics Ltd, formerly TAU Systems Ltd, have announced modifications to the SPC-300 and SPC-3000 aerial tuning units.

The eight tie bars in the original design of both units were made of metal. These have now been replaced with acetole.

The metal tie bars were discovered to introduce extra inductance, which did not help on 10 metres.

The long connection lead from the split stator through the tie bar to earth has been removed, and the company has shortened the spindle and increased its diameter on the front of the roller coaster.

On the roller coaster itself, the profile of the wheel has been deepened so that during normal operation it is possible for it to roll off the windings in its 'stop' position.

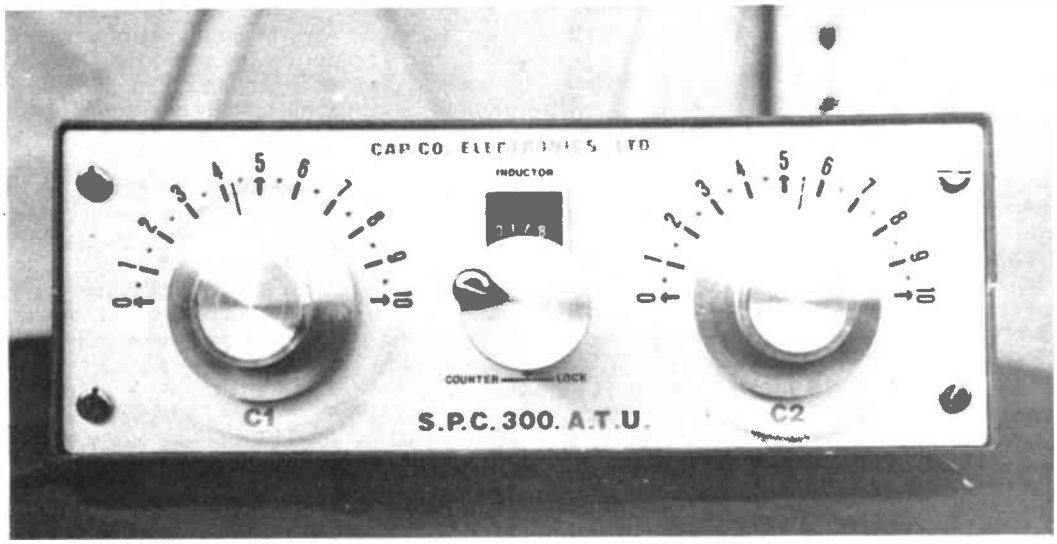
On the original models there was some difficulty in tuning 10MHz and 28MHz. Both frequencies are now tunable and the SPC-300, being smaller, will suit some amateurs whilst still handling up to 1kW, which is ample for the UK market.

The mechanical structure of the split stator capacitor has also been changed to one above the other, which not only eliminates the need to run a separate earth point but also greatly improves the mechanical balance of the rotor.

By altering the links on the front and rear of the units, the user can transform the SPC format into a transmatch, P1 match, L and C match, T match, C match, L match, etc.

The SPC-300 retails at £164.00 including VAT and the SPC-3000 at £214.00 including VAT.

Further information is available from: *ATUs UK of Cap Co Electronics, 63 Hallcroft, Birch Green, Skelmersdale, Lancs WN8 6QB. Tel: (0695) 27948.*



STRAIGHT & LEVEL

CLUB NEWS

Follow the bear

Gale force winds and torrential rain have flattened hopes of setting a long distance world record for transmitting on 2 metres VHF. The West Kent Amateur Radio Society abandoned their Heineken-sponsored attempt (see *Amateur Radio*, October)after their tents and equipment were battered by weather, which never gave them a hope of keeping to their schedules.

Perched 1,500 feet up a Galway mountainside, the 11 member group had no protection from the Atlantic gales which ravaged the coast all summer. Having lost one tent in a gale which almost blew down their aerial mast, most of the group retrieved what was left of their equipment and came home (maybe now they'll become Skolars?).

However, some members travelled on to the Arran Islands to carry out test transmissions from the protection of a stone cottage.

One of the expedition organisers, Nigel Peacock, commented: 'The weather was absolutely diabolical – we were totally washed out. We had to burn one of the tents as it was not worth bringing back, and had we tried to carry on I think we would have lost everything else. It's obviously disappointing after so much preparation.'

As Heineken appears to have failed to refresh parts sufficiently during this attempt, the club would be well advised next time to 'follow the bear'.

EGM proposal

As RSGB members will, no doubt, already know, an Extraordinary General Meeting has been proposed by G4AJJ, G6JNS and G3GJW with the aim of putting forward ideas for change within the society which they believe will be beneficial to all members and the long term future of the hobby.

In a document by Ingemar Lundegard G3GJW, entitled 'The RSGB: A Need For Reorganisation', he points out that 'a minority of people are on too many committees and staying on them for too long', which prevents the introduction of fresh ideas. A motion will be set out before the EGM to limit members' service on council and/or committees to six years.

It will also be proposed that council members, the vice-president and the president should be elected by secret postal ballot. Candidates must provide a statement giving not only biographical details but also a clear idea of what he/she would hope to achieve if elected. As G3GJW points out, 'There is no point in electing people about whom you know nothing at all'.

To guarantee impartiality, all ballots would be supervised by the Electoral Reform Society.

Copies of this document and the agenda for the EGM can be obtained from: *T I Lundegard G3GJW, 'Saxby', Botsom Lane, West Kingsdown, Sevenoaks, Kent TN15 6BL.*

75 and still alive!

The Derby and District Amateur Radio Society will be celebrating its seventy-fifth anniversary next year, and is reputedly one of the oldest radio societies in the world.

The society, originally called the Derby Wireless Club, was established in 1911 by S Grimwood-Taylor and A Trevelyan-Lee, two local wireless experimenters, and was so successful that by 1912 the club was giving advice to amateurs in various parts of the world through the pages of *English Mechanic.*

Over the next few years the club continued to flourish and encourage the formation of similar organisations, although World War I reduced its activities somewhat and World War II caused them to cease altogether, when all transmitting equipment was confiscated by the authorities.

In 1947 it was decided to reform as the Derby and District Amateur Radio Society with the aim of catering for those with an interest in all aspects of radio and electronics.

An exhibition was staged in 1971 at the Derby Museum to commemorate the society's sixty years in amateur radio. Many of the items constructed by the club members in the early days have been preserved, together with original documents and photographs.

The society's original callsign was G3ERD (Experimental Radio Derby) and this is still used, along with G2DJ, formerly held by an early member, A T Lee, and G8DBY.

The society is planning many events for its anniversary year, details of which will be announced at a later date.

Meetings are held on Wednesday evenings, beginning at 7.30pm, at 119 Green Lane, Derby.

Poole Club Award

The Poole Radio Amateur Society has announced the Poole Club Award, the rules for which are as follows.

Activity for the award must take place between Sunday 15 December 1985 and Sunday 5 January 1986 inclusive.

Contacts may be made on any bands and modes with stations located in Poole, members of Poole Radio Amateur Society or the club station G4PRS. Points will be awarded for contacts in the following categories:

a) working a station located in Poole – 1 point;

b)working a member of Poole Radio Amateur Society – 5 points;

c) working G4PRS (which may be /A, /P, or /M for part of the time) – 20 points.

To qualify for the award stations must have obtained at least 50 points.

To claim the award, a log detailing claimed contacts should be submitted with 50p (2 IRCs for non-UK stations) to Colin Baverstock G4WCK, 28 Kingston Road, Poole, Dorset BH15 2LP, posted not later than 31 January 1986. No station may feature more than once in a log (even if on a different band or mode).

G4PRS will be active for several hours on most days during the period, mainly on 80m, 2m and 10m, although some activity on other HF and VHF bands is likely.

Restoration project

We recently received a plea for help from Mr W M James in Zimbabwe, who plans to restore some old equipment but is unable to obtain the relevant circuit/service diagrams and parts.

The instruments in question are a Rogers stereo amplifier, model HG88 Mk II, and an Erskine Laboratories Ltd oscilloscope Type 13, serial number 187, reference number 10S/825.

If you think you can help, write with details to: *Mr W M James, 32 Cawston Street, North End, Bulawayo, Zimbabwe.*

Behind the Iron Curtain

We occasionally receive letters from Eastern European amateurs who require equipment, books and magazines relevant to the radio and electronics hobby.

The latest plea comes from Poland. Pazur Stanislaw is willing to exchange copies of the Polish magazine *Radioelektronik*, records or classical music for the *Amateur Television Handbook*, volumes 1 and 2, *CQ-TV* magazine and *Television*, 1980-1985.

If you think you can help, write to: *Pazur Stanislaw, Tarnowiecka 3/35, 04-174 Warszawa, Poland.*

Focus on the ACC

A few years ago the original Amateur Computer Club (ACC), founded in 1974, split into two groups: the new Amateur Computer Club, which continues to publish the bi-monthly *ACCumulator*, and the Association of Computer Clubs (also ACC, just to confuse matters!), which represents clubs and user groups at a national level.

The Amateur Computer Club supports the 'hacker' – but members are quick to point out that they do not mean the database pirates who have recently adopted this title but rather the 'true hacker': the enthusiast who builds his own computer and add-ons and writes his own software.

ACCumulator is aimed at the DIY computer enthusiast and has published many designs, including most of the microprocessor chips.

Readers who are interested in this aspect of the computer hobby should contact: *Bazyle Butcher (Chairman), ACC, 16 St Peter's Close, Bushey Heath, Watford WD2 3LG.*

Errata

In Tony Smith's article, *Multipurpose Morse Unit*, published in the October issue, there was an error in the circuit diagram.

Transformer 2 must be connected across at the earth end, otherwise Tr1 is disconnected from the power supply and the unit will not work! Sorry!

Mirfield RC

The Mirfield Radio Club is a new organisation in Birmingham. Activities include CW on Tuesday evenings, club night on Wednesday, when the club station is in operation, and RAE tuition on Thursday evening. All activities begin at 7.30pm.

Anybody who is interested in joining the club should contact: *C Marks, 63 Alvis Walk, Chelmsley Wood, Birmingham B36 9JZ.*

Get your diary out!

The Verulam Amateur Radio Club usually meets on the second and fourth Tuesdays of each month. However, in December the meetings will be held on the first and third Tuesdays to avoid the Christmas holiday period.

On Tuesday 17 December the club will be holding its AGM at 7.30pm, followed by an informal social evening when members will be invited to show their films of the year's events. All visitors will be welcome.

All meetings take place at the RAF Association Headquarters, New Kent Road, Off Marlborough Road, St Albans.

Information is available from: *Hilary Claytonsmith G4JKS, 115 Marshalswick Lane, St Albans. Tel: (0727) 59318.*

Room for Improvement

The GlenRothes and District Amateur Radio Club (GM4GRC/GM3ULG) have carried out a lot of work on their clubrooms in the past few months, especially with regard to the installation of various antennas on the roof of the building.

A VHF system is now complete with a 4 element yagi for 4m,16 element yagi collinear for 2m and 16 element yagi for 70cm installed on a common rotator.

On HF the antennas have been erected but still require tuning before work is complete. The installation consists of a 3 element triband yagi for 10, 15 and 20m and dipoles for 40 and 80m. There is also a possibility that dipoles for 160m and the WARC bands may be added at a later date.

Those interested in finding out more about the club and its activities should contact. *Jim Burke GM4TNP, Provosts Land, Leslie, Fife, Scotland.*

Ghost in the machine?

If ghosting, co-channel reception or electrical interference are spoiling enjoyment of television or radio programmes help is available from a new guide published by the Department of Trade and Industry.

Called *How to improve television and radio reception*, it is available free of charge from main post offices.

The guide is aimed at giving DIY solutions for reception problems as nearly half of all reception problems are due to deficiencies or faults in the radio or television, the aerial lead or aerial, many of which can be remedied by the owner.

The first part of the illustrated guide is for householders and explains how to check equipment, diagnose the type of interference and gives simple and safe ways of solving the most common problems.

If, however, the problem is more complicated the second part of the guide is a technical section to help TV and radio dealers identify and resolve the interference. It deals with classes and sources of interference, check charts and information about filters, aerials and the relevant regulations and British Standards.

Electronic love

Here is a lighthearted piece spotted in the October issue of WACRAL'S (World Association of Christian Radio Amateurs and Listeners) newsletter:

If she wants a date – meter; if she comes to call – receiver; if she needs an escort – conductor; if she's been cheating – detector; if she's too fat – condenser; if she's too thin – feeder; if she's extravagant – limiter; if she's in error – rectifier; if her hands are cold – heater; if she's bossy – resistor; if she's bored – exciter; if she refuses – rejector.

L·E·T·T·E·R·S

REACTion

The Raynet article in the October issue of *Amateur Radio* made interesting reading, but as you subtitle the magazine *'For all two-way radio enthusiasts'* I would like to put the record straight as regards other users – public service by radio is not the prerogative of Raynet.

Citizens' Band has its corresponding organisation, REACT, which does a first class job and, given the resources, monitors channel 9 for 24 hours a day. In addition, there are many other organisations throughout the country which do a similar job where emergency cover is required. Since they are not subject to the third party traffic regulations imposed on amateur licensees, a major part of their operation is the marshalling and control of events, ranging from local carnivals to marathon events attracting thousands of entries.

The CB operators in my own area have on two occasions recently given RTA demonstrations involving the local police, fire brigade and St John's Ambulance, as well as Casualties Union.

Such demonstrations contribute considerably to public awareness of the role of the emergency services, as well as publicising the more non-hobby applications of radio communication (be it Citizen's Band or amateur radio).

I have nothing against Raynet, but I would like to see credit given also to the thousands of CB operators who give up the same amount of time and display the same dedication in providing a service in areas where amateur radio is scarcely known to the public – they do us no disservice.

P A Waddington G1ORW, Essex.

I can assure you that the article on Raynet was not meant to insinuate that the group's services are unique. I am sure that other groups provide as much of a service and would gladly give them similar coverage. Send us some info and we'll wave your flag.

FREE SPEECH?

I suppose one of the penalties of free speech is that we have to hear all viewpoints, no matter how prejudiced or non-factual.

Mr Ian Abel seems to reduce his own credibility each time he puts ink to paper, and he really should marshall his facts beforehand lest he becomes a laughing stock, in addition to being ignored by most thinking amateurs.

I refer of course to his latest gem, namely that the RSGB consists of people who have been in amateur radio for over 60 years. Of course some members were interested in 1925, but so what?

His current obsession (what will it be next month, one wonders?) is that only old men run the society. Let me give our mutual friend some facts, which he would be in possession of if he was a member.

Of the eighteen council members, three only were licensed prior to 1939, and in the case of regional representatives the figure is one out of 20. Taking the statistics further, of over 200 committee seats less than 30 are occupied by amateurs licensed prior to WW2.

In addition, I am reasonably sure that no member of the society staff falls into Mr Abel's category, because any schoolboy interested in wireless sixty years ago would now be well past retiring age!

It is appreciated that a vociferous few delight in baiting the RSGB, but it is very easy to criticise and a lot harder to organise an alternative system. Some of the more irresponsible journals seem to give these people undue publicity, presumably to boost a falling circulation, and I trust that you will not fall into the same trap.

It is hard to visualise any licensing authority, whether it be for dogs, cars, firearms, or radios, which operates without making reference to, and taking advice from, various outside bodies. What Mr Abel meant, but did not have the honesty to say, was that the DTI should run amateur radio matters according to the wishes of himself and his group of friends.

The trouble is that none of them ever say what these wishes are, hence the fact that the majority of people, and I'm sure the RSGB itself, treat this gentleman's outpourings with an amused indifference.

A R Sutton, London SW19

We do try to be as objective as possible on the subject of all radio matters and if this means giving 'undue publicity' to those who do not agree with all aspects of the RSGB, or any other radio organisation, then, in the cause of free speech, we will continue to do so.

We credit our readers with the intelligence to look at all the arguments and then form their own opinions.

RULES ARE RULES

This is yet another letter on the subject of a novice licence. I am employed by an electronics company and over the last few months have listened to many arguments for and against this matter in my shop.

It seems to me that an amateur who has worked hard for his licence does not agree to just anybody coming along and using the bands. People who are not licensed do not see why they cannot have a novice licence. Fairly straightforwardly divided categories.

However, I see people struggling to pass the RAE and if they fail or give up before even taking a test they want a novice licence – but I have seen these same people after passing the test and a frequent comment is no, there should not be a novice licence.

I must admit I was for a novice licence before I passed and against after I had obtained my callsign. Incidentally it doesn't matter to me now if there is or isn't.

As for G Curtis (*Whose Air?* October 1985) I cannot agree with his comments. Now we have Morse tests at rallies (what an excellent idea) and correspondence classes for the RAE there is absolutely no excuse not to take the tests. I suggest that he studies the syllabus in the time that he planned to be on air – if he was that busy he wouldn't have time to even use a radio anyway.

Rules are rules and the system has worked so far. You can never please everybody.

Mark Francis G1NFU, Essex

REPEATER PROBLEM

In the course of my job I travel around 25,000 miles a year by car. Mobile operation on 2m helps prevent boredom – over the last two years I have made many regular mobile contacts, which tend to be amateurs who frequent a local repeater.

In many ways this is a good thing as one can usually call up a repeater and have a QSO with a friendly voice. The only problem with repeater regulars is that familiarity breeds contempt. Through these columns I would like to make some good-natured points to make the use of repeaters more pleasant.

When the repeater is in use, please listen to the over before calling 'break'. Many times I have heard a pair of hams about to close and someone else calls 'break' before they finish.

Please remember that you are not the only one using the repeater and keep it short even if you are mobile. Some regulars on my local repeater tend to regard it as their personal property and monopolise it.

Finally, if someone calls 'break', return and let them in. To call 'break' and then hear nothing but silence does not mean anything. I was told that on one repeater a silence after a 'break' call meant that the repeater had been handed over to the breaker. This is stupid as often several people call 'break' simultaneously.

Mobile noise often kills weak signals into the repeater which makes it difficult to decide whether a silence is a hand-over or a weak signal.

Leslie Panell (address not supplied)

DX DIARY

News for HF operators compiled by Don Field G3XTT

As I write this column at the end of September, Baldur Drobnica DJ6SI is active as DL0MAR/9G from Ghana. So far he has worked the UK on 80, 40, 30, 20 and 17 metres, all CW. QSLs to his home call.

This is one of the first operations from Ghana for some years and should make many DXers very happy. The operation has taken the DX world somewhat by surprise, with very little advance warning and a healthy scepticism that a Ghanaian licence would be forthcoming. We shall, of course, have to wait for the documentation to be accepted by the ARRL before knowing whether the operation will qualify for DXCC. Two other Ghanaian stations have been reported in the last few months, 9G1HT and 9G2ER, but to date there has been no news about their validity.

DJ6SI, DXer extraordinary

Although I describe this recent DL0MAR/9G operation as a surprise, Baldur DJ6SI is already something of a legend in DX circles. He is a superb CW operator, a member of the FOC (First class Operators Club) and an experienced DXpeditioner. His operations in recent years have included such exotica as DJ6SI/T5, DJ6SI/5V, DJ6SI/9L, DJ6SI/3X and 5X5BD to name but a few. One which didn't come off, but which is indelibly etched on Baldur's memory, is the ill-fated expedition to Spratly Island in the South China Seas in April 1983 during which two German amateurs lost their lives.

Incidentally, one of the reasons that Baldur sticks to CW operation is, I understand, that he speaks little or no English. As a CW operator he is fast and efficient, and always pays particular attention to the LF bands.

Uganda

Baldur's 5X operation (Uganda) took place last spring and netted over 7,000 contacts in just four and a half days of operating. The operation took place from the home of Father Gerry, a Russian Orthodox priest and medical doctor who runs a small clinic on Bukasa Island, one of 84 islands in Lake Victoria.

Gerry is licensed as 5X5GK and is frequently to be heard on SSB on 20 and 15 metres. In particular, Gerry maintains a daily schedule with DJ5RT, also a doctor, who can help in shipping medical supplies and equipment from Europe. Indeed, it is this need for a communications link that persuaded the Ugandan authorities to issue Gerry with his amateur licence.

Band planning on 160

Last month I devoted space to the question of DX segments on 80 metres. This month I want to do the same in respect of Top Band, particularly as some new recommendations have recently appeared in the American *QST* magazine.

First, though, a general comment on band planning. UK amateurs have never had band plans imposed by the authorities, and our division of bands into CW and SSB segments, DX and local segments, etc, is on a purely voluntary basis on HF, just as it is on VHF. This is not so in all countries, and the unusual frequency allocations in different countries on 160 metres present particular problems.

German stations, for instance, can often be heard ragchewing on SSB around 1832kHz, which British amateurs might tend to regard as the CW part of the band. Unfortunately our German colleagues are restricted to operation in this part of the band.

Although particular conventions have long been with us on 160, particularly the concept of DX windows for split frequency operation, these have never been enshrined in a band plan. In the USA that is not the case; a band plan was drawn up and agreed in 1981. Although not mandatory, it has the support of the ARRL and is generally adhered to. However, the article which appeared in this August's *QST* suggests that a revision is now required to take account of increasing band occupancy.

Increased use of the band stems from the wider availability of commercial gear for Top Band, allied to the decline in HF conditions as we move into the depths of the sunspot cycle. In addition, the low MUFs (maximum usable frequencies) mean that DX signals are currently stronger on Top Band than they would be at the peak of a sunspot cycle, with the result that split frequency operation is not always necessary for DX working.

W1XX, who wrote the article in *QST*, used as his main criteria the need to largely separate SSB and CW, to separate ragchewers and DXers, to preserve the basic DX window concept, and to recognise that, during SSB contests, SSB will have dominance throughout the band. He comes up, therefore, with a sort of 'rubber' band plan aimed at trying to keep everyone happy.

Not happy

K1MEM, for one, isn't happy. He has circulated a note arguing that the proposed new band plan does not recognise the inherent conflict which exists between wideband and narrowband modes (in this case SSB and CW). He proposes a band plan which separates the two modes and which maintains the DX window concept without compromise.

Here in the UK, as I said earlier, there is no band plan as such. Any attempts to put one together have met with failure, primarily because of the diversity of Top Band frequency allocations across Europe.

GM3WTA, writing in *DX News Sheet*, is firmly in favour of maintaining DX windows and encouraging Top Band users to go back to the old habit of split frequency working for DX QSOs. He also suggests restricting the use of SSB to frequencies above 1840kHz. Finally, he urges other Top Band users to avoid 1907.5 to 1912.5kHz (the whole Japanese Top Band allocation!) at times when propagation exists to Japan.

DX DIARY

A return to sanity?

From my own observations on 160 metres I can only agree with GM3WTA that a return to sanity is called for. When a DX station appears more people than ever before are getting into the pile-up and the DX station is often lost completely beneath the QRM. I have lost QSOs with VK, ZS, ZL and 9M2 at various times purely as a result of this happening. In each case, if the DX station had been transmitting on a different frequency to the one on which he had been listening this problem would not have arisen.

So there we are. I would be interested in comments from readers, particularly those who are frequently active on 160. I can provide copies of the existing and proposed US band plan in return for an SAE. I am also interested in comments on HF band planning in general, and in future columns hope to devote space to discussing band planning problems on our other HF bands.

Countries wanted

The American *DX Bulletin* has recently conducted a survey of most-wanted countries. The top ten world-wide are (in order of rarity): ZA (Albania), 7O (Yemen Peoples Democratic Republic), 3Y (Bouvet Island), VU (Andaman Island), XV (Vietnam), YA (Afghanistan), 4W (Yemen Arab Republic), XZ (Burma), 5A (Libya) and S2 (Bangladesh).

I must be a fairly typical DXer as I haven't worked any of them! It's easy to see why these particular countries are top of the list, but the DXer is ever the optimist and keeps tuning the bands just in case.

Yasme sails again

Lloyd and Iris Colvin are off on their travels again, this time to Southern Africa. They should be active by the time this column appears in print and hope to spend about three weeks operating from each country they visit. Their itinerary is likely to include South Africa, Botswana, Swaziland, Zimbabwe, Namibia, Lesotho, Zambia and Malawi.

QSLs go to the YASME Foundation in California. The address has appeared several times in this column. Lloyd and Iris tend to split their operation roughly half and half, CW and SSB, and in recent years have been paying more attention to the LF bands than on their earlier DXpeditions. They also appear on 10MHz from time to time.

Italy on 10MHz

Talking about the 10MHz band, Italian amateurs received the use of 10.1 to 10.11MHz from late September, so they now have an allocation on all the new bands. This is just as well; activity on all three of the new HF bands has been declining of late and any injection of new life is welcome.

There are a number of European countries still to be given permission to use these bands, so we can only hope that activity will pick up again when all three bands are widely available. Otherwise the efforts of those amateurs involved in the 1979 World Administrative Radio Conference will have been largely in vain.

N6TJ plans to operate D44BC from Cape Verde Island during November. The aim is to be operational during the CQWW CW Contest on 23/24 November, with SSB operation before and after the contest.

ZL1AMO, who was active earlier this year from Tonga, was due to be operational from Tokelau Island from 15 October for four weeks. I suspect his callsign will be ZK3EA, but I may be wrong. Like DJ6SI, ZL1AMO is another CW enthusiast and is likely to be found in the early mornings at the bottom end of 40 metres, or around 14025kHz on 20 metres. QSL cards should be sent to his home call.

There is a rumour of an operation from Botswana from late October until mid-November by a British amateur. I have no final confirmation of this at the time of writing.

Since the reappearance of S92LB on the bands (see my August and October columns) there is news of a DXpedition to a Sao Tome.

This is expected to be a 10-14 day operation in November by two Brazilian amateurs who, presumably, believe that amateur radio is now acceptable on the island. We can only wait and keep our fingers crossed in hope.

The SEAnet (South East Asia Network) Convention will be held in Manila from 22 to 24 November and two special event stations will be active. These will have the callsigns 4D7SEA and DX7SEA.

Finally, from December there will be a station operational from the Council of Europe HQ in Strasbourg, with the special callsign TP2I. Operators will include F6FQK, F6EYS, F8RU, F6EQG and F6HIX. Don't expect this one to count as a new country, but it will be an interesting one to contact all the same.

Contests

November brings the CQ Worldwide CW Contest on the last full weekend (23/24th), as well as the RSGB 160 metre CW event on 9/10th. Add to those the TOPS CW Club 80 metre contest on 7/8 December and there should be more than enough CW operating to relieve the after effects of the October CQWW SSB affair. If, of course, you need a small dose of SSB, then try the OK DX Contest on 10 November (a 24-hour event) which is both CW and SSB.

Peter OH1RY is reported to be using a full size three element yagi for 80 metres. To save you getting out the pocket calculator, I can tell you that this means elements of almost 150ft in length. ON5NT reports that, when he was operating from Burundi earlier in the year, OH1RY was 20dB louder than the closest opposition. Any *Amateur Radio* readers with large gardens want to take up the challenge? Or how about this one? W7MME is reported to have built his own tower out of 2 by 4 timber. So what? Well, it's 110 feet high!

PI4AA

The Dutch Veron Club station, formerly PA0AA, now has the callsign PI4AA. It is operational each Friday on 3602 and 14103kHz as follows:
1745GMT-DX news in English;
1800GMT-Morse practice for beginners;
1830GMT-Morse practice for advanced operators;
1900GMT-RTTY bulletin;
1945GMT-DX news in English.

IRCs

I want to end this month with a word about the humble IRC (International Reply Coupon), a vital tool to the keen DXer. IRCs were introduced by the Universal Postal Union back in 1906 as a way of permitting the prepayment of return postage, regardless of which country they were being sent to. The theory is that the recipient can exchange the IRC for 'one or more postage stamps representing the minimum postage for an unregistered letter sent by surface mail to a foreign country'.

In England this means that you can exchange an IRC for a 22p stamp, representing the airmail rate to Europe or surface mail elsewhere. To buy an IRC costs considerably more, to cover the Post Office's handling costs. As a result radio amateurs very rarely cash IRCs and, instead, they remain in circulation for very long periods of time.

Expiry date?

From time to time the rumour goes around that obsolete designs of IRC are worthless. As long as they continue to circulate within the amateur radio world this doesn't actually matter, as they retain a certain value by virtue of their acceptance by the amateur community.

In fact, however, the Post Office will redeem even the oldest IRCs, but only if you take them or send them to a main Post Office branch. As it happens, some of the early IRCs had very attractive and elaborate designs and, if they come into your hands, are worth holding on to as a collector's piece.

Forgeries

All genuine IRCs are printed by the same firm in Switzerland who, if required, will overprint them with the sale price in whatever currency is appropriate. In recent years there have been rumours of forged IRCs circulating in the amateur radio community, identifiable by the absence of the official UPU watermark. Indeed, I believe some have turned up in the UK.

Incidentally, if readers need IRCs for QSL purposes, I may well have some to hand by the time you read this as a result of my QSL manager activities for GJ6UW.

Drop me a line if you are interested. 73 de Don Field, 105 Shiplake Bottom, Peppard Common, Henley on Thames RG9 5HJ.

Thanet El

ICOM ICOM

IC-3200E Dual-band

A new exciting set is the ICOM IC-3200E FM Dual-band transceiver (144-430/440 MHz).

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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.

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

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SIMPLE WIRE BEAM FOR 20m

by Bill Mantovani G4ZVB

There can be no doubt that an antenna with a little extra gain can make all the difference . . . If you want to get some sleep and save your sanity – read on

This project came about for two reasons: an anticipation that despite the poor band conditions because of our being at the bottom end of the sunspot cycle things would improve slightly during the summer (who said 'what summer?'), and as a direct result of a massive lack of sleep! Those of you who have stayed up until the early hours of the morning after telling the XYL that you were just popping into the shack to have a quick listen before going to bed will have had first-hand experience of the latter – it's very hard to pull the switch when a band suddenly comes to life for a few hours after days of poor propagation, isn't it?

A bit of a struggle

The problem didn't stop at that though, for it would have been nice to report that I had actually been able to work a few stations after all that time calling CQ DX, whilst all other sensible people were nicely tucked up in bed.

The truth was that QSOs were few and far between and those that I did manage were a bit of a struggle. It is usually at this point, when the rest of the family start to cast doubts on your sanity, that you realise that the time has come to review the situation – after a bit of sleep though!

I have always strongly maintained that it should be quite possible to work plenty of DX without having to put up the biggest and the best antenna. However, when propagation conditions are poor, or when a band is wide open and everyone on your side of the world seems to be jostling for the same frequency, there can be no doubt that an antenna with just a little extra gain can mean all the difference between being heard or becoming another station in the pile-up.

The inspiration

The latter is precisely how I felt a few months ago. As you know, 20, 15 and 10m all closed down very early last winter so activity in the evenings was confined to the lower frequency bands, such as 80m, where even my simple trap-dipole picked up quite a number of DX stations. It was when 20m, in particular, began staying open late into the night that the idea of building some sort of beam first cropped up.

The original intention had been to design an antenna for 10m, mainly for reasons of size and ease of construction, but plans for this were dropped when the band failed to live up to expectations and has steadfastly refused to open up to anywhere other than Europe or Scandinavia, even at the best of times.

Next in line was 15m but this too has been very poor up to the time of writing, so 20m it had to be. There is, however, no reason why the reader should not use this article as a basis for the construction of a wire beam for one of the other bands using the suggested dimensions listed in *Table 1*.

For 10m though, a two element quad with some means of rotation might be more suitable, and this will be the next antenna to be tried out by the author when that band improves.

The first problem was to decide what sort of beam antenna would be the most suitable in terms of both size and performance. A quad, delta loop or similar arrangement was felt unsuitable at this stage as the means of support to be used would not allow for a very good effective height. Also, whilst the mechanical construction of such antennas does not have to be complex, a yagi type beam looked to be a better proposition on the grounds that extra elements could be added at a later date without too many problems. The yagi beam would also be easier to raise and lower when it was time to tune the antenna or try out any modifications.

The next question was how many elements? The two element yagi seemed like the obvious choice as this could, with a bit of thought, be constructed so that if operation in the opposite direction was required the beam could be easily flipped over. A problem with a wire beam of the size required for 20m is that it cannot easily be made rotatable unless some form of centre support is employed, but as this particular beam was to be strung from the ends rotation was out of the question and correct sighting of the utmost importance.

A two element beam usually consists of a driven element plus a director as this arrangement gives a slightly greater forward gain than if the parasitic element is cut to act as a reflector. It had already been decided that, to begin with, the antenna would be positioned pointing west as the supports for this were already conveniently located. This position would be good for contacts in the Caribbean, North and South America and parts of Canada with possibilities a little further into the Pacific area.

That seemed like a good start as I wanted to be able to test the performance of the beam in relation to the other antennas at the QTH *and* with respect to varying propagation conditions. The latter, I felt, was very important as it would be all too easy to assume the beam was working well when it might in fact just be that propagation had improved. To this end, the assistance of a number of stateside stations was to prove invaluable. Eventually it was decided to go for a three element beam as it was felt that with Britain being in the 'flight path' for signals from Europe, any improvement in front-to-back ratio would be a welcome bonus as the QRM at the time from tuner-uppers, '. . .Olla-Ollas. . .', and splatter was getting worse.

The three element beam

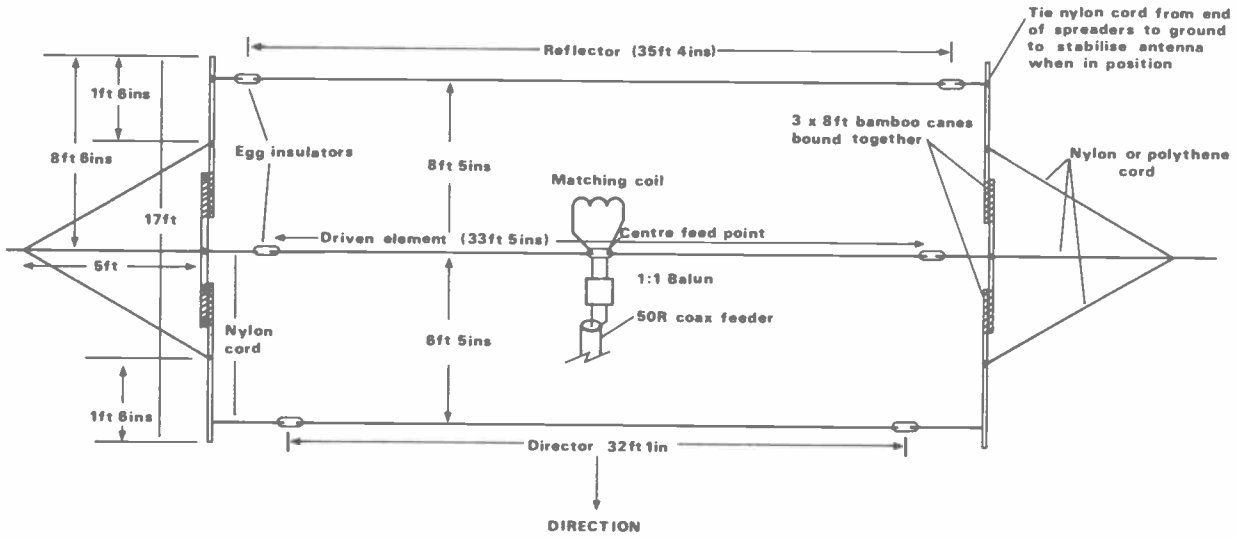
The three element yagi beam consists of one reflector element, the driven element and a single director (*Figure 1*). The power gain of this type of antenna is dependent on the spacing of the elements, which is usually between 0.1 and 0.15 wavelength. A smaller spacing between the elements leads to a reduction in the power gain and also the bandwidth of the antenna, whilst extending the element spacing tends to produce a slight increase in the gain for a reduction in front-to-back ratio. Obviously, there are other factors which affect the gain and front-to-back ratio,

Table 1 *Suggested dimensions for a three element beam*

Suggested dimensions for three element beam (approx centre of band operation)			
Element	**Band**		
	20m	**15m**	**10m**
Reflector	35ft 4in	23ft 6in	17ft 6in
Driven element	33ft 5in	22ft 4in	16ft 7in
Director	32ft 1in	21ft 5in	15ft 10in
Spacing of elements	8ft 5in	5ft 6in	4ft 3in

20m WIRE BEAM

Fig 1 *Practical design for a three element wire beam*



Notes
1. Use a suitable length of nylon cord to secure the elements to the bamboo spreaders
2. There should be minimum sag in the elements when the beam is hoisted in position
3. Do not connect the feed point matching coil until after initial tests – see text
4. Use as thick a diameter of wire as is feasible for the elements

such as anything that will distort the radiation pattern of the antenna.

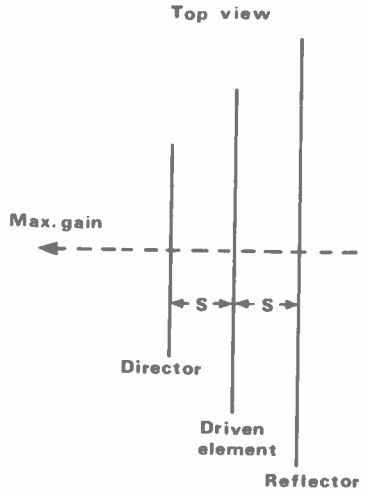
Height above the ground should be no less than half a wavelength at minimum but, as with everything, quite a few compromises had to be made with this particular wire beam. Even so, it still gave excellent results over a normal dipole of the same height and positioning. The only real problem I expected to encounter was the matching of the antenna to the feeder as the radiation resistance of a normal beam, let alone a wire beam, is very low and some form of matching device would be required. As it happened, matching proved easier to accomplish than anticipated.

A practical design

Figure 1 gives the details for a practical three element wire beam as built by the author, with dimensions and spacing for the elements as per *Table 1*. These dimensions have been calculated using the appropriate formulas given in *Figure 2*, but it must be stressed that this is only a suggested starting point as there are many factors which could alter these to some degree, such as the environment surrounding the antenna, its height off the ground and, of course, the diameter of the wire used. As with any antenna construction, theory is used as a guideline only and the actual adjustments are then made by experimentation.

A note about the spacing of the elements. The positioning of the reflector and director either side of the driven element will have an effect on feed point impedance, bandwidth and gain. It is quite in order to space the parasitic elements equally from the driven element but an improvement in both bandwidth and feed point impedance can be achieved if the reflector spacing is made about 0.2λ and the director brought in to 0.1λ. This still maintains the overall 'width' of the antenna at 0.3λ and the gain is unaffected. I would encourage anyone wishing to experiment with the above to do so as suits requirements.

Fig 2 *The three element beam antenna*



The spacing (S) is between 0.1 λ and 0.15 λ. Element lengths are worked out from the following formula:

Reflector length approx $\frac{500}{f(MHz)}$ feet

Driven element approx $\frac{475}{f(MHz)}$ feet

Director length approx $\frac{455}{f(MHz)}$ feet

The use of wire for the elements presents problems in its own right. Little can be done to raise the radiation resistance of the antenna and the bandwidth once again suffers. Bearing this in mind, the final design arrived at was indeed very much of a compromise and there is certainly much room for improvements for anyone wishing to investigate the use of wire beams further. However on the plus side, the beam described proved very easy to assemble, worked very well for the effort involved and for negligible outlay, produced results far in excess of expectations.

Construction

There are a number of ways in which a simple wire beam can be constructed but the following was found both easy and quick and took just one afternoon to complete. Conditions being as they are on the 20m band over the winter months it was decided not to place too great an emphasis on durability as the beam would be taken down again when band conditions drop off later this year. This also avoided having to proof it against the ravages of winter. If the beam is to be left up for a considerable length of time then weatherproofing of the bamboo spreaders is strongly advised by the application of a few coats of varnish or similar. Provided attention is paid to isolating the antenna elements from any untreated bamboo (which is a very poor insulator when wet) and to adequately waterproofing the driven element feed point, then it is very likely that the beam will outlive its usefulness with little or no weatherproofing of the spreaders or supports.

Start by making the spreaders first. Three 8ft long bamboo canes, as sold in most garden stores, are bound together with suitable insulating tape to make one of the 17ft spreaders, two of which are

required. Next, measure out the wire for the elements. The wire used should have as thick a diameter as is practicable and for the original design I used 7-strand sheathed copper wire having a nominal conductor area of 1.5mm². This was first pre-stretched by tying one end to a post, unwinding at least 35ft from the reel and pulling on it until it would stretch no further. Be careful though not to pull too hard and break it!

No trouble

The correct length for one element can now be cut off and the process repeated for the others. It is a good idea to lay out these wires on the ground with the spreaders at the ends, so that once assembled the whole antenna can be simply hoisted up into the air without too much trouble. I would also recommend that you follow the dimensions given to begin with and to leave any modifications until after the antenna has been tried out. The only exception is the driven element, which should be cut to a few inches longer than specified to allow for trimming later.

Now tie the elements to the spreaders at the points shown using egg insulators and nylon or polythene cord and insulating tape to keep the cord in position.

As 50 ohm co-ax feeder is used for convenience, a balun is included at the centre of the driven element and those few inches of excess length of this element should be allowed to hang loose for trimming at the egg insulator end. The balun used should be light enough so as not to cause the centre of the element to droop and there are a number of suitable types available on the market. Before connecting the balun, though, the driven element is checked to see that it is somewhere near resonance. This can be done using a dip meter as shown in *Figure 3*. Now connect the balun in place together with the 50 ohm co-ax feeder.

Erecting the beam

The bridle for the spreaders is made from polythene washing line cord and provided the lengths are cut and tied with some degree of accuracy, any slack will actually be taken up by the bamboo bending slightly when raised into position and pulled taut. The method for supporting the antenna in position, as previously stated, is one of the areas where the biggest compromise has to be made. If you are in the position of being able to erect two 40ft poles to sling the beam across then you are very lucky indeed, but most people are not and for this reason I decided to use the chimney of the house and a suitably located scaffolding pole.

Choose the direction in which you wish the beam to face and erect the pole accordingly. If you have a tree growing conveniently nearby then that too can be used. A washing line pulley is employed at the two ends as shown so that the beam can be easily raised and lowered and the complete structure is steadied by nylon or polythene cord tied to the ends of the spreaders. Hoist up the beam, making sure that it is pulled good and taut and you are now ready to make initial tests. Matching will be dealt with later.

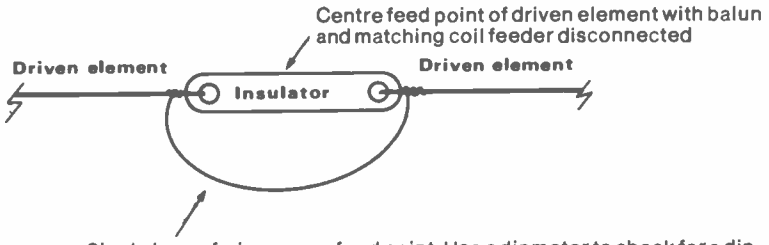


Fig 3 *Checking the driven element for resonance*

Making the beam work

Making sure that the transmitter drive is turned to minimum, connect up the beam to the transmitter via an SWR meter, tune to the centre of the 20m band and check the SWR reading. Making a note of this, repeat the procedure somewhere near the lower and the upper ends of the band and from this you will find that, provided the lengths were measured out carefully, the lowest SWR reading is obtained towards the lower end of the band.

Now trim the antenna by taking one inch or so at a time off either end of the driven element and rechecking the SWR at the lower end until the reading is about 2:1.

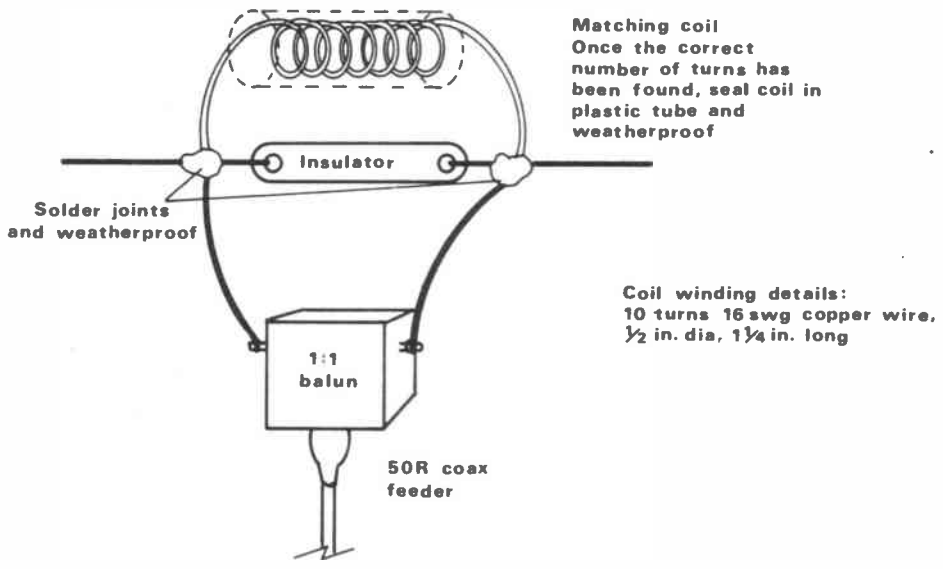
If you find that the SWR is lowest at the top end of the band then it is very likely that the driven element was cut too short in the first place and you will need to add wire or measure out a new element. Provided you remembered to check the driven element with a dip meter, as was suggested before hoisting the beam into position, then you will not have this problem!

Matching

It is unlikely that the minimum SWR reading obtained at this stage will be much below 2:1 because the feeder has yet to be properly matched to the very low impedance that exists at the feed point for this type of antenna, but at least you will have some idea that everything is still going according to plan! Some form of impedance matching is now required before the SWR will come down any further and, whilst there are many ways in which this can be accomplished, it was decided to try to do this as simply as possible so as not to weight the centre of the antenna too much.

The method which proved the easiest and simplest was to include a small inductor at the feed point, as shown in *Figure 4*, and slightly shorten the driven element. This has the effect of creating an L-network, with the driven element providing capacitive reactance and impedance; matching can now be easily achieved by both varying the number of turns in the coil and further shortening the driven element as necessary. Details of the coil are given in *Figure 4* and this is

Fig 4 *Details of matching coil at centre of driven element*



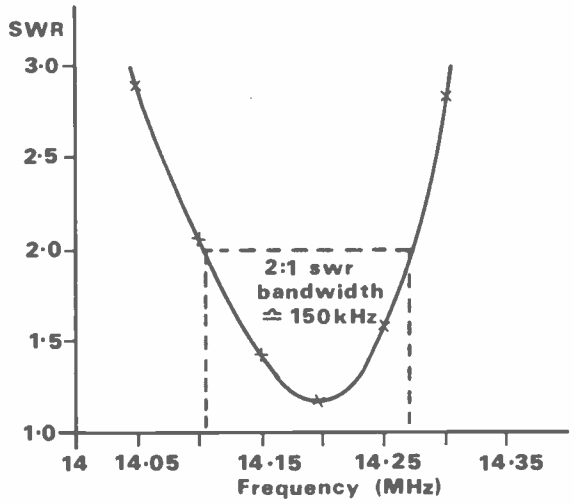


Fig 5 *SWR v frequency plot for the author's prototype beam*

made from 10 turns of 16 swg copper wire wound on a half inch diameter former (which is then removed) and spaced over a length of one and a quarter inches.

The antenna can now be matched to the feeder as follows. With the beam lowered, the coil is placed in position and two inches are cut from either end of the driven element. Raise the beam and check the SWR again at the lower end of the band.

This should have fallen below 2:1. Check the SWR at the centre and top end of the band to gain some idea of how mismatched the antenna still is, and then repeat the process of taking one inch off both ends of the driven element until the SWR is lowest for the portion of the band that you normally prefer to use.

Narrow bandwidth

Remember that the usable bandwidth of this type of beam is quite narrow, though the construction details given here result in an antenna that can be used over a reasonable section of the 20m band.

You will find that as you shorten the driven element, so the lowest value of SWR measured begins to rise slightly. This is because the capacitive reactance provided by the driven element obviously changes. Therefore, fine matching of the antenna is achieved by shorting out a couple of turns on the coil (this will result in a very low SWR measurement again being possible but this detunes the antenna slightly) and retrimming the driven element for the required part of the band.

Repeat the above until a satisfactory SWR reading has been achieved (on my original beam I managed 1.1:1 on 14.200MHz without too much fuss) then cut off the shorted turns, seal the coil in a small plastic tube and reconnect it. Do one final check on the SWR before weatherproofing the coil, all connections and the end of the co-ax cable (to prevent water from seeping inside it) with insulation tape and a few liberal coats of polyurethane varnish. Hoist the beam back into position, and make sure that it is held good and taut so that the elements do not sag too much.

Bandwidth

Before commencing use of the beam, it is a good idea to draw up a chart for variations of SWR with frequency. This will then show what the usable bandwidth of the beam is (the frequency range between the two points where the SWR plot has a value of 2:1) and can be used as a reference when carrying out any work on the antenna at a later date. *Figure 5* gives the chart for the prototype antenna as constructed by the author and from this it can be seen that this particular beam has a 2:1 SWR bandwidth of 150kHz, which isn't much down on one or two commercial beams the author has come across! An ATU can be used where the SWR is high.

The proof of the pudding. . .

As with any antenna, the real test comes when it's time to try it out on the air. No exaggerated claims are being made for this particular beam except to say that its performance far exceeded expectations. The first thing was to have a listen on the 20m band and see if there were any stations on that had been previously worked using the trap dipole. It was a Friday evening and the whole of Europe seemed to be on as conditions were fair, but through the QRM a VE3 could be heard without problem.

I had worked him a few days earlier under similar propagation conditions but with the trap dipole, and it had taken many calls before he had finally come back to me. So it was a pleasant surprise when, despite the QRM, he answered my very first call using the new beam and reported my (SSB) signal to be some two S-points up on our last QSO. A quick switch back to the trap dipole confirmed this and subsequent back to back tests have shown the beam to have a forward gain equivalent to 2 or 3 S-points over the trap dipole, whilst also providing a useful degree of attenuation on European signals coming in on the back of the antenna.

Suitably impressed, especially as the beam was only 20ft in the air and the trap dipole much higher than that, it was time for the real test – put out a CQ call! For me this was the real test because my CQ calls with the other antenna rarely brought a reply at that time of night from Central and South America because of the QRM and QRN levels at the other end. If the beam would help my signals to cut through this then what better proof that the design really worked? I got more than I had expected. The first CQ call, at around midnight, still on SSB, brought an answer from a VK3! This was to be my first contact into VK land and despite strong local QRM we were able to complete the QSO.

The beam was pointing towards Central America so this wasn't a bad effort, especially as I couldn't hear the other station at all on the trap dipole. One further CQ call brought a string of contacts with the Caribbean, so the new beam was certainly doing its job. A few nights later another single CQ call brought two hours worth of QSOs with the USA and South America (the state-side stations were actually queuing up at one point) but the biggest improvement when using the beam has been in the ability to get my signal heard through a pile-up when a rare DX station is on.

Conclusions

There is little doubt that despite its simplicity and very low cost, the wire beam really does work, though it could never perform as well as a 'proper' metal beam. However, the cost of this antenna is negligible and the satisfaction derived from the results is great.

There are many improvements that could be made in the design shown here – this article is primarily a starting point for anyone wishing to experiment with beams who doesn't yet want to start cutting up pieces of alloy tubing. After all, a 20m beam is a pretty big beast to have in the back garden. Also, a wire beam tends to make less visual impact on the neighbours and in some cases could be made almost invisible if you are lucky enough to have some handy trees nearby.

Once the beam is up and working in its suggested form, then the next step would be to experiment with the element spacing to try to improve the gain and/or front-to-back ratio, or possibly, for the more ambitious, to make it multi-band by the use of traps or linear resonators. There is a lot that can be tried out and much satisfaction to be gained from this experimental side of amateur radio. Just wait till you hear the comments from the 'California Kilowatts' when you tell them you are using a home-made wire beam.

References

Radio Communication Handbook – RSGB

HF Antennas for all locations – L A Moxon G6XN (RSGB)

Radio Amateurs' Antenna Handbook – W I Orr W6SAI and S D Cowan W2LX (RPI)

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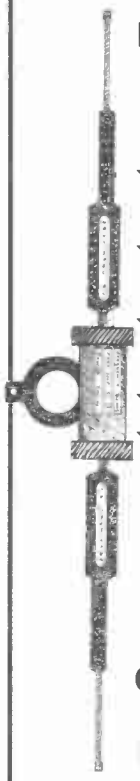

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A few years ago Trio introduced the TS660 mobile HF transceiver which offered multimode facilities on the 21, 24, 28 and 50MHz bands giving around 10W output. The rig of course was not popular in the UK because we did not then have the 50MHz band, and consequently only a dozen or so were imported. This new model includes very many new features which are extremely useful and innovative, and is primarily intended for mobile use as it requires 13V dc input, although of course it can be used as a home station rig with an external 13V power supply.

The rig transceives on the 7, 21, 28 and 50MHz bands with CW, LSB, USB, AM and FM modes. It also has a general coverage receiving facility from 500kHz to 30MHz. 80 memories are included which can store frequency and mode. Direct access to any frequency or memory is provided as well as VFO tuning, the two VFOs having buttons selecting A or B, A=B, split Tx/Rx, frequency lock and VFO to memory.

Each mode has two tuning rates, 10Hz or 100Hz steps for all modes except FM which is 10kHz or 100Hz per step. Thus the rate per revolution is normally 10kHz or 100kHz, but on FM 10kHz channelling becomes 300kHz per revolution. On the left side of the front panel are the following push-buttons: 13V dc on/off, speech frequency read-out button for optional speech synthesiser, noise blanker on/off, meter ALC or RF on Tx, MOX, Rx/Tx, 20dB antenna attenuator, narrow or wide filter (selects wide AM filter or narrow CW one when pushed in) and a matrix of 10 numbered buttons enabling direct access to frequency or memory.

Underneath these are buttons for memory scan, program scan, hold, VFO/memory, memory write and enter. A vertical row of buttons selects the required mode.

VFO assembly

The VFO assembly has an adjustment beneath it to vary the rotation tension. On the right side of the panel is a dual concentric control for RF power output, operating on all modes from approximately 1W to full power with a concentrically mounted mic gain control. The mic gain does not, unfortunately, operate on FM, which seems ridiculous. Two other dual concentric controls operate RF and AF gain and IF shift with RIT (±1.3kHz approximately). A squelch control operates on all modes.

Push-buttons select VFO functions as outlined, tuning steps and band up/down (this either selects the amateur bands in 1MHz segments or changes frequency up or down by 1MHz when the general coverage Rx mode is selected, which is an option). An additional button selects RIT on/off.

The digital display is of the electroluminescent type and indicates frequency normally in 100Hz steps, but 10Hz resolution can be selected internally. Comprehensive status functions are included (memory channel etc).

Underneath the rig are four large feet and a pull-out bail stand. The loudspeaker is mounted under the right-hand side of the top cover, whilst on the back of this cover are many ventilation slits. Four miniature feet are on the left side cheek and a carrying handle is on the right one.

There are two separate SO239 antenna sockets and the top one can be selected for all bands, or alternatively a switch can be changed over to allow the 50MHz band to be on the second socket. A large earth wing nut is underneath the latter. A large heatsink is fitted across the centre of the back for the 10W solid-state PA stage. A 7-pin DIN remote socket provides the following interconnections: speaker output, ground, external PTT input, spare, 8V dc, external ALC input, 12V dc output and max 10mA on Tx. Also on the back is a 3.5mm jack for an external speaker, a ¼ inch jack for Morse key connection and a special 13V dc connector which is non-reversible. The dc power lead supplied is fused in the positive line only at 4A.

It is possible to put any desired memory frequency directly into the selected VFO by pushing in the memory channel number on the keypad. This has to be done within a second as otherwise double digit memories will not be accessed and only the final digit will transfer. Entering frequencies is simplicity itself, requiring you to press enter followed by the required frequency and then enter again. If you press frequency to 10Hz resolution, you do not have to press enter again, and if you require a frequency below 10MHz you must enter 0 first.

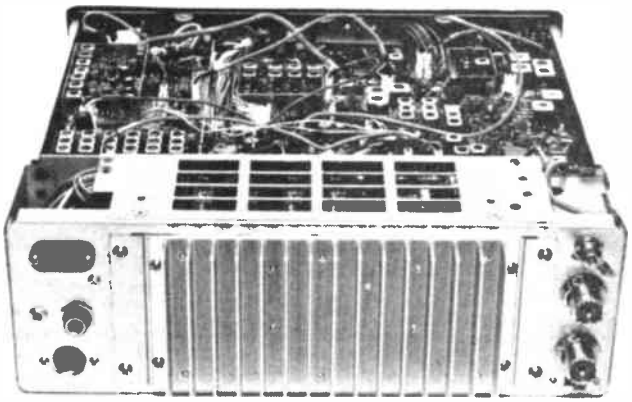
A little tiresome

Writing into memory is a little tiresome, for even if you have selected a memory on a memory position, the VFO does not transfer until you press memory in, hold it down and then press the memory channel number again fairly rapidly. To clear a memory you have to select the memory first, then press enter followed by 00 then enter again. This is rather confusing.

The rig contains a lithium memory back-up battery and so memories and the last used VFO frequencies and modes will be memorised when the 13V supply is disconnected. If you power up and the display goes to 50MHz immediately with USB it is an indication that the memory back-up has failed, unless this was your last used frequency! The battery is claimed to last five years but the rig will work if the lithium battery goes dead.

Although the ergonomics are very good indeed, I am concerned that this rig leaves out some important functions which would have been highly desirable. Once again, there is no short to ground on Tx connection but, more seriously, there is no transverter drive socket. I am sure it would be easy for you to add this but there would be many who would like a low power HF rig with the main purpose being for driving transverters.

This would have been absolutely ideal because of the excellent filter switching



on the different modes, and the fact that both the 28-30MHz and 50-54MHz bands are included, both of which are currently used by many amateurs for driving transverters. The use of 50-54MHz as an IF for microwave equipment is particularly appropriate as the image response is that much further away from the required frequency.

I have discussed the lack of the transverter drive facility with Lowe Electronics. The first mixer is common to all frequencies and fed from either the general coverage board, the amateur HF band board or the 50MHz pre-amp. The best point to insert a transverter Rx feed would be immediately before the mixer, and a phono socket could be added on the back for this, beside which would be a switch to select normal or transverter operation. Alternatively, one could have another phono socket for the normal feed and use a short jumper.

The Rx drive immediately prior to the PA is common for all the frequencies provided, and so this drive would be easily available. Lowe Electronics, the official Trio importers, have told me that they are prepared to supply modified rigs along the lines outlined but, of course, with an additional charge, and this may very well entirely alter your attitude to the rig.

Incidentally, the spare pin 4 on the remote socket could become a PA disable pin which would be activated by switching the 8V pin to it, thus enabling the transverter drive. It would be rather nice if this one single connection could then change the entire box over to transverter drive by using an external switch box for Tx drive and Rx input selection, as well as PTT activate and PA disable.

Subjective trials

The provision of the 7MHz band on this rig is extremely useful as it gives a mobile operator an LF band to go with all the HF ones, the 7MHz one replacing the less popular 24MHz band provided in the previous model. However, when I checked out the 7MHz band on my home station antenna overloading was so serious, even with an ATU in circuit, that reception was impossible unless the 20dB antenna attenuator was switched in.

When switched to the general coverage mode I noted the same front end problem on the 3.7MHz band, but, surprisingly, there was less of a problem at 1.9MHz because a broadcast band filter comes in below 1.8MHz. Even so, I still needed to put the 20dB attenuator in at times, but the band noise is so much higher at LF that the apparent sensitivity was not significantly degraded at 1.9MHz. In a mobile installation the front end intermodulation problem would be nowhere near so serious and one might be able to use full front end gain without any trouble. The 50MHz performance was astonishingly good, the sensitivity being superb.

The received sound quality on CW, SSB and FM was excellent, but AM quality, as seems usual on so many receivers these days, was not quite as clean as I would have liked. The available output level on the internal speaker was quite adequate but you would have to use a fairly sensitive external speaker to obtain a higher volume before the onset of clipping. The noise blanker worked adequately and the IF shift control was extremely useful.

I very much liked the feel of the rig and, in particular, the VFO and its facilities. The provision of 80 memories seems somewhat unnecessary, but they will be far more useful if you put in the transverter modification. The 12V dc on Tx pin can be used to switch external integrated circuit switches to operate external equipment, thus making this rig one of the most useful ones for driving VHF and microwave transverters.

It is to be hoped that Trio themselves will do something about the recommended modifications which could make the rig much more attractive, especially to class B operators who would probably rather like the general coverage Rx option.

The Trio hand mic supplied had both PTT and up/down buttons and these operated searching quite reasonably at 500Hz or 5kHz per second. It was extremely useful to have 10kHz channelling for FM so that channels could be stepped up and down again from the mic.

The receiver could not be used around the first IF of 8.83MHz, as explained in the manual as a warning, because of feedback from the IF to the input. I did not note any problems on other frequencies, though, apart from the relatively poor RFIM performance at the front end. Transmitted quality on all modes was above average and FM was much liked on 10m. The provision of two VFOs with a split function will enable access into 10m repeaters, which will be an asset.

Laboratory tests

The RF sensitivity on the 50MHz band causes severe degradation in the intermodulation performance at the mixer. The first IF filter, a crystal type, is fed directly from the mixer and is a roofing filter which has to be wide enough to pass FM. This feeds into the first IF stage which drives the noise blanker system, the FM section and the chosen additional IF filter for SSB/CW.

The rig comes with an SSB filter (YK88S), but optional additions are a CW filter type YK88C (500Hz), or YK88CN (270Hz) and an AM filter type YK88A with 6kHz bandwidth. The FM board is fitted as standard but the general coverage board type GC10 is optional, as is the speech synthesiser readout type VS1. A VOX unit accessory type VOX-4 has presets for VOX gain, anti-VOX and VOX delay. It also contains a built-in mic processor with gain control for use with the rig externally.

The RF intercept points are thus very disappointing for a modern rig, although the performance on 50MHz should be perfectly satisfactory even when activity mounts up to as high a degree as I think it might do one day. In the context of mobile operation the RFIM performance does not have to be so good, as received signals are much weaker. Mobile HF antennas are also fabulous and as good as I have ever measured on any unmodified Japanese black box on any frequency. On the HF and LF bands the sensitivity falls a little but is at least as good as one could possibly need on all the bands below 30MHz on CW and SSB. On FM/10m, however, it is just a little lacking, although not bad. The reciprocal mixing performance is average and therefore slightly disappointing.

The noise floor fails to reach the astonishing figures of the latest Icom and Trio rigs from 20kHz outwards and close in to the carrier there is slight synthesiser noise, but this is not serious. We spent hours checking and rechecking the RFIM measurements on 7, 28 and 50MHz bands. The blocking performance caused by frequencies fairly close to the required one is just adequate, and intermediate spacings show a clear improvement up to 50/100kHz. However, further out than this there is a most puzzling situation, the apparent intercept point degrades quite markedly and only improves again with carriers spaced 1 and 2MHz off-channel. The following

explanation is highly tentative but seems probable.

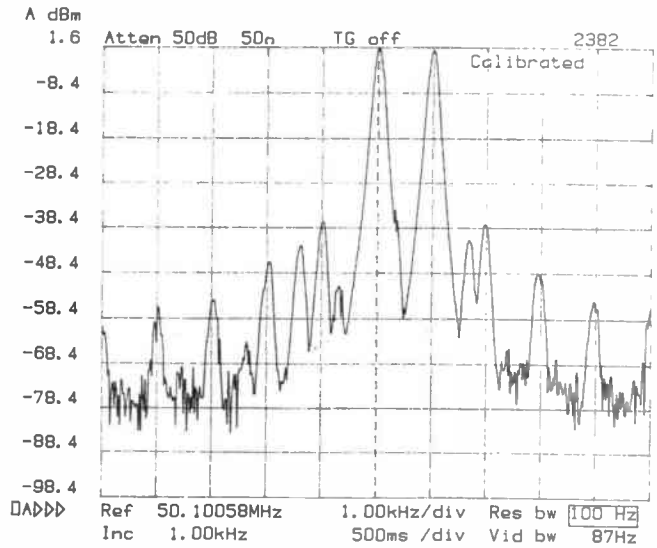
The AGC line feeds back to the RF stage as well as the single 8.83MHz IF stages. The mixer output, I suspect, is far from correctly loaded at off-channel frequencies, and thus normally resonant over a fairly narrow bandwidth, especially on the 7MHz band where the problem is most severe in a home base station.

The CW and SSB selectivities both measured quite well, although the overall bandwidth of the latter was slightly wider than usual. However, this was certainly not too wide, thus permitting some good quality audio to come through. The skirts are fairly steep so that the bandwidth for −80dB at 4.7kHz is only 100Hz wider than the −60dB bandwidth. An alternative narrower SSB filter is available, type YK88SN, designed originally for rigs such as the TS130.

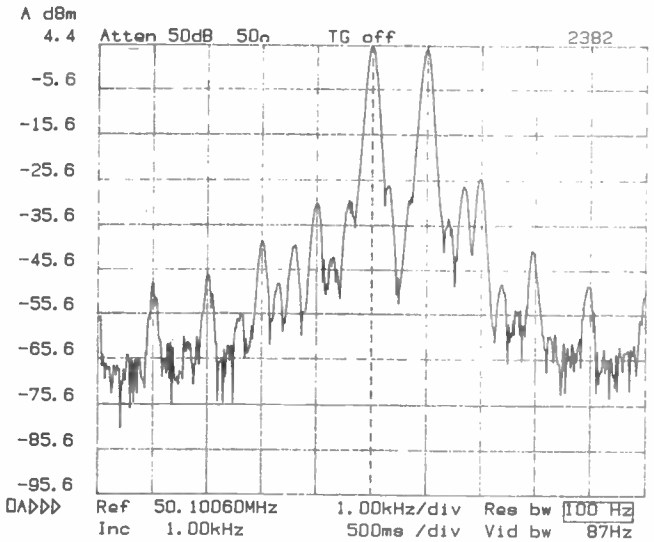
I have one of these filters as an option for my old TS130 and SSB is far better reproduced on crowded bands as the skirts are steeper. I recommend you to consider using this filter instead of the wider one and the rig can be supplied with it if necessary, which would also be beneficial on Tx for DX working.

The CW filter type YK88C had a reasonably flat top with a 600Hz bandwidth, whilst it was −60dB at 1.4kHz bandwidth and hardly any wider for −80dB! The FM selectivity was excellent for 20kHz channelling but was not quite good enough for 10kHz. The AGC speed showed a very fast attack and a surprisingly slow recovery on SSB, whilst on the CW position the recovery was fast.

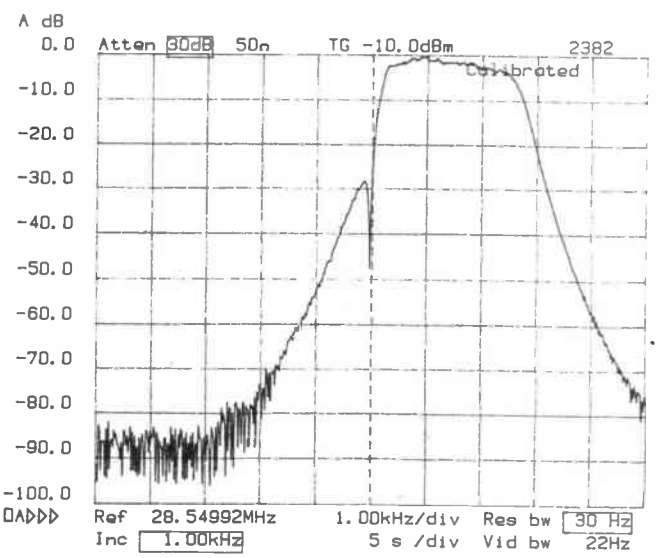
I would have preferred to have the AGC speed switchable, as one often needs fast AGC for net working. The AGC threshold comes in at about 1μV, all signals above this being reproduced at similar levels.



Two-tone test of TS670 of 50.1MHz at low power



Two-tone test of TS670 on 50.1MHz at full power



Complete transmitted response from mic socket input to RF carrier output, well below any ALC action showing filter response, alternate sideband and carrier rejections

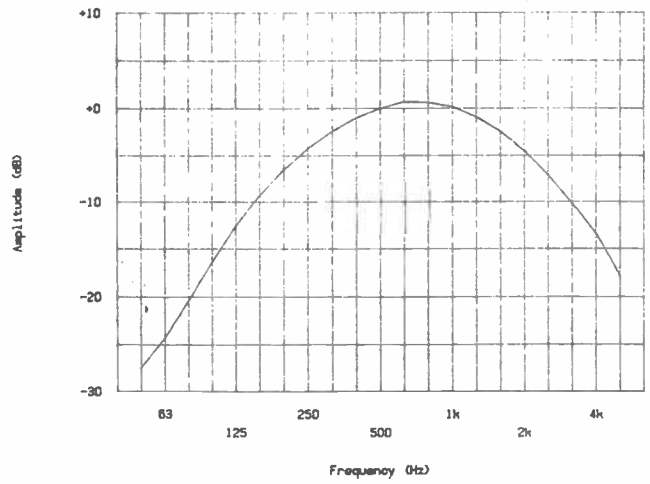
S-meter

The S-meter on SSB required an average signal of −78dBm (28μV) to read S9 and S1 averaged 2.2μV, thus giving a range of 22dB up to S9. 20dB increments above this were actually 16dB, approximately. S9 was up to 5dB more sensitive on the 10 and 6m bands, depending upon configurations. On FM there was only a 14dB difference between S1 and S9, but this is a lot better than some S-meters on FM! However, the +60dB indication on FM only required an additional 7.5dB above S9!

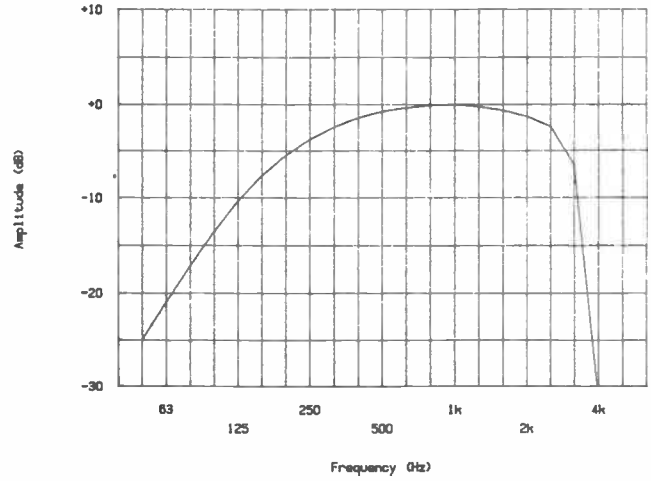
The SSB product detector, also used for CW, gave an average distortion of 2%, which is reasonably good but not excellent. The FM discriminator measured out very well indeed at only 1% distortion for 2.5kHz deviation. The AM detector was quite acceptable at low and medium modulation levels, but above 40% modulation distortion rose quite rapidly to reach 8.4% at 90% modulation of a 1kHz tone. At 300Hz modulation the distortion degraded to 12%.

Maximum audio output power into 8 ohms was, surprisingly, a little limited at 1.9W for 10% distortion, but much more power was available into 4 ohms so I would recommend 4 ohm speakers here.

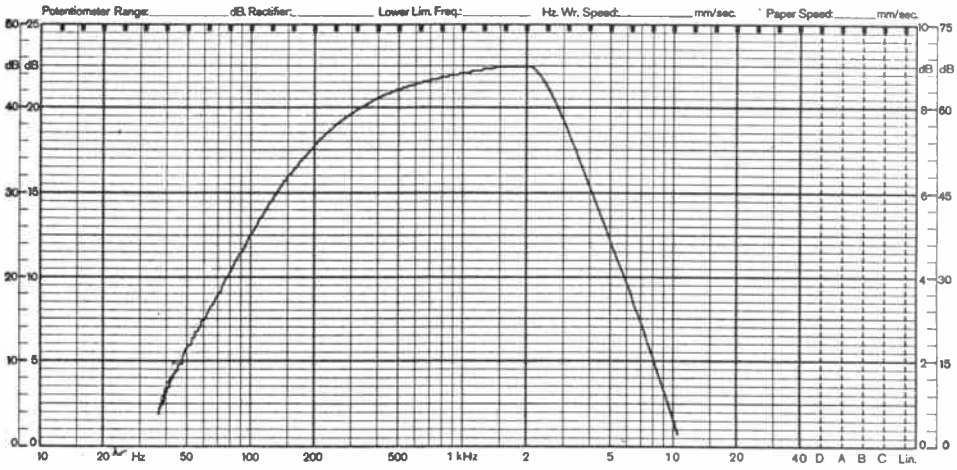
The received frequency accuracy was within 100Hz. The SSB response showed a gentle roll-off from below 2kHz until the IF filter bit hard at around 2.5kHz. The passband was just about in the right place, with the IF shift control on its centre indent. The FM response, measured with 750μS pre-emphasis, showed a fairly steep base roll-off below around 300Hz, the HF end rolling off above 1.5kHz so that it is 10dB down by just over



Trio TS670 FM received audio response (750μS pre-emphasis)



Trio TS670 AM received audio response



TS670 FM Tx response

3kHz. I suggest that there is slightly too much HF roll-off in the output audio amplifier. The AM response, using the optional wide AM filter, was −7dB at 3kHz, above which the response literally went over a cliff. Again, LF is attenuated moderately steeply below 300Hz.

We interconnected the transmitter output via an attenuator dummy load to the Marconi 2382 spectrum analyser and HP automatic plotter. An examination of the two-tone plots shown with this review reveals the IM performance to be very good for low orders, but high orders tend to be a little higher than desirable, although not bad. There was only a slight improvement when the output power was reduced to around half power.

The SSB AF/RF response plot taken from the mic input socket to carrier output shows good carrier rejection, with an SSB passband from around 200Hz to 2.5kHz. The skirt at the HF end was fairly steep, reaching −60dB at 4kHz, but below 200Hz attenuation was not really rapid enough. This causes some alternate sideband breakthrough at LF, although by 1kHz on the lower sideband the breakthrough was well down at −52dB. Audio distortion produced in the mic amp and modulator stages was at a fairly low level, although we have seen cleaner signals on more expensive Trio models.

The transmitted frequency accuracies were all excellent. We checked the FM performance and obtained rather a high maximum deviation, typically at 6kHz, but with absolute maximum twitches up to 7.4kHz if the measurement passband was increased. The transmitted FM response was reasonably flat from just below 500Hz to 2.5kHz, with a very rapid attenuation at HF. LF attenuation was fairly rapid, which is just what is needed.

Power outputs were typically around 12.5W PEP, with slightly more than this at LF, but just 10W PEP on 50MHz. CW and FM powers were similar. On AM it was possible to obtain similar carrier levels to those for FM, and it is therefore essential to decrease the power to around 4W or so for the AM modulation to keep within the PA capability.

Harmonic and spurious outputs were generally at very low levels, although we did note a second harmonic output of −52dB at 7MHz. Other harmonics were at −59dB or lower, the 50MHz harmonics being particularly low. At maximum RF output the rig draws just over 4A, whilst on Rx the minimum current drawn is 1A.

Conclusions

I liked this rig very much indeed but I am concerned that Trio have not designed the front end at all well, as it falls far below the standard that one should expect from a fairly high-priced product.

I suggest that the rig could have had perhaps four times the potential sales if the front end had been better, with the transverter facility included. I can certainly recommend purchase of the rig for a mobile installation, but if you are interested in the 7MHz facility you would probably be rather disappointed with the performance on this band under home base station conditions.

Trio have got so much right in this rig, but the areas that I have criticised are important ones and you will have to do quite a lot of weighing up of the pros and cons if you consider purchase.

Obvious driver

I strongly recommend you to consider getting Lowe Electronics to put in the transverter drive modifications, which would make the rig a most useful one for so many applications in driving transverters of all types. This is an obvious rig to use as a driver if you make your own transverters, for it has almost all the facilities that you are likely to need on VHF, UHF and microwave frequencies. However, you would have to add a toneburst facility if you wanted to use repeaters.

I would like to thank Lowe Electronics for the loan of this product at very short notice, and Mark Capstick G4RCD and Nigel Bickell G1LSA for all their assistance in helping me with the measurements and trials.

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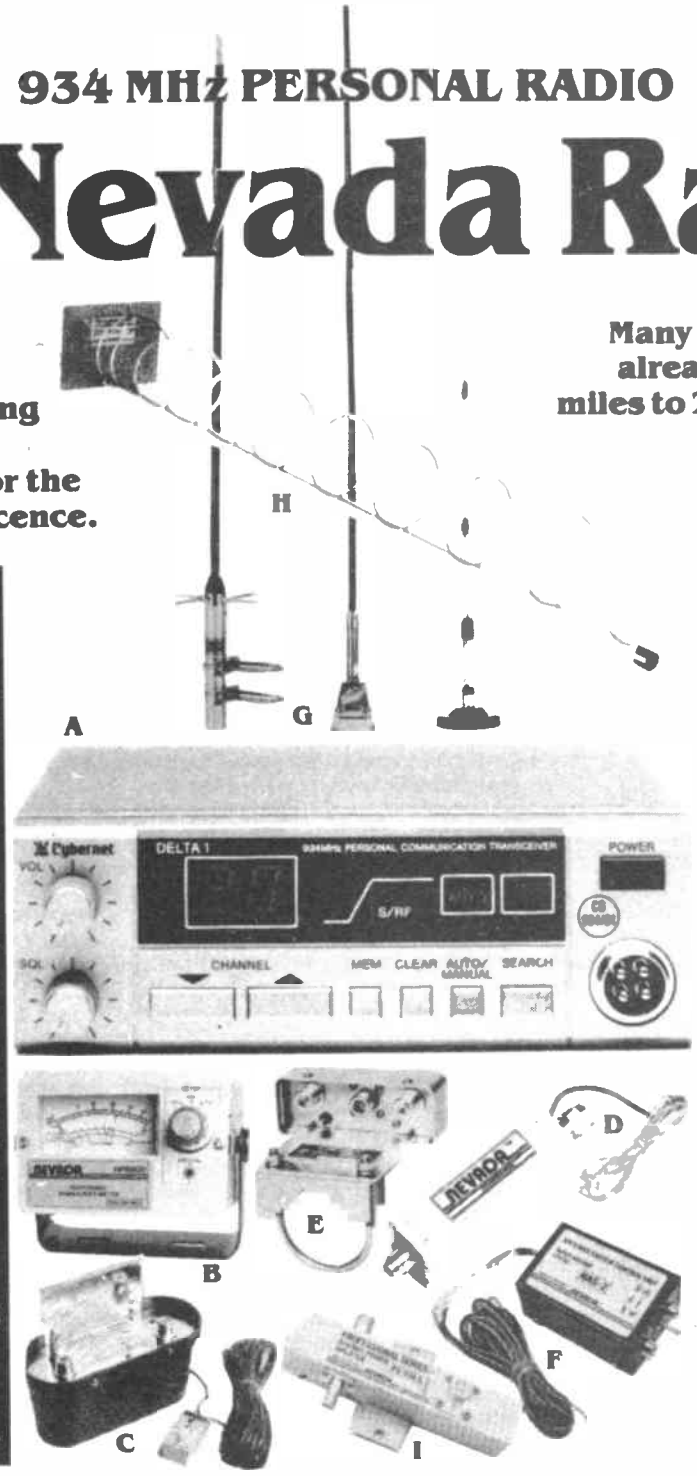

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DRESSLER D70

Valve linear amplifier

If you want a really powerful 432MHz linear amplifier, you will either have to make your own, buy a Dressler D70, or import an unbelievably expensive monster from the US. This review reveals some astonishing incidences about the installation, explosion and final operation of a Dressler D70, eventually purchased after some months of anxiety.

This linear is fitted with a 4CX250R tetrode valve and is capable of delivering 400W PEP output for an input of around 12.5W PEP. On the front panel there are knobs controlling anode tuning and loading, a four position switch for off, standby, operate, and operate with dc on the antenna socket for driving a masthead pre-amp.

A fourth knob switches one of the two meters to read HT, relative output power, grid 1 current and grid 2 current. The second meter permanently monitors the total cathode current, with full scale deflection at 500mA. A rotary switch can select FM or linear operation, the standing current being decreased for FM. Another pot alters the Tx hold time for use when the RF sensing circuits are switched on. A switch on the rear panel selects RF sensing on or PTT for Tx operation. The input from the transceiver is on a 50 ohm BNC socket, whilst the RF output is on an N-type.

Bypass relays

Bypass relays are included to give a direct throughpath for receiving or for when the linear is switched to standby for barefoot Tx. There are two phono sockets on the back for interconnecting with transceivers, the first requiring a short circuit for Tx, whilst the second requires 5-15V dc positive to change the linear over to Tx. The mains socket is an IEC type.

Within the rig itself is a large power supply and a blower which only seems to give just enough cooling to cope with an average duty cycle, the output exhaust being on the left side cheek. There is a very large sand filled HT fuse internally and a safety cut-out to disable the HT if the top lid is taken off.

Basic status LEDs on the front panel indicate 'operate', 'transmit' and 'overload'. A temporary overload is taken care of by the linear switching to Rx and back to Tx again, approximately once per second, but the rig can also shut down more permanently. There is a reasonable degree of circuit protection internally, most of the circuitry being designed with the use of ICs.

Shortly after we received the D70 for review we connected it up to my normal 70cm system using a Microwave Modules transverter as a drive source and a 1kW 50 ohm microwave dummy load on the output. We were totally unable to get more than 225W output, so three days later the original sample was changed for a second one. Once again we connected it up to the same equipment, turned on, and after about 80 seconds warm-up, we obtained 400W output for a few seconds on a single carrier.

We congratulated ourselves and switched the unit to standby whilst we decided upon appropriate tests. After about two minutes, and with five people in the lab, we heard the most almighty explosion followed by an ominous silence by all.

My wife, Fiona, shot into the lab shouting, 'What on earth was that?'. We all started talking again, although most of us were still shaking, and then noted that almost all the equipment was no longer working. The Dressler had managed not only to blow its own plug top fuse, but had taken out the complete bench fuse as well. There was also an ominous and expensive smell.

The Dressler was opened up, whereupon my colleague, Nigel G1LSA, discovered that several inches of PCB copper track had completely vaporised. An electrolytic capacitor, a Zener diode, another diode and a resistor had also hit the dust. Upon investigation we could see that the PCB tracks had been very poorly edged and the mains wiring from the IEC socket was taken directly to the PCB. The other end of the tracks then fed the mains fuses and other parts of the machinery.

The manufacturer in Germany admitted that three other D70s had previously hit the dust in the same way and was changing the source of supply for his PCBs. We made a strong recommendation that the mains wiring should go directly to the fuses first, and that recommended IEC PCB spacings should be used in future with careful attention paid to efficient edging.

Nigel spent many happy hours peeling bits of copper off the board and replacing the burnt out components. Finally, the time came to test Nigel's handiwork; he had done a good job. This time, with all of us at least 15ft away, the Dressler was connected up. After 20 minutes, we gradually crept up to it with a degree of nervousness.

There was one odd thing that we noticed, the actual value of electrolytics used in the power supply was 47μF, six of them being across the HT supply with equalisation resistors. In the circuit (handwritten and very difficult to read) 100μE capacitors were specified, but it took three months to acquire the correct ones from Germany. The manufacturer stated that he had used 47μF for a while because he was out of stock of the higher value and had changed his source of supply.

All the original tests were made with the original value components in circuit, but the correct value ones were put in by us shortly before writing this review, and so far the Dressler has not exploded again.

Subjective trials

I used the linear on the 432MHz band for around three weeks before taking any measurements, as I wanted to be sure that it had indeed become explosion free. I noted that with the linear turned off there was a through power loss of around 1.5dB. I suggest, therefore, that the input and output RF relays are rather too lossy. These relays are very small, but they are reliable. The RF sensing circuits worked very well but I much preferred to use the normal PTT line. The fan exhaust in the last few months has become very hot indeed when driving the linear with around 12W PEP, which is required to obtain a reliable 400W PEP output, especially when I have been using speech processing.

Under normal use the exhaust is fairly hot, but tolerable, and one has to weigh up the fact that the fan is clearly rather inadequate against the greatly increased manufacturing cost that would be involved if a larger fan was used, requiring a larger case.

Long periods of speech processed transmissions would sometimes cause the overload cut-out system to come in, despite the fact that the linear was being operated well within its manufacturers' specifications. However, if processing was switched out the linear never tripped out. I do not normally use more than 8dB or so of processing, for I believe that excessive processing actually decreases intelligibility in many circumstances.

At no time have I ever noted input or screen grid metering show current, but I

would have thought that a small amount of screen grid current would have been better, and it seemed to me that it was not possible to apply enough loading for this. More loading should improve intermodulation distortion, although in some circumstances the absolute maximum power output when overdriven could be somewhat less. The manufacturers claim that most German users seem to want more power rather than clean transmissions, but I would much prefer the reverse and hopefully Dressler will change their mind about this.

The main HT is 2.2kV and standing current should be around 70-100mA. The PA uses a half wave anode tuned line with a tuning capicitor at one end, whilst the other end is connected to the 4CX250R anode. The output coupling is somewhat crude, being operated by a form of cord which can catch, requiring you to open everything up to fix it. The input drive can be trimmed with two preset trimmers to get optimum input tuning and SWR.

Now that I have used the linear for some months I have found that it has worked very well, but it has required more than 10W to get the full 400W output.

I have had some very good reports on the quality of the output, although at full power it has added just a slight roughness on speech peaks because of the slightly high low-order intermodulation products.

Laboratory tests

Since the amplifier required a surprisingly high input drive power, we decided to use another 4CX250R linear to drive it, and I put my old Fischer to good use here. When the latter gave 12.5W PEP output its intermodulation products were so low as to be negligible. For some tests we inserted a 3dB power attenuator in front of the Dressler to stabilise the source impedance.

The source signals were from two Marconi 2019 signal generators via a hybrid coupler. The output from the Dressler was taken through a Rohde and Schwarz attenuator load, and thence to a Hewlett Packard spectrum analyser. The overall gain was just under 16dB. No matter how we twiddled and pushed we could not obtain 400W for 10W input, which was unfortunate.

At 110W two-tone PEP output the distortion performance was superb, whilst at 220W PEP the third order distortion was at −23.5dB, which is a little high. What is most important here, though, is that higher order products attenuated very rapidly, thus avoiding any spreading. For this reason, whilst there was slight deterioration in transmitted quality, reports of spreading characteristics were most favourable.

The maximum output PEP tested was 440W, and at this level third order products were poor at −18dB, but once again the higher order products were well down, ninth order being at −58dB. The products were seen to be somewhat asymmetric, and this confirmed my opinion that it was not possible to load the PA correctly. We could not make any improvement no matter how long we twiddled.

We checked the anode current on single carrier and noted 425mA for 400W output. The HT at this point was just below 2kV, thus efficiency was at around 50%, which I think is extremely good but possibly too good, for correct loading would probably have decreased the efficiency slightly. At just over 200W carrier the PA current was 325mA, showing much less efficiency.

Too optimistic

The relative power indications were far too optimistic, for an output of 210W actually indicated at 270W. Perhaps the meter is designed to persuade you to hold the power down! The input SWR was checked with a Bird through line wattmeter, using an accurate 50 ohm drive source. At 5W input the SWR was excellent at around 1.1:1. However, when we switched the linear to standby and checked the straight-through SWR we were dismayed to see 1.6:1, thus again showing that the relays were not particularly good. We very carefully checked both low and high level power loss through the linear on standby and confirmed the 1.5dB loss noted in the subjective tests.

The RF sensing circuit was very sensitive indeed, for as the linear requires just over 10W for full output, a 21dB margin is a lot better than that provided on many of the competitive solid-state linears designed a few years ago, although some of the recent ones from BNOS are a lot better.

There is one point about both the through loss and SWR which concerns me. There may well be a degradation of apparent receive sensitivity dependent upon the length of co-ax between the transceiver and the linear. System sensitivity could be affected by as much as 2dB in addition to the actual direct loss of 1.5dB. However, if you use a masthead pre-amp, you can ignore this problem completely, although you will still have the power loss if you transmit without the linear on. Dressler can also supply a separate masthead pre-amp powering box, and you will find this much safer than using the linear's own masthead dc supply.

Note that if the linear does not go to Tx for one reason or another, and the front panel switch is in the masthead energising position, then power from the main transceiver or transverter would go backwards through the masthead and probably blow it. You therefore only need an intermittent PTT lead to do untold damage, hence my recommendation to avoid using the internal masthead powering.

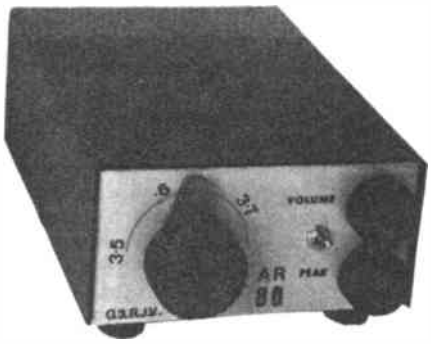
Conclusions

When I review a piece of equipment I always have to bear in mind available competition. The problem here is that there is, as yet, nothing available at a reasonable cost which will give powers in excess of 100W. I have been very critical about some aspects of this model and the explosion saga has shown up a serious failing, but it has to be said that I would far rather have this valve linear than any solid-state one that I have ever used on the band. It becomes all the more important to avoid spreading if both your output power capability and antenna performance are improved.

Of course the D70 could have been even better, but the question is whether it could be made substantially better in design for only a very modest increase in cost. I rather doubt it, and so for two reasons, overall cost and performance, it is well worth-while considering making your own if you have the necessary knowledge, as well as the time and patience.

My final conclusion is that the D70 is well worth buying, but you should absolutely insist on the mains wiring modifications and the correct values of power supply capacitors. I noted a substantial improvement in HT regulation with the higher value capacitors installed, and subjective reports suggest that peaks are less distorted, which might well be due to an improved low order IM performance. If you already own one of these linears, open it up and check on the points raised and rewire if necessary.

BEGINNERS' WORKSHOP



A series for the would-be constructor

PART SIX: COMPLETING THE RECEIVER

Rev George Dobbs G3RJV

Construction: the exciting bits!

Building up a circuit board, by whatever method, is only part of the process for the amateur radio constructor. To be really complete the project requires housing in some kind of box or case and the controls and legends put onto the front panel.

For many constructors, myself included, metalworking is not their forte. I remember well my early days of valve radio construction: bashing great holes into aluminium chassis bases, endless filing of holes to take large government surplus meters and painting cases with black crackle finish paint which never seemed to work.

The whole process is somewhat simpler these days. Components are smaller, cases can be bought ready-made and everyone has a power drill. In this article I am going to describe the standard way in which I have made my cases for some years. It is simple – it has to be for the likes of me – and produces a pleasing and individualised appearance. In fact it is possible to personalise the finished project so that not only does it look smart but it cannot be mistaken for yet another piece of commercial equipment.

Minor branch of science

Amateur radio construction is, I suppose, regarded as a minor branch of science, but with a little bit of care, and flair, it can be almost an art form. The best amateur radio constructor I know, George Burt GM3OXX, produces not only technically fine equipment but also aesthetically pleasing equipment. I have heard his projects described as 'radio jewellery'.

Although such a level of expertise is not given to us all, we have no real excuse for producing untidily finished projects.

Perhaps the most exciting project that the amateur can build is a receiver. I have built many over the years and still thrill to the sound of the first signals on any receiver I have built myself. It's like the wonder of radio all over again. If you have never built a receiver now is the time to try it.

Simple but viable

The last two articles in this series described an audio amplifier and a variable frequency oscillator. This article takes those two items, adds another board and produces a simple but viable amateur band receiver. The completed receiver covers the 80 metre (3.5MHz) amateur band and is suitable for Morse (CW) and single sideband (SSB) signals. I have called my prototype receiver for this project the AR80m. An amateur 80m band receiver designed for *Amateur Radio* magazine.

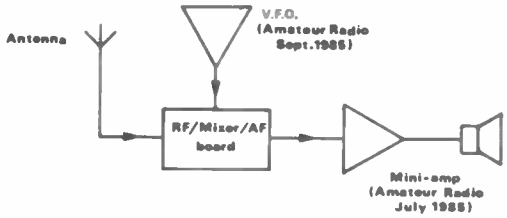


Fig 1 *AR80m receiver block diagram*

I did not realise, until I marked that title on the front panel, its closeness to that real classic of short wave receivers, the AR88.

This little receiver will not beat a good AR88 but it will provide many hours of fruitful listening on the 80m band.

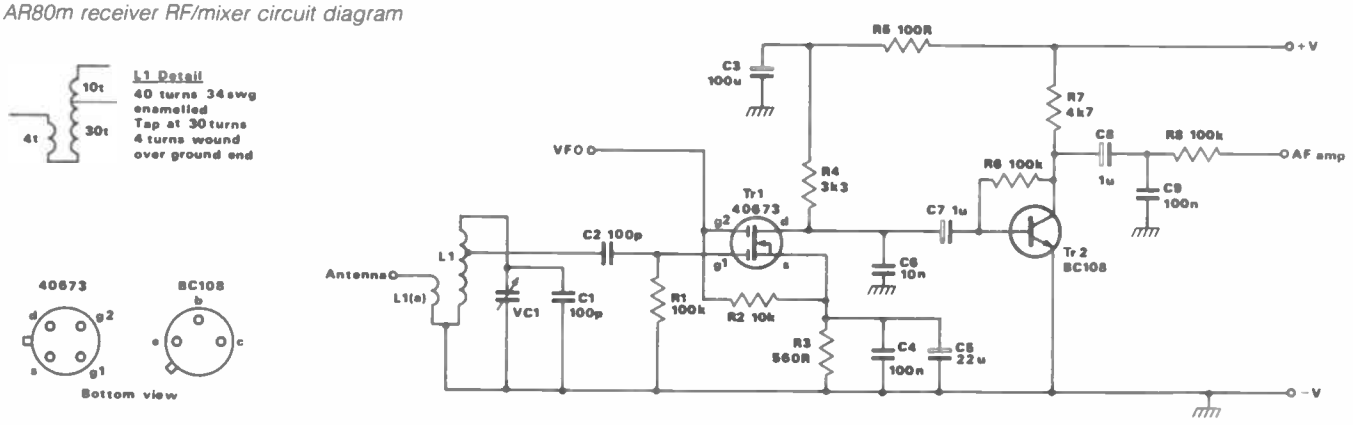
AR80m receiver

This little receiver is a direct conversion receiver. I have described such receivers many times before. I like them. Although they have some drawbacks endemic in their simplicity, for what they entail the results are very good indeed.

Figure 1 shows how the existing projects from the previous two articles are utilised in the complete receiver, and it also shows the principle of the direct conversion receiver. These receivers are so called because the radio frequency signal received at the antenna is directly converted into an audio signal, without the intermediate frequency conversions used in the more conventional superhet receiver.

The additional board required offers radio frequency tuning, a mixer (or frequency changer) and an audio pre-

Fig 2 *AR80m receiver RF/mixer circuit diagram*



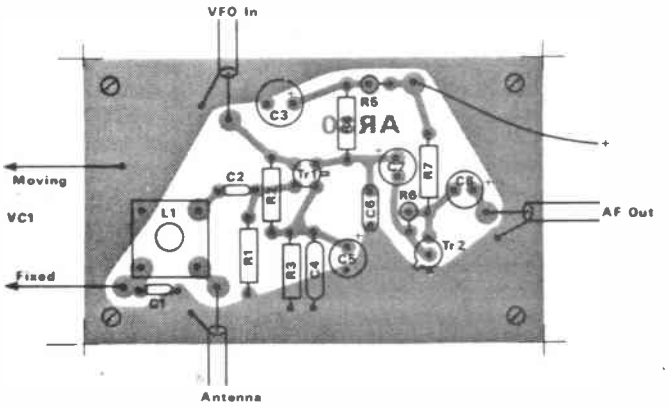


Fig 3 *PCB with component overlay*

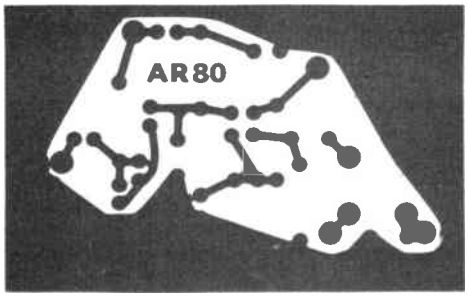


Fig 4 *PCB copper side (actual size)*

amplifier. The signals from the antenna are received via an input tuned circuit and pass into one input port of a mixer circuit. The other input of the mixer accepts the variable frequency oscillator input (VFO). The VFO tunes the same range as the required band frequency.

Imagine a Morse (CW) signal, which is simply a radio carrier wave switched on and off, being the input signal. The output from the mixer will be the various products of the input. The VFO signal will be present together with the input CW signal and, because of the mixing process, so will the sum of the two and the difference between the two. If the difference between the input signal and the VFO signal is (say) 1kHz, a signal of this frequency will emerge from the mixer. Not only will that signal contain the CW information, for as the carrier goes on and off so does the output mixed product, but also the mixer output is at audio frequency. Thus the radio signal has been converted into an audio signal which can be heard.

A nice simple way to receive a radio signal, and the principle also applies to SSB transmissions. The resultant audio signals from the mixer are rather weak, so they have an extra stage of audio pre-amplification before they pass into the audio amplifier board.

If the reader has been following this series, three-quarters of the receiver already exists. *Amateur Radio* in July 1985 described a mini-amp which now becomes the audio amplification, and the September 1985 issue described the VFO for use with the AR80m receiver. All that is required in the way of new electronic circuitry is the RF/mixer/AF amplifier board.

The circuit for the new board is shown in *Figure 2*. Experienced constructors will recognise straight away that it is not novel in any way. The input from the antenna is coupled via a small winding into a single tuned circuit formed by L1 and VC1. C2 couples the signal from a tapping on L1 into one gate of a dual gate MosFET mixer. The mixer forms the heart of the receiver.

Standard circuit

This is a very standard circuit. There are better mixers but the cost and simplicity of this dual gate MosFET mixer is such that I have used it many times for simple receiver designs. The VFO signal is fed onto the other gate of the MosFET. The resultant mixed signals appear at the drain of the device. The resistor R4 provides a drain load and C6 decouples, or gets rid of, the RF components of the signal.

We now have an audio signal across R4 which is fed via C7 into a single stage audio pre-amplifier, Tr2. There would probably be enough gain without the Tr2 stage; in fact it is possible to overload the mini-amp with audio signal when the gain control is turned high. This 'audio overkill' is included to allow plenty of signals should some form of audio filter be required which could reduce the overall gain of the receiver. Apart from adding a more sophisticated form of front end tuning, the only simple way to increase the selectivity of a direct conversion receiver is by using audio filters.

The signal from Tr2 passes via C8 into the mini-amp board. C9 reduces some of the high frequency content of the signal and R8 is a limiting resistor. This resistor could be adjusted in value to suit a filter, if added later, or increased in value if the output makes the mini-amp take off too easily.

Construction

Figure 3 shows the layout of the new board. This series has already discussed the various methods for fabricating circuit boards and *Figure 4* shows the layout of the copper side of a printed circuit board for this module. In fact I built the prototype on Perfboard, the board with a 0.1 inch spaced matrix of holes.

This was discussed earlier in the series but no example was given of a complete board built in this manner. The board here can be built using either an etched board, a cut circuit board or the Perfboard, as shown in the photographs. The layout, both top and bottom, would be the same for each method.

The coils, L1 and L1(A), are wound on the same 3/16 inch former. In this board I have used the standard 3/16 inch former with a base plate and core. The arrangement of the windings is shown in the insert of *Figure 2* and the actual layout of the coils is shown in *Figure 5*. The terminations of the top ends of the main winding and the tapping on that winding go to binding posts. They are pieces of stiff copper wire soldered into the base plate pins and cut to a length which reaches the height of the tapping and the end of the coil.

The main winding is made by baring one end of the wire of its enamelling, tinning the exposed copper and soldering it to the centre of the ground connection pin. The binding post wires should be in place but pushed outwards to allow ease of winding. Wind on 30 turns closely side by side.

At this point pull out a small loop of the wire and scrape the enamelling off the loop. Form the loop into a tightly twisted single lead, twisting back as far as the former, and tin the twisted wire. This is soldered to the binding post in line with the 30th turn. Pull the twisted section taut and continue the winding for 10 more turns.

At the top of the winding, which will be very near the top of the former, hold the wire in place with your thumb and bare the copper. Tin and solder the wire onto the binding post and pull it into a taut position to hold the end of the winding.

The smaller winding, L1(A), is a little more fiddly but should not be any real problem. Secure one end of the winding into the same ground pin as used for L1. A little care is needed with the winding operation since the wire has to pass between the binding posts and the former.

It is best to use a short length of wire: 6 inches is plenty. The 4 turns are carefully laid over the bottom of the main winding of L1.

No binding post is used for the top of this winding as it is so small. Simply take the top end of the winding to the appropriate pin, shown in *Figure 5*.

The rest of the circuit is easy to build. Apart from the polarity of the capacitors, C3, C5, C7 and C8, and the orientation of the pins in Tr1 and Tr2, very little can go wrong. Because of the size of the board, physically small capacitors are required and ¼ watt resistors.

Vero pins or similar PCB termination pins may be added at the termination points into and out of the board. A slight modification of the input circuit of the mini-amp board is required. This is shown in *Figure 6*. The components C9 and R8, marked in *Figure 2*, are not on the board but wired directly onto the volume control potentiometer on the mini-amp.

VC1 is a front panel mounted input signal peaking control. In the prototype, a small polycon variable capacitor was used. These are the little variable capacitors so popular in tuning cheap AM portable radios. A good item to have taken from a scrap radio. They can vary in capacitance from about 500pF to about 250pF, but any of these values will work in this circuit.

Care must be taken to identify the tag that goes to the control shaft which becomes the ground connection. Then work out a tag that goes to one of the fixed sets of vanes to provide the connection to the top of L1.

Usually these capacitors are double gang controls but only one capacitor section is required. There may also be other gangs for FM tuning which are not required here. It is a relatively simple matter to sort out what is what by visual inspection of the component. It is a good idea to check the ground connection with an ohmmeter between the tag and the tuning shaft. Choose a variable capacitor which has a shaft long enough to go through the front and take a knob.

Let's hear some signals!

The completed receiver may be tested before it is put into a case. The various sections of the receiver can be connected together on the bench. Bench hook-ups sometimes have a habit of not working, although in many cases the reverse seems more common: boards that work on the bench but not in an attractive case!

The problem with some bench hook-ups is careless interstage wiring – crocodile clip leads or bits of wire dab soldered from point to point. Make up proper soldered leads between all the units and then the completed receiver should work in this naked state.

It is not a bad idea to check the VFO first by locating the signal on an existing 80 metre receiver. Connect the antenna to the input of L1(A). This input is designed for a nominal low impedance of some 50 ohms, common in amateur use, so the antenna termination should be 50 ohms. This may require the use of an ATU (antenna tuning unit).

If the antenna is just a bit of wire strung out down the back yard without an ATU it might be better connected onto the top end of the L1 main winding. Make such a connection through a capacitor; try a value of about 100pF. With power applied to all three boards and an antenna and speaker, the receiver should yield signals. These may be peaked using VC1. If VC1 does not peak the signals or the peak occurs at one end of VC1, adjust the core of L1 to obtain a suitable tuning range with VC1.

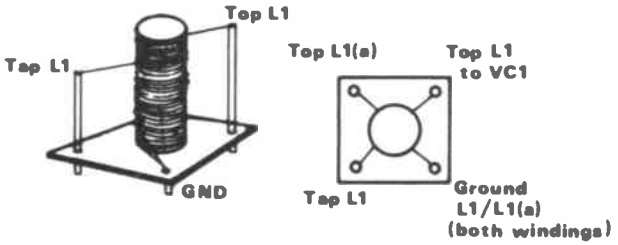


Fig 5 *L1/L1A winding details*

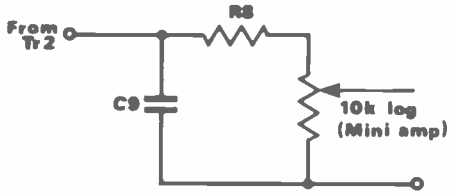


Fig 6 *Input circuit to mini-amp*

If by chance you have built the VFO in advance and calibrated a scale for the slow motion drive, forget about it! The VFO is a very simple design without buffering and hence will change calibration when connected to the load of the receiver mixer. In fact, it is best to leave the calibration of the dial until last, when the whole receiver is safely housed in its case.

Boxing it up and making it pretty!

There are many choices for housing the receiver in an attractive case. The metalworkers amongst us will rush into their workshops and fabricate a smart box to their own design, but what I suggest here is a more simple approach for us lesser mortals.

Like most of my projects I have used a case made by Minfford Engineering. Not only is this an easy way out, but these cases are little more than the cost of making a case from aluminium stock. The case used is their aluminium box type A48, which is 4in × 6in × 2in high. These boxes have a lift-off top and side panel, and a base plate which bears the front and back panels.

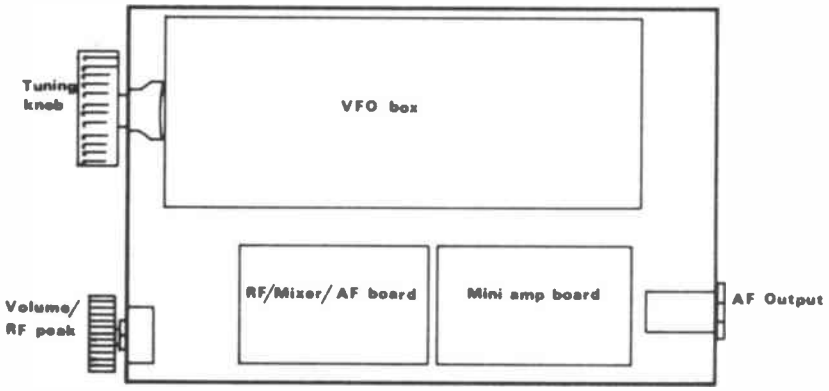
The VFO box and the two circuit boards are mounted as shown in *Figure 7*. The VFO box is placed in the left side (viewed from the front) of the case on ¼ inch 6BA stand-off pillars. The two boards, with the mixer board to the front, are placed to the right of the VFO box. The boards are also mounted on stand-off pillars.

The holes now have to be drilled in the front and back panels of the case. The back panel has three sockets. In any case these are a standard jack socket for audio output (to speaker or phones), a phono socket for the antenna input (I use phono sockets as standard for most connections), and another phono socket for 12 volts (the positive to the centre connector).

Perhaps using a phono socket for both the 12 volt supply and the antenna input is not a good idea, as it would be possible to mix up the connections, but this has been my standard practice for some years now. I opted to operate the receiver on the bench 12 volt supply that I use for all my equipment in the shack, but it would be fine to use a 9 volt battery supply for the receiver.

It should just be possible to squeeze a PP3 battery into the case, although its life will be limited. Any 12 volt power

Fig 7 *AR80m case layout (½ size)*



supply used must be *well smoothed.*

The front panel has holes for the main tuning control, the input peaking control (VC1), the audio gain (volume) control and a miniature toggle on/off switch for the power line. There is just enough room to place the volume and peaking controls to the right of the front panel.

As with all drilling of controls for a front panel I began with a drawing, full size, of the front panel and worked out the layout on paper before making any holes. The largest hole is the one for the main tuning control on the front of the VFO box. The outer flange of the slow motion drive has to be available on the outside of the front panel for mounting a scale. This flange rotates at the same speed as the vanes on the tuning capacitor.

To position the hole I rested the VFO box on the 6BA stand-offs, which are to hold it off the bottom of the case. The box on the stand-offs is placed on the upturned lid of the case (which is the same thickness as the bottom plate) and the control shaft is pressed firmly against the front of the case to make a mark in the soft aluminium. This gives the height at which the hole has to be made. The distance from the left-hand edge of the case front is gauged by measuring how the box can just fit into the case.

Drill undersize

The holes are made with a power drill and high speed twist drills. Because aluminium is soft I usually drill undersize holes and take them into the correct size for the controls by using a reamer. A small reamer is a very useful tool for the aluminium 'box basher', allowing accurate fitting of holes to be made even when a hand-held high speed drill makes the first cut.

There are several ways to mount a scale of frequency onto the flange of the slow motion drive. A method I often employ is to have the flange behind the front panel with a circular scale fixed to it, which can be viewed through a small window cut in the front of the case. However, for this receiver I chose to have the scale outside the front panel. Again it could be a circular scale; just a disc with a centre hole that is a push fit onto the outer flange of the drive.

In the AR80m receiver I decided to have a pointer on the flange which rotates to indicate calibration on the front panel markings. The pointer is a small piece of perspex, cut then filed to shape, with a centre hole to allow a tight push fit onto the slow motion drive flange.

The finishing touches

Often one of the main downfalls of home-built equipment is the final finish of the case. Some prefer to leave the plain aluminium finish, perhaps with a caustic soda wash to produce a dull matt effect, others like to have a white or coloured front panel. A common approach has been to spray the case with a car paint spray can and add lettering in Letraset or other rub-down or water slide letters. This type of finish is far from durable, the paint scrapes off easily, or even flakes off, and the lettering can be rubbed away with very little handling.

My method over many years has been to apply a false front made from thin card. This may sound awful but the complete process is simple, adaptable to most applications and produces a very durable finish. What is more it hides the metal on the front panel so that ill-cut holes, scratches or even misplaced holes are not seen. I have often redrilled old cases, with holes from the last project remaining, and applied this type of finish so that the old holes and markings are lost.

Oddly pleasing effect

Begin by removing all the controls from the front panel. Choose a piece of thin card or thick paper, which can be white or any lightly tinted colour. The prototype AR80m is a pale orange. I have a lot of this colour thin card and it gives an oddly pleasing effect on equipment. Cut the card slightly over-size for the front panel, and place it on the panel with a couple of small blobs of Blu-Tak. Using a sharp pencil, mark out the positions of all the holes from the back of the panel by running the pencil tip along the inside of the cut holes. Remove the card. Using either a pair of small finely pointed scissors or a sharp pointed modelling knife, carefully cut out the holes.

The lettering can now be added to the front of the card. A whole variety of methods can be used. Letraset is the easiest but I have had good results with Rotring pens and stencils. Check the area of the control knobs because it is easy to put markings in positions which may be hidden when the knobs are added.

A little convenient

The calibration of the tuning scale is a little inconvenient because this can only be done by replacing all the controls, firing up the receiver and calibrating it against an existing receiver or a signal generator. If using a receiver it should pick up the VFO as the AR80m is tuned along the band. Make faint pencil marks at the required calibration points, then remove the controls and the card and add the required numbers for the scale. Legends, logos, and callsigns, etc may also be added to the front panel to enhance the final product.

Now comes the real secret of this method, because the card alone would not be very tough or attractive. The card is cut to fit the front and lightly glued onto the panel. Then onto the card is added a layer of clear sticky backed plastic. This is the stuff sold as library film to protect books. It gives an attractive and tough finish to the card.

Use a piece slightly too large and tuck the ends around the inside edge of the panel. The holes have to be cut out with a sharp pointed knife. Finally, add the controls, making sure not to screw them down too tightly and wrinkle the plastic film – you might find that a washer is useful here. The knobs are also added. The final result should be a pleasing and individualistic finish. The purist can do the same to the back panel.

The completed AR80m should look attractive and will be a useful 80 metre receiver.

Suppliers

Aluminium box type A48: *Minfford Engineering, Sun Street, Ffestiniog LL41 4NE. Tel: (076676) 2572.*

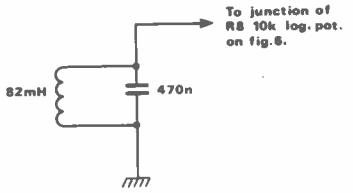
Coil former 3/16 inch (4.8mm) and base: *Maplin Electrical Supplies Ltd, PO Box 3, Rayleigh, Essex. Tel: (0702) 552911.*

VC1 – surplus components ideal but a suitable type is Toko Polyvaricon 2Q-20ST7 from: *Cirkit Holdings plc, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111.*

40673 dual gate MosFET available from: *J Birkett, The Strait, Lincoln (as are many of the other components). Tel: (0522) 20767.*

Post script – a simple filter

Direct conversion receivers are always better with a little audio filtering. The very simple circuit shown below helps quite a lot. The 82mH inductor is type 10RB (stock number 34-82302) from Cirkit Holdings. The result is a tuned circuit at audio frequency which peaks up the required signals. Any type of capacitor will do the job if its value is 0.47μF. Add it and see the improvement.



AR80 COMPONENTS LIST

R1	100K
R2	10K
R3	560
R4	3K3
R5	100
R6	100K
R7	4K7
R8	100K
All resistors ¼W	
C1	100p mica
C2	100p min dipped ceramic
C3	100μF 25V electrolytic
C4	0.1 ceramic
C5	22μF 16V electrolytic
C6	0.01 min ceramic
C7	1μF 16V electrolytic
C8	as C7
C9	as C4
VC1	Polycon variable capacitor (see text)
Tr1	40673
Tr2	BC108
Miniature toggle switch for whole receiver circuitry	

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★1250 DC50 DOWNCONVERTER★
★THE MARKET LEADER★

SPECIFICATION:
Input frequency range: 1240-1325 MHz
Intermediate frequency: 50 MHz nominal
Local oscillator injection: 1190-1325 MHz
Conversion gain: >25 dB; 30 dB typical
First RF stage: MGF 1100 Gs As FET
Mixer type: Discrete Schottky ring
Post mixer processing: SL560c amplifier
Operating voltage: 11.5-14.0 Volts
Operating current: 80 mA nominal
Internal stabilisation: 8.5V; 5.5V rails
External connections: AFC input
Supply input
Tuning voltage input
8.5V rail output
RF connections: BNC

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Improve your video quality with this low cost add-on board. Maybe wired for transmit or receive use. Includes amplification to compensate for attenuation of CCIR network.

SCT2 TRANSMIT SOUND MODULATOR
Generates FM sound sub-carrier which is then combined with composite video to drive UFMOI. Requires 350 mV RMS AF input. Specify 5.5 MHz or 6.0 MHz.

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Takes FM sub-carrier from VIDIF board and provides 2 squelched audio output, 600 ohm and 8.0 ohm, independently adjustable, specify 5.5 MHz or 6.0 MHk.

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7. 2M Linear/Pre-amp 10W	(144PA4/S + 144LIN10B)	45.00
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SHORT WAVE LISTENER

TREVOR MORGAN GW4OXB

Well, I don't know what happened to the summer this year but at the time of writing I was still waiting for it!

Being back at work has left me little enough time to get on the air, and when I did get on conditions were most peculiar; ten and fifteen metres being full of life one minute and as dead as a dodo the next. Good old twenty was the hunting ground for most operators and listeners, with eighty being lively with lots of special event callsigns to be worked.

The ex-services radio clubs were offering a special award for listeners and operators during the VE and VJ celebrations and I must comment on the courtesy shown by the many members of those clubs to those who called in 'just for a number'. Thank you lads!

Bulging mail bag

Once again we had a full mail bag, including a letter from Stuart Stephens in Bridgend. Stuart has returned to short wave listening after a break to earn some bread (he took his C&G in baking... HI). His original Satellit 2000 was replaced, thanks to his newly acquired XYL who recognised the withdrawal symptoms, and he now has a nice new Panasonic RF-B600LBE, which has rekindled his enthusiasm.

Nigel Marston from Sunderland joined the gang with an enquiry about the Prefix Awards, which I clarify elsewhere for those interested in having a go.

R C Harvey of Weston-super-Mare comments on the content of *Amateur Radio* in that he feels we've changed from a 'generalised' format to a more 'ham biased' magazine. I hope we haven't, Mr Harvey, as we try to cater for all interests. However, if there is a specific subject you have in mind, let the Editor know. It is difficult to get folks to write articles, especially on subjects not already covered by the magazine.

Tony Blackburn (!) from Stratford on Avon has enjoyed the challenge of the Prefix Awards and, between interruptions caused by moving QTH, has been putting his Trio R2000 through its paces.

Dave Howes of Rochester is a newcomer to the hobby (three weeks at the time of writing) and is off to a good start with a Yaesu FRG7700/FRT7700 combination, fed to a loft mounted end fed. Despite his short time on the phones, he has started his prefix list.

Going deaf?

Dave was puzzled by the lack of activity on the higher bands and wondered if his receiver was deaf. No, Dave, you have come into the hobby at a time when the radio spectrum is being affected by something called sunspots, or, rather, the lack of them.

During the peak periods of sunspot activity the maximum usable frequency is higher and the 15 and 10 metre bands are alive (the reason why CBers were able to work DX a few years ago and probably the reason for its sudden popularity), and 20 metres can be used for twenty-four hours a day. As the sunspot activity decreases so does the MUF until, over approximately eleven years, we reach the minimum and the higher frequencies are less amiable to the DXer. This is only a basic idea of what is happening, but it's not your receiver Dave.

Despite what's happening on the sun, which has been conspicuous by its absence this summer, our intrepid prefix hunters have been straining their ears for new ones to add to their lists.

Firstly, our Gold award has been claimed by none other than Keith Forward who, only last month, badgered me with his Silver claim and a threat of things to come. Perhaps sitting for a couple of weeks with his leg up had something to do with his success, but it does prove that they are there if you can get in and collect them. Anyway, our congratulations.

While on the Gold award, please be patient when claiming this as I have to get the plaques individually engraved. I've now got a few in hand so you should have your award within a week or so of me receiving the claim.

Over to Tony Blackburn RS87156 (you know, I'm sure I've heard that name somewhere!), who gets off the mark with a claim for both Silver and Bronze in one fell swoop. Tony offered a super collection including AL7BL/P, AX9, CX2 and 6, DU7, HK3, ZP5, 6Y5 and a mass of interesting stuff to complete the claim. Well done Tony!

Mike Hudson sends in his Silver claim including 5Z4, 5N8, 6W2, AP2, HK5, J87 and a fine selection for the balance. Most of the DX seems to have been found on eighty metres but occasional forays onto the other bands picked up a choice selection of Europeans to make the numbers up.

Getting into it

John Simpson gets into Silver with his claim, including a selection caught on RTTY! A71, BY2, CX2, PYs 1-6, VU2, 5B4 and 5Z4 headed the list with a good collection for the rest. Twenty was John's hunting ground with eighty being the back-up. RTTY captured CG1, DL3, HA7, I0, KK8, UZ2 and a few others.

Ian Thomson of Rye gets into the thick of things with a claim to make Silver. Ian, now G1OZR, offered 3A2, 5N8, 6Y5, 8P6, A34, AP2, CP8, D44, H44, JW0 (Svalbard), KH0 (Mariana), T2 (Tuvalu) and a really interesting collection for his award... all nicely computer printed too.

With 20 years of listening behind him, Ian is now looking forward to actually working those amateurs he's logged over the years (I know just how you feel, Ian) and perhaps we'll soon have his Gold claim for working the 1000!

I still get enquiries about the rules of the game. The prefix is the first part of the callsign and these count even if in the same country, so G4, GM4, GW4, etc, are all separate prefixes, as are W2, WA2 and WB2. If a station is being operated on 'foreign soil', the suffix counts, so G4SUP/VE3 counts as VE3. If the station is /M or /MM it counts as separate. The awards are given for 250 prefixes heard for Bronze, 500 for Silver and 1000 for the Gold. I am considering a request for a Platinum award for 2000 prefixes, but let's see how we go!

Another newcomer to the hunting party is Peter Cardwell from Sheffield, who has an extensive shack including the Yaesu FRG7700 complete line-up and a multitude of aerials ranging from a home-brew 40-160 wire beam to a Hy-gain 18V multiband vertical. He also uses a Spectrum computer for RTTY/CW and a Sharp MZ700 for logging, etc. Sounds a bit like GCHQ to me! Peter includes 3B6, 6Y5, BY1, 5T5, KH0, J37 and JW6 in his claim for Bronze. His Sharp prints out a nice QSL card too! Well done Peter.

Second in for the Bronze is Chris Foreman of Gateshead, also with the 7700 and a G5RV. Chris is an ISWL member (G17113) and offered 5B2, 9H3, A71, CP8, PY7 and VP8 amongst the bunch. A nice list, Chris. Look forward to your Silver before long!

That's it for this month's claims. *Please* send award claims direct to me at 1 Jersey Street, Hafod, Swansea SA1 2HF.

Value for money

The BARTG (teleprinter group) kindly sent me a copy of their Journal *Datacom* which must rate as the best value for money around. The summer edition consisted of no less than 120 pages of news, hints, tips and circuits – in fact lots of goodies for the RTTY and data communications buffs. If you are in to this side of the hobby, details can be obtained from Pat Beedie, Ffynnonlas, Salem, Llandeilo, Dyfed (SAE please).

During the past couple of weeks I have had a new toy to play with in the shack, in the shape of the Daiwa AF606 all mode active filter. What a nice piece of gear it is too! The

filter fits between the receiver (or transceiver) and the extension speaker or, if you haven't an extension speaker, Daiwa have put one into the unit anyway.

Looking at the front panel we find (left to right) the notch control, PLL control, bandpass filter control, mode selector, headphone socket and power switch. The rear panel holds the dc input socket, extension speaker socket, input socket, PLL tone adjustment, notch bandwidth adjustment and PLL volume control. The internal loudspeaker is mounted in the top panel which has a forward incline.

Setting it up

Setting up the filter is simple, with a connection to a 13.8V dc supply being required plus a connection to the output of your receiver (use shielded cable). The choice of modes is as set out above and the selector control can be set to operate on SSB or CW signals.

In the SSB mode the filter consists of high and low pass filters of 1.5, 2 and 2.5kHz, and low frequency noise can be very effectively reduced. In the CW mode the filtering can be adjusted down to 80Hz bandwidth! The effect is rather like listening down a narrow water pipe and practically every signal except the one you want is effectively wiped out.

The phase locked loop (PLL on the front panel) is extremely effective if the desired signal is reasonably strong but spoilt by adjacent signals. I found that if I was working a CW contact over a long period adjacent signals were most annoying, and using the PLL was a treat. The filter accepts the required signal which you tune until the 'lock' signal lights up using the PLL control. Switching to PLL on the mode selector then gives you uninterrupted CW generated by the filter's own oscillator. Furthermore, the tone and volume can be adjusted to your own taste.

In use over a month or so, the filter has performed beautifully and many virtually unreadable CW stations have been copied with ease. On the WAB net I was able to winkle out a very weak mobile from a very noisy 80m band to work a tasty square.

The technical gen is given in the table and, although nearly £70, it is a very effective and extremely well made piece of equipment and recommended without reservation.

Many thanks

My thanks to Arrow Electronics for the chance to try it out. I subsequently bought it!

So to this month's featured listener, Keith Forward G1JNK, who hails from Bognor Regis. After being made redundant in late 1982 Keith was drawn to the radio scene through CB, but once he realised what could be attained with a little study, and with the help of a few friends, his interest increased. This was mainly due to his green eyes wandering over the Trio JR310 owned by his pal, Peter Wall G1ITW.

Like many of us, being short of the readies, his first receiver was a rather dated Marconi Forecaster valve job which, although not really right for the job, kept his interest on the boil. Working out the crystal frequencies was a bit of a headache and the set's narrow bandwidth meant sitting on a frequency until some kind soul took pity on him and transmitted there.

Keith Forward's (G1JNK) shack

Despite its obvious drawbacks the Marconi gave him many hours of pleasure and helped him on to better things in the guise of the Eddystone EC10. Coupling this to a 30 metre long wire, Keith started logging in earnest in September 1983 and began concentrating on the amateur bands, hoping to join them before too long.

The next upgrade was to the Heath HA108. He found this similar to the EC10 in use and his logbook started filling nicely. He also found his geography improving no end having to look for countries previously unheard of.

Tony G4XIV was the chap who was instrumental in obtaining Keith's present receiver, the Panasonic DR29, which, with digital readout and full band coverage from 3-30MHz, has proved a delight to use.

However, due to the sensitivity the long wire was abandoned and a vertical was employed (ex-11m) fed with 50 ohm co-ax. This has really produced results (witness his Gold award claim!).

Having spent a few months in dry dock due to an accident, Keith found short wave listening not only absorbing but a saviour to his sanity, and the added challenge of having to work hard for his awards made his listening a rewarding experience. Now for the Morse, eh Keith!

If you would like to be the featured listener one month, please send your details to me and you will receive a nice binder for your copies of *Amateur Radio* with my compliments!

Kontest Korner!

Well the 'new bands' set listening period was a bit of a damp squib as far as reports go, with only Goff Curtis sending in a log. As Goff states, the 18 and 24MHz bands were pretty diabolical and 10MHz produced mostly Europeans with a smattering of decent DX to be heard around 2300, most of this from South Africa.

Perhaps the fact that CW is the chosen mode on these bands puts a lot of people off, but after taking the trouble to learn Morse it seems a pity to let it go to waste. You don't need 20 words a minute to make a contact and many of those using the bands transmit below the required 12wpm of the test. Anyway, thanks for the report, Goff.

I'll be involved in some special events over the next couple of months, so keep your ears open as I'll be mentioning listeners regularly so that you can claim QSL cards.

Once again my thanks to all who have written in with comments and interesting titbits from their experiences. Those who have registered with the information exchange list will be receiving an updated list in the new year. If you want to join in, just send your SAE to me for an information sheet.

All the best for another month. Good listening.

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CW	Band pass Centre frequency 500-1200Hz Width 140Hz −3dB 110Hz −3dB 80Hz −3dB
PLL	Centre frequency 500-1200Hz Lock range 70Hz Input voltage 0.1-2V Tone frequency 500-2500Hz

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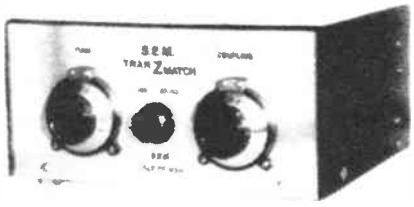

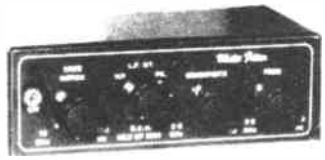

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OPERATING PRACTICES AND PROCEDURES

Operating practices

Last month we concluded our look at the licensing conditions and in doing so touched on certain aspects of operating practices and procedures, which we will now discuss in more detail. Those of you who listen on the amateur bands or who have seen an amateur station being operated should already be familiar with certain practices, such as the use of something called a 'Q-code' or the 'RST code', etc, and what is meant by someone 'calling CQ'. These, and how to go about establishing and conducting a contact (or QSO) is this month's brief.

Language differences

One of the more common questions a radio amateur gets asked is how amateurs in different countries manage to understand each other when everyone speaks in different languages. The answer is not simply that the English language has been adopted by many of the operators, but that there also exist certain internationally agreed abbreviations which considerably ease the problem caused by language differences as well as making the QSO easier to conduct, especially when using Morse code.

The Q-code

One of these abbreviations, as you have just seen, is the use of a word beginning with the letter Q, which comes from a list called the *International Q-code*. This is a list of abbreviations, each Q-signal consisting of three letters with the first one obviously Q, originally devised to aid communications using radio telegraphy. The full list is quite extensive, so the Q-code employed by the amateur service is simply an extract of the more commonly used Q-signals. Some of these are given in *Table 1*, which you should remember, and to help you become familiar with this Q-code extract I shall continue using the code in this text where appropriate. Many of the Q-signals are also often used as nouns, as when I used the abbreviation 'QSO' for 'radio contact'. A list of these is provided in *Table 2*.

CW operating

The international Q-code is actually a means of sending either questions or answers in an abbreviated form that can be understood in any language. There is also a further list of accepted CW abbreviations and procedure signals, some of which are given in *Table 3*, and which when used together with the Q-code allows the CW operator to send his messages in 'shorthand', thus avoiding the need for long transmissions where each word is individually spelt out.

You can see therefore why many amateurs far prefer to operate CW rather than one of the speech modes. Apart from CW being far easier to read under adverse conditions than, say, an AM or SSB signal, it is possible to have a good QSO and exchange information with someone who doesn't know a single word of the other operator's language!

Unfortunately, the very use of all of these abbreviations does, in some cases, put the newcomer off using CW as it tends to confuse them a little, and they find that they cannot feel quite as confident using the Morse key as they can using a microphone. Those who persevere, however, find that this is only a very temporary situation, and once confidence has been gained they soon become quite proficient at conducting a QSO using CW.

The RST code

If you look at *Table 1* you will notice that some of the Q-signals ask for or give reports on the strength and quality of the signal. **QRK**, for instance, refers to the **R**eadability of a transmission; **QSA**, the **S**ignal strength and (in the case of radio telegraphy) QRI for the **T**one. To give these reports a further code is used

Q – –	Question	Answer
QRA	What is the name of your station?	The name of my station is...
QRG	Will you tell me my exact frequency?	Your exact frequency is...kHz
QRH	Does my frequency vary?	Your frequency varies
QRI	How is the tone of my transmission?	The tone of your transmission is...
QRK	What is the readability of my signals?	The readability of your signal is...
QRL	Are you busy?	I am busy. Please do not interfere
QRM	Are you being interfered with?	I am being interfered with
QRN	Are you troubled by static?	I am troubled by static
QRO	Shall I increase power?	Increase power
QRP	Shall I decrease power?	Decrease power
QRQ	Shall I send faster?	Send faster
QRS	Shall I send more slowly?	Send more slowly
QRT	Shall I stop sending?	Stop sending
QRU	Have you anything for me?	I have nothing for you
QRV	Are you ready?	I am ready
QRX	When will you call me again?	I will call you again at...hrs
QRZ	Who is calling me?	You are being called by...
QSA	What is the strength of my signals?	The strength of your signal is...
QSB	Are my signals fading?	Your signals are fading
QSD	Is my keying defective?	Your keying is defective
QSK	Can you hear me between your signals?	I can hear you between my signals
QSL	Can you acknowledge receipt?	I am acknowledging receipt
QSO	Can you communicate with...?	I can communicate with...
QSP	Will you relay to...	I will relay to...
QSY	Shall I change to another frequency?	Change to another frequency
QTH	What is your location?	My location is...
QTR	What is the correct time?	The correct time is...hrs

Table 1 *Commonly used Q-signals*

Q-signals used as nouns

QRA – Address
QRG – Frequency
QRK – Signal strength
QRM – Interference from other stations
QRN – Static or electrical interference
QRO – High-power
QRP – Low-power
QRS – Send slower
QRT – Close down
QRX – Stand by
QSB – Fading
QSL – Verification or confirmation
QSO – Radio contact
QSP – Relay message
QSY – Change frequency
QTH – Location

Table 2 *Q-signals used as nouns*

called the RST code *(Table 4)*, its initials being self-explanatory. Thus, if the question QRS were received, then an answer of QSA9 would mean 'your signal is extremely strong'.

To avoid having to ask all three questions – QRK, QSA, QRI? – the standard operating procedure of always giving the other station an RST report is adopted. Sending RST 589 would mean: 'your signal is perfectly readable, strong and with a pure dc note'. The quality of the signal can be identified further if there is something amiss with it. The letter 'C' is added after the RST report if chirp is evident, 'D' is used to denote that the signal is suffering from drift and 'K' if there are key clicks. One other letter, 'X', is used to indicate that the tone appears as stable as if the note were crystal controlled. For speech modes, the tone report is not sent and you would give or receive an RS report only.

Sending speed

Whilst the Q-code and procedures are there to help you through a CW QSO, it is important to remember that you should conduct the contact at a speed which is easily copied by everyone in the QSO. A good CW operator does not send Morse which he readily knows is too fast as this is often seen as showing off more than anything else, and could make copying difficult for the other amateurs who may not yet be as proficient as yourself. You may also come unstuck one day when you come across another operator who turns out to be able to send CW faster than you and promptly gives you back a taste of your own medicine!

No, although the speed of sending generally depends on circumstances, so that when conditions are poor you might have to send slowly or when they are very good, with little QRM or QRN then you might increase your speed if possible, the rule is quite simply never send at a greater speed than you yourself are able to receive. It is even better practice to adjust your speed to that of the operator at the other end, if his is slower than yours, but do not try sending faster than you are able as this could result in your CW becoming unreadable because of bad sending. Always send Morse that is easy to read and remember that in the case of the callsign, the licensing conditions require that this is sent at speeds not greater than 20 words per minute.

Telephony abbreviations

To just clarify one point, it should be realised that these abbreviations, codes, etc were all thought up primarily with radio telegraphy in mind, but the usage of some of them has since found its way into speech operation more for convenience than anything else.

For instance, there is no real advantage to be gained from saying 'there is QSB on your signal' instead of 'your signal suffers from fading' during a speech QSO, save for the fact that someone who doesn't speak your language all that well might recognise the abbreviation QSB better than he would the word 'fading'. On the other hand, at times when conditions are such that you find it necessary to spell words out phonetically, such as your callsign, name or QTH, the term QSBravo might just be that little bit easier to distinguish.

However, it is not absolutely necessary to use abbreviations or the Q-code for telephony contacts and this practice is not always approved of. It's rather like using CB slang. That's fine on those channels because not only is it part and parcel of CB itself, but the limitations imposed on Citizen Band operation means that someone using a legal CB would not normally be expecting to talk to people at the other side of the world.

In amateur radio it is completely different and world-wide communication is commonplace, so it is particularly important to avoid the use of slang or jargon when at all possible. This is not because it is wrong to use words like 'handle' when you mean 'name'; a lot of people will know what you mean, but not everybody. In many cases this could lead to unnecessary confusion, so getting into the habit of talking in plain language is both advisable and certainly a better and more effective way of conducting a conversation.

Unfortunately, not everyone agrees with the points just mentioned and certainly, you must have heard, or will hear, jargon used over and over again on the air. A lot of it will be unnecessary use of the Q-code, CW abbreviations (yes, on phone) and even CB slang. Everyone develops their own style of speaking over the air and there is nothing wrong with the use of a small degree of 'jargon'. After all, an amateur at the other side of the world will certainly understand the

CW abbreviations

AR	–	End of message
BK	–	Break in
CFM	–	Confirm
CL	–	Closing down
CQ	–	General call to all stations
DE	–	'from. . .'
DX	–	Long distance
K	–	Invitation to transmit
KN	–	Invitation for a specific station to transmit
NW	–	Now
OK	–	That is correct
PSE	–	Please
R	–	Received
RPT	–	Repeat
TU	–	Thank you
VA	–	End of work
WX	–	Weather report

Table 3 *Extract of CW abbreviations and procedure signals*

The RST code

Readability

R1 – Unreadable
R2 – Barely readable, occasional words distinguishable
R3 – Readable with considerable difficulty
R4 – Readable with practically no difficulty
R5 – Perfectly readable.

Signal strength

S1 – Faint, signals barely perceptible
S2 – Very weak signals
S3 – Weak signals
S4 – Fair signals
S5 – Fairly good signals
S6 – Good signals
S7 – Moderately strong signals
S8 – Strong signals
S9 – Extremely strong signals

Tone

T1 – Extremely rough hissing note
T2 – Very rough ac note, no trace of musicality
T3 – Rough, low-pitched ac note, slightly musical
T4 – Rather rough ac note, moderately musical
T5 – Musically modulated note
T6 – Modulated note, slight trace of whistle
T7 – Near dc note, smooth ripple
T8 – Good dc note, just a trace of ripple
T9 – Purest dc note

(Add 'C' for chirp, 'D' for drift, 'K' for clicks or 'X' if note appears to be crystal controlled)

Table 4 *The RST code*

question 'what is your QTH?', but what would they make of 'where's your 20?' So, do try to develop a style of talking over the air that will be easily understood by everyone.

If it is necessary to clarify a callsign or the spelling of certain words, use the recommended phonetic alphabet *(Table 5)* because all amateurs should be familiar with this. In certain cases, where the other operator does not understand your language very well and so has difficulty in recognising the pronunciation of some of the words, it might help to use a word he (or she) is familiar with, such as saying 'B for Brazil' instead of 'B for Bravo' to a South American station. At all other times though you should try to get into the habit of using the recommended phonetic alphabet of *Table 5*, and this is the one you are expected to be familiar with for the RAE. Facetious or objectionable words are certainly not allowed.

On the air

Here are a few hints on how to go about establishing a contact on the air. Some may seem obvious, some not. Unless you are going to have a chat with another amateur whose QTH is not too far away from your own, then it is advisable to spend a few minutes listening on the amateur bands to gauge the conditions. If all that is heard on, say, 20m are local European stations then do not expect great things in the way of DX on that band at that time. Similarly, if there is a contest in progress and the airwaves are chock-a-block you can indeed expect there to be some good DX on, especially if it is a well favoured contest, but don't hope for many long QSOs with participants as you may well have to fight your way through a very, very big pile-up of stations to work the rare stuff.

If you want an idea of what propagation is like have a listen first to who is working who. The reports they exchange can also give you an indication of whether the conditions are good both ways, for sometimes you may find that propagation from a certain part of the world into your country is fine but almost non-existent from you to them.

Do not always immediately assume though that if a band sounds dead, and no signals are being heard, it is unusable. It is often quite possible to manage an unexpected contact (maybe even DX) from a couple of CQ calls instead of passing the band by. The LF bands tend to have some activity on them nearly all of the time but 28 or 21MHz in particular will sometimes appear devoid of all signals, especially as we are presently at a low point in the sunspot cycle. At a time like this, 28MHz, for instance, may actually be 'open': it's just that everyone is having a listen, hearing no-one and switching off.

Another good indication of the condition of these HF bands are the beacons which put out signals at certain spot frequencies within the amateur bands. A list of some of these HF beacons was published in the May '85 issue of *Amateur Radio*, in 'DX Diary'.

The term 'CQ call' was just mentioned. Some of you may not know what this means, so before going any further I would certainly recommend to those of you who don't that you should now be thinking along the lines of spending a small amount of your time listening on the amateur bands and becoming familiar with operating practices. Do try though, for your own sake, to differentiate between a good operator and a poor one.

So, what is meant by 'CQ'? Well, there are two ways in which amateurs can establish contact with each other – by calling a specific station or by issuing a general request for a contact. If you look at *Table 3* you can see that the latter can be done using the abbreviation 'CQ', which means: 'this is a general call to all stations'. The following is how the CW operator would put out a general call: 'CQ CQ CQ DE G7XYZ G7XYZ G7XYZ K'. The abbreviation 'CQ' is repeated three times followed by 'DE', meaning 'from' and the station callsign is then sent three times. The 'K' at the end of the call invites any station to reply.

The CQ call can be altered to specify that the operator is putting out a general call to any long distance station only, as follows: 'CQ DX CQ DX CQ DX DE G7XYZ G7XYZ G7XYZ K', or that a contact with a particular country only, for example New Zealand (callsign prefix ZL), is being sought: 'CQ ZL CQ ZL CQ ZL DE G7XYZ G7XYZ G7XYZ K'. When a station is heard to answer the call but its callsign has not been identified because of interference, for instance, the code 'QRZ' is sent to ask the question 'who is calling me?' The CW operator would therefore send: 'QRZ? QRZ? DE G7XYZ G7XYZ G7XYZ KN'. Because the message is directed at a specific station now, KN is used in place of K until the contact is terminated.

Telephony

When putting out a CQ call using telephony, the same procedure is used except that the words 'This is' are spoken instead of using the CW abbreviation 'DE' and that the callsign is spelt out using the recommended phonetic alphabet. The other abbreviations are retained as follows: 'CQ DX CQ DX CQ DX. This is Golf Seven X-ray Yankee Zulu calling, Golf Seven X-ray Yankee Zulu calling CQ DX and standing by'.

The other way of establishing a contact is by answering a call. If G7AAA was heard calling CQ then the reply would be: 'Golf Seven Alfa Alfa Alfa. This is Golf Seven X-ray Yankee Zulu'. It is always a good practice to give both callsigns very clearly so that the station you are establishing contact with can both understand your call and also check that his call has been correctly received. Once this has been done it is no longer necessary to use phonetics until the QSO is terminated. If the mode of operation was CW then the call would be answered: 'G7AAA G7AAA G7AAA DE G7XYZ G7XYZ G7XYZ KN'. Whichever mode is in use it is recommended that calls be kept short unless the conditions are such that it becomes advisable for the answering station to send their callsign a number of times.

Before putting out a CQ call, or in fact making any form of transmission (ie, tuning up, which should really be done into a dummy load, or a test call), it is important to ensure that no-one else is using the frequency that you have chosen. Try to pick a clear frequency (yes, I know this is not often possible) as not only will you then not interfere with anyone else but it makes your transmis-

Table 5 *Summary of log-keeping requirements*

Summary of log-keeping requirements

1. An indelible record shall be kept in one book (not loose-leaf)
2. The following data must be recorded:
   a. The date
   b. Time of commencement of operation (in GMT)
   c. Frequency bands
   d. Class or classes of emission
   e. CQ calls
   f. The callsigns of stations called and with whom communication is established. Also, the callsigns of stations who are called but do not reply
   g. The time of establishing and ending communication with each station
   h. Any tests carried out from time to time as appropriate (eg, to check for TVI)
   i. The time of closing down the station
   j. When appropriate, the particulars of the temporary location or the addresses of any temporary/alternative premises from which the radio station has been operated
3. All entries should be made at the time of sending/receiving and there should be no gaps between entries
4. A separate log may be maintained for mobile or pedestrian use. Entries in this should be made as soon as practicable after the end of the journey and must consist of date, geographical area of operation, frequency band(s) and time of start and end of journey.
5. The log must be signed by any authorised operator of the station who is not the licensee and the callsign or Amateur Radio Certificate number of this operator must be shown.

sion far easier to be heard by others. If you decided to put out a call only a few kHz away from someone else already in QSO then QRM would be experienced all round and no-one would benefit. So, have a good listen to make sure that the frequency is clear and, for final confirmation, it does no harm to enquire at least twice, 'Is this frequency in use?'

In CW, sending a question mark (di-di-dah-dah-di-dit) is the accepted abbreviated form for this enquiry. However, please do *listen* after asking; there are still too many operators who ask if the frequency is in use and then promptly start calling CQ all in the same breath!

Remember also that even though the frequency may sound clear to you there may very likely be others on it, it's just that you cannot hear them and they cannot hear you because the propagation between yourselves is poor. Someone in a different part of the world might be having good propagation and all he can hear is a lot of noise from two or more stations all talking at the same time on top of each other and seemingly totally oblivious to the fact that the frequency is already occupied. This does happen: during the recent summer months, for instance, it was quite common to hear the American stations complaining of the QRM level being so high that they could hardly make out even the strongest of signals. We, on the other hand, could often hear them quite clearly without the least bit of interference from other stations.

Properly tuned

Finally, on the subject of establishing a call, do try to remember to make sure that you are properly tuned to the correct frequency when answering another station's call. This may sound like unnecessary advice to those who only have experience of black box type transceivers, but it is in fact equally applicable to everyone. If you have a separate transmitter and receiver, you first of all have to adjust the transmitter so that it is tuned onto the frequency of the station you are listening to and intend to call. This is called *netting* and should be carried out at reduced transmitter power and as quickly as possible so as to keep any possible interference to a minimum. The other station, for instance, may already be in contact with someone else and neither would relish the idea of a strong carrier signal coming over the top of them whilst they are trying to have a quiet QSO. Tuning up of the transmitter output stage should then be done into the dummy load, not the antenna.

For operators with transceivers the problem of netting is greatly reduced as transmitter and receiver share the same VFO. For equipment with valve PA stages the output stage will still need tuning up, and again this should be done into a dummy load and not directly into the antenna. Most transceivers have what is called a clarifier, a means of tuning the receiver to a slightly different frequency to that which the transmitter is tuned to.

Sometimes the clarifier is left on and the operator sits there wondering why he is getting no reply, when he suddenly realises that for the past 20 minutes he has been listening to a different frequency to the one he has been calling on! They might sound silly now, but all of these things can happen in reality.

General advice

Here are some points that apply to both CW and telephony operation. Do respect the band plan. Most amateur bands have areas allocated for use by various modes and, whilst it is not mandatory for radio amateurs in Great Britain to stick to these band plans, it is recommended that they should.

If a station calls CQ and you answer that call it is deemed good manners to move away from that frequency and leave it to the calling station at the end of the contact. Similarly, if a station is heard making a directional call, eg CQ VK, it would be deemed bad operating for a British station, say, to answer the call. The same goes for someone calling CQ DX. If the calling station is located in Europe an answer from another European station would, in this case, not be appreciated.

Don't break into a contact that is already taking place unless a pause has been left between overs for that specific reason. Wait until the end of the contact before making your call. Not waiting for a QSO to finish is probably the biggest failing of many European amateurs, especially when the station they are after is DX.

Finally, do try to give accurate and meaningful RS(T) reports. If the signal strength of a station is only S5 then give S5, don't boost it up to S9 because he (or she) has just given you S9.

Log-keeping

We looked at log-keeping last month but ,as there is often a question on this topic in the RAE, the main licence requirements with regard to log-keeping are summarised in *Table 5*.

Repeaters

Moving into a completely different area now, we look very briefly at a couple of different fields of amateur communication to those we have so far discussed.

The first is repeaters, those automatic listeners sitting on hilltops waiting to extend the range of your low power equipment. Seriously, though, the function of a repeater is to receive a transmission on the *input channel* and to re-transmit it on a different frequency within the same amateur band (called the *output channel*).

The repeaters we are concerned with here are designed to aid VHF and UHF communications when using portable or mobile equipment and, by careful siting at the tops of hills with the antenna positioned high in the air, they give a greatly increased range to the VHF and UHF operator at no extra cost in terms of extra power or improved antennas at the accessing station. Repeaters are built and installed by amateurs, are unmanned and are maintained by repeater groups throughout the country. Mode of operation is usually FM, though one or two can handle SSB and there is even, I believe, a slow-scan TV repeater in operation at the time of preparing this article. The RAE manual explains how a repeater is accessed.

Satellites

There are satellites specifically designed for amateur radio operation, such as the Oscar series (the name is taken from Orbiting Satellite Carrying Amateur Radio). The main difference between repeaters and satellites, apart from the fact that one is on the ground and the other racing through space, is that the latter are *transponders*, that is, they re-transmit the received signal in a different band to that on which they receive. These bands are currently from 432 to 144MHz, 144 to 432MHz and 144 to 28MHz.

It is only possible to access a satellite when it appears over the horizon and is in direct line-of-site, and high gain antennas that point at and follow a satellite as it orbits the earth are often used to gain access using low power transmitters. A satellite extends the VHF and UHF coverage over a very wide range indeed compared to the extended range available with a repeater.

Safety precautions

That just about wraps it up for another month, but before closing here are a few notes on safety in the amateur station. The RSGB Safety Recommendations for the amateur radio station, given in Appendix 2 of the RAE manual, should be carefully studied as they are part of the syllabus, but for your convenience here are three of the more important precautions:

1. Before attempting to investigate or repair a fault, always switch off and disconnect the equipment from the mains supply;
2. Make sure that all equipment is properly earthed and that the earth itself is satisfactory. The latter should be checked from time to time, as corrosion, etc, can often result in a poor earth;
3. Don't forget that capacitors, especially those of a high value (and particularly where the dielectric is paper), can hold their charge for a very long time, from hours to days and even weeks. Even where bleed resistors are used to discharge high voltage smoothing capacitors in seconds, care should still be taken. With the December exam getting closer, next month I will give you tips on tackling the RAE.

Acknowledgements and references

Radio Amateurs' Examination Manual – G L Benbow G3HB (RSGB)
Amateur Radio Operating Manual – R J Eckersley G4FTJ (RSGB)
City and Guilds of London Institute

QUESTIONS & ANSWERS

RAE PRACTICE DEVISED BY R.E.G. PETRI G8CCJ

MISCELLANEOUS QUESTIONS

In previous issues of *Amateur Radio* I have prepared questions and answers on specific subjects. This month I've prepared a broad selection to test your knowledge so far.

1. The unit of current flow in the electrical circuit is the:
   a) amp
   b) volt
   c) ohm
   d) watt

2. The voltage applied across the 10 ohm resistor is 10 volts. What happens to the current when the voltage is halved and the resistance is doubled?
   a) It remains the same
   b) It increases
   c) It decreases
   d) It alternates

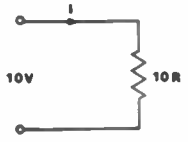


Fig 1

3. The 10 ohm resistor in *Figure 1* is replaced by two 5 ohm resistors connected in parallel. What happens to the current, I, in the circuit?
   a) It decreases to 0.25A
   b) It increases to 4A
   c) It remains constant
   d) It reverses

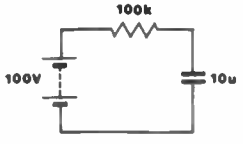


Fig 2

4. What is the time constant of the RC circuit shown in *Figure 2*?
   a) 1 second
   b) 10 seconds
   c) 100 seconds
   d) 1000 seconds

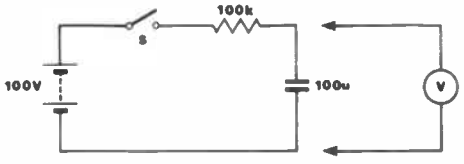
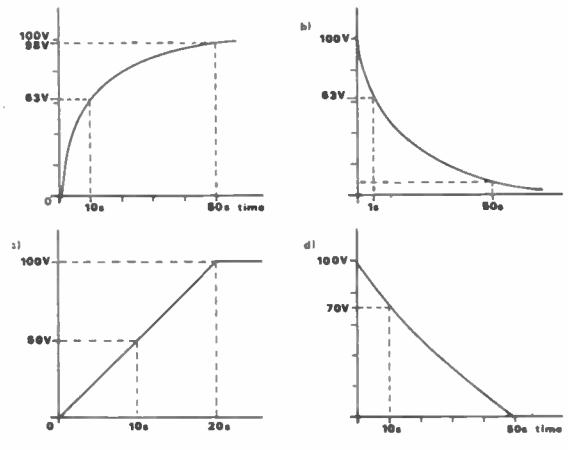


Fig 3

5. An electronic voltmeter, V, of very high impedance, is connected as shown in *Figure 3*. Initially the capacitor has no charge. Which one of the graphs shown below represents the voltage across the capacitor when switch, S, is closed?



6. Opposition to current flow in a pure capacitor is:
   a) resistance
   b) impedance
   c) resonance
   d) reactance

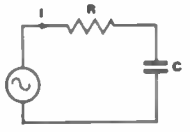


Fig 4

7. *Figure 4* shows R and C in series. Opposition to current flow in this circuit is known as:
   a) reactance
   b) impedance
   c) resistance
   d) rejection

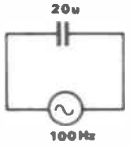


Fig 5

8. What is the reactance of the capacitor shown in *Figure 5* when the supply frequency is 100Hz?
   a) 79.57 ohms
   b) 795.7 ohms
   c) 0.0126 ohms
   d) 0.002 ohms

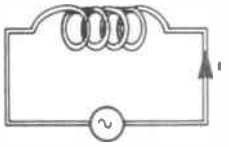


Fig 6

9. The number of turns on the inductor or coil shown in *Figure 6* are increased, the spacing between the turns and the generator voltage and frequency remain constant. How will the current flowing in the circuit change?
   a) It will decrease
   b) It will increase
   c) It will remain the same
   d) It will cease to flow

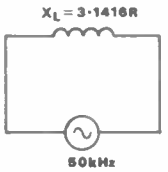


Fig 7

10. The inductor shown in *Figure 7* has a reactance X_L of 3.1416 ohms at a supply frequency of 50Hz. What is its value of inductance?
    a) 3.14H
    b) 0.1H
    c) 0.01H
    d) 0.001H

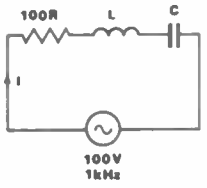


Fig 8

11. Referring to *Figure 8*, the condition for resonance is:
    a) $X_L = X_C$
    b) $X_L \times X_C = R$
    c) $X_L + R = X_C$
    d) $\frac{V_L}{X_C} + R = 0$

12. Referring to *Figure 8*, what is the value of current flowing in the circuit at resonance?
a) 0.314A
b) 0.1A
c) 1.0A
d) 3.14A

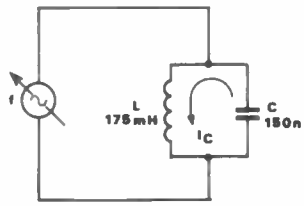


Fig 9

13. What is the resonant frequency of the parallel tuned circuit shown in *Figure 9*?
a) 98.23kHz
b) 982.32Hz
c) 1000kHz
d) 3142kHz

14. Refer to *Figure 9*. Assuming a variable frequency source, what will happen to the circulating current, I_C, as the source generator is swept through the resonant frequency?
a) It will peak
b) It will dip
c) It will not alter
d) It will gradually decrease

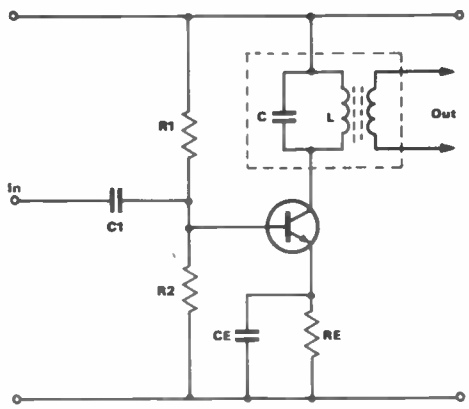


Fig 10

15. Referring to the tuned amplifier stage shown in *Figure 10*, what will be the most noticeable effect if capacitor C_E is removed?
a) The gain will increase
b) The gain will decrease
c) There should be no change
d) Oscillation will occur

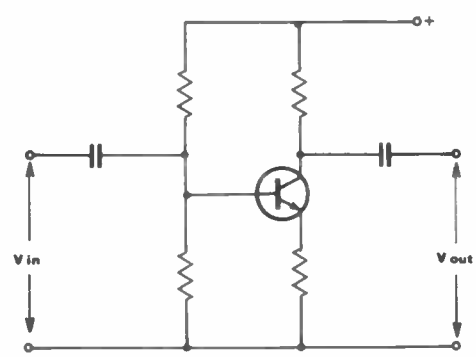


Fig 11

16. The voltage gain, A, of the amplifier stage shown in *Figure 11* can be determined by measuring V_{in} and V_{out} and applying the formula:
a) $A = \frac{V_{out}}{V_{in}}$
b) $A = \frac{V_{in}}{V_{out}}$
c) $A = V_{out} \times V_{in}$
d) $A = V_{out} + V_{in}$

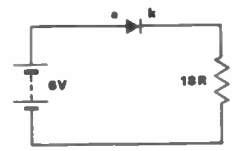


Fig 12

17. What is the approximate pd that you would expect to measure between the anode and cathode of the diode shown in *Figure 12*?
a) 18V
b) 6V
c) 3V
d) 0.7V

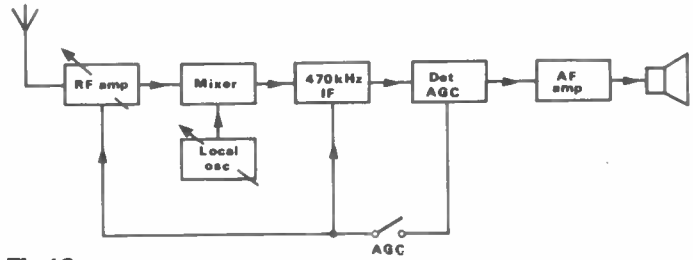
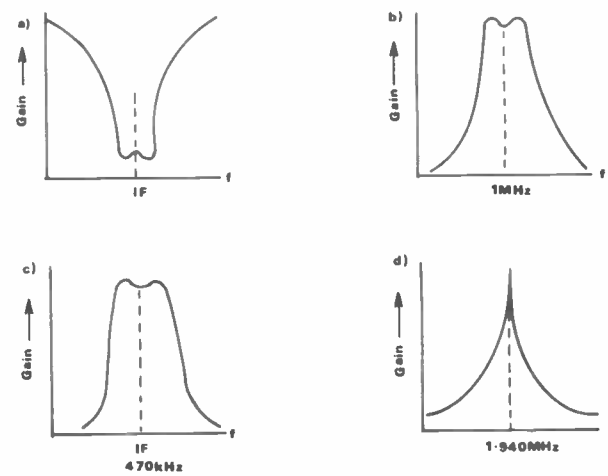


Fig 13

18. *Figure 13* shows the block diagram of a typical superheterodyne receiver. The IF is fixed at 470kHz and the local oscillator is set above the received signal and tuned to a frequency of 1470kHz. To what frequency is the receiver tuned?
a) 470kHz
b) 530kHz
c) 1.0MHz
d) 1.940MHz

19. Referring to *Figure 13*, which one of the following frequency response curves is representative of the IF amplifier?

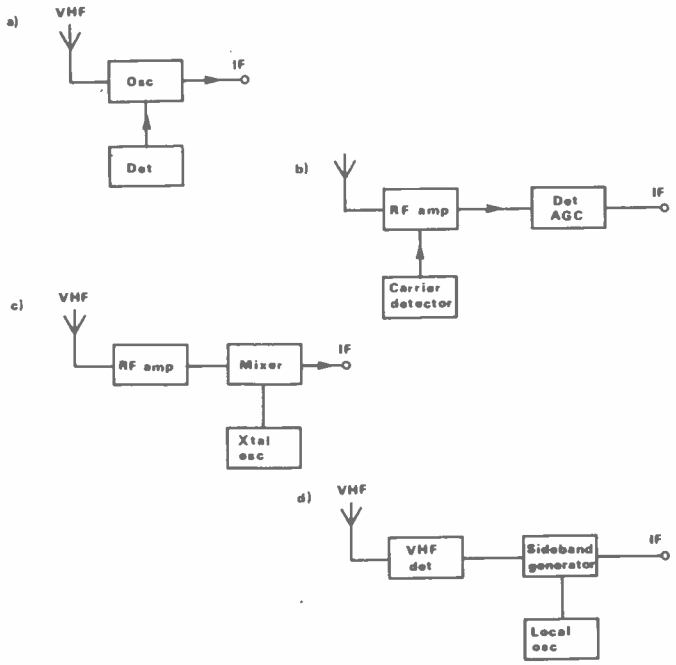


20. Referring to *Figure 13*, which stage in the circuit is responsible for the elimination of co-channel interference?
a) The IF amplifier
b) The RF amplifier
c) The AF amplifier, when using a self-energising loudspeaker
d) None, but re-orientation of the antenna, if possible, could improve matters

21. Referring to *Figure 13*, which stage of the receiver is responsible for reducing image channel interference?
a) The RF amplifier
b) The IF amplifier
c) The AF amplifier
d) Both b and c above

22. It is the start of a 24-hour contest, and the FM detector of your multimode transceiver has gone for a Burton. How will you attempt to receive FM signals?
a) It is not possible
b) Retune all the IF and RF stages in the receiver, using an insulated, copper bladed tuning tool
c) Repeatedly switch between USB and LSB in sympathy with the modulating frequency
d) switch to AM and slope detect

23. Which one of the block diagrams shown below represents a typical VHF downconverter?



24. The frequency stability of a transmitter is only as good as its:
a) harmonic content
b) carrier oscillator stability
c) power amplifier voltage regulation
d) output filter stability

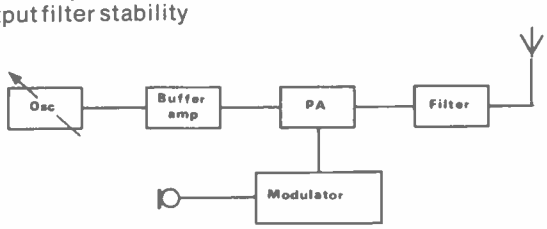


Fig 14

25. *Figure 14* shows the block diagram of a simple AM transmitter. The buffer amplifier will have:
a) high input impedance and be operated in class A
b) low input impedance and be operated in class C
c) low input impedance and be operated in class A
d) low input impedance and high output impedance

26. When the power amplifier stage of a transmitter or a linear amplifier can be operated over a wide range of frequencies without retuning, it is said to be:
a) high Q
b) highband
c) narrowband
d) broadband

27. The carrier deviation of an FM transmission is determined by the:
a) amplitude of the modulating signal
b) amplitude of the carrier oscillator
c) depth of modulation
d) modulating frequency

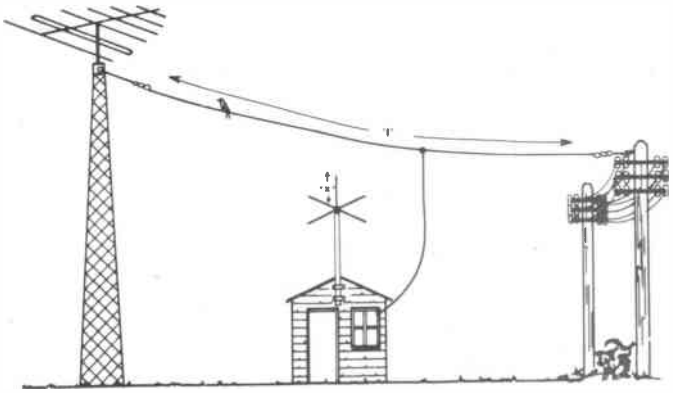


Fig 15

28. The centre fed half wave dipole shown in *Figure 15* is designed to operate on a frequency of 7MHz. What is its practical length, l?
a) 42.85m
b) 28.00m
c) 20.35m
d) 10.15m

29. The 7MHz dipole shown in *Figure 15* is said to be:
a) vertically polarised
b) horizontally polarised
c) centrally polarised
d) current polarised

30. *Figure 15* shows a ¼ wave groundplane antenna mounted on the shack roof. What is the approximate length of the radiating element, X, for an operating frequency of 145MHz?
a) 1.96m
b) 0.98m
c) 0.49m
d) 0.25m

31. Surmounting the tower shown in *Figure 15* is a VHF yagi antenna. What is the advantage of this type of antenna?
a) Omnidirectional coverage
b) Its gain is controllable by its direction
c) High feed impedance for easy receiver matching
d) High directional gains are possible

32. Excessive transmission bandwidth should be avoided because it:
a) is very wasteful of transmitter power
b) always causes TVI
c) can be the cause of adjacent channel interference
d) is the main cause of harmonic distortion

33. One would not normally consider keying the VFO of a CW transmitter because of:
a) causing 'chirp'
b) eliminating the third harmonic
c) blowing the PSU fuses
d) eliminating the second and third harmonics

34. Spurious emissions from a transmitting station are likely to be radiated from:
a) the antenna only
b) the low pass filter only, if fitted
c) the mains filters only
d) any part of the transmitter and transmitting set-up

35. Parasitic oscillations in a transmitter or linear amplifier are usually due to poor design and caused by:
a) stray capacitance and inductance, and changes in component values
b) frequency multipliers tuned to the wrong harmonic
c) harmonics of the local oscillator
d) parasitic fungal growth on non-tropicalised printed circuit boards

Q&A

Now, the moment of truth . . .

Back to the same old boring routine – turn the page through 180°, etc, etc or, for added interest, place the mag against a wall and stand on your head to read the answers through clouded vision!

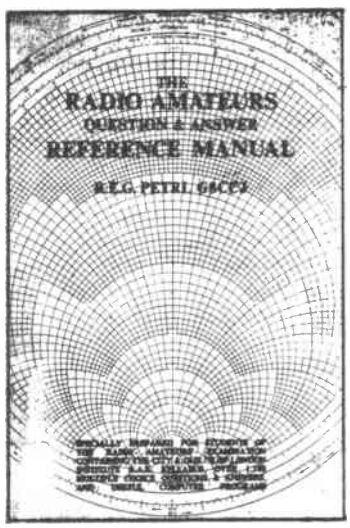
ANSWERS

1 – a; 2 – c; 3 – b; 4 – a; 5 – a; 6 – d; 7 – b; 8 – a; 9 – a; 10 – c;
11 – a; 12 – c; 13 – b; 14 – a; 15 – b; 16 – a; 17 – d; 18 – c; 19 – c;
20 – d; 21 – a; 22 – d; 23 – c; 24 – b; 25 – a; 26 – d; 27 – a; 28 – c;
29 – b; 30 – c; 31 – d; 32 – c; 33 – a; 34 – d; 35 – a

That's it for this month, then. If you thought that the horizontal dipole in *Figure 15* should not really have been hooked onto the telephone pole without permission, and would soon bring along a fleet of little yellow vans and an army of men in bowler hats carrying brief-cases, you were correct; award yourself 2 points. If you also thought it could lead to the propagation of interference via the telephone wires, and would definitely bring you a visit from your local friendly DTI investigation officer, you were again correct; award yourself 4 points this time.

Now that the RAE courses are under way, I suggest that you obtain a copy of:

THE
RADIO AMATEURS'
QUESTIONS & ANSWERS
REFERENCE MANUAL



Just in case you've not already purchased it (or even heard of it!), I've written a Q&A book specially for the RAE student. It contains about 1,100 questions (with multiple choice answers, of course). The questions have been divided into sections and selected to progress with each part of the RAE syllabus. It also contains the C&G syllabus for 1986-88 and some computer programs written in BASIC for the Commodore 64 (which will run on most machines with suitable mods) to assist with the RAE calculations and provide Morse tuition.

The book, *The Radio Amateurs' Q & A Reference Manual (Second Edition),* is available at £5.95 plus £1 P&P (UK) from:

WP Publications,
11 Wayville Rd,
Dartford, Kent DA1 1RL.

News and comment from Glen Ross G8MWR

Duff gen dept

In last month's issue I mentioned that the Microwave Society were holding an open meeting on Monday 23 October at the Daventry Club. Unfortunately the gremlins got in to this piece and the truth was that the event was held at the Droitwich Club on 23 September. Anyway, this will not have reached you in time to stop you taking a wasted trip, so apologies all round. The actual event was a great success with around 20 sets of gear set up on the night. It also provided a great opportunity for people to get together and sort out plans for future activity. Sorry that you were misled about this one.

Good gen dept

Having whipped up your enthusiasm for these events, and so that you don't feel too hard done by, there is a similar event taking place at Sheffield University on Saturday 30 November, starting at 10am. The exact location is the Electrical Engineering Dept in Mappin Street. There will be loads of enthusiasts for you to meet and lots of highly expensive test gear available to examine your gear, plus people to help you if you don't know how to use it. It's got to be a good day out.

More good news

It seems that in future your chance of passing the Morse test will be greatly improved. Gavin, the man who does the testing, won a prize in the raffle at the Telford Rally and found himself the proud owner of a slow speed Morse practice tape! He was last seen buying a cheap cassette player and promising to get plenty of practice before the next rally. The next time you see him ask how he's getting on with it; after you have passed, of course!

Wallpaper matters

The awards are really going strong now and it is pleasant to be able to report two milestones being passed: two 144 Golds have been issued and the first 70cm award. The 144 Golds go to Byron G6HCV and Mick G1IPA, both claims coming in on the same day. Included in Mick's claim were contacts with EA, OK, Y23, YU, OZ, SM and LX. The equipment used was a TS77G, 70 watt linear and a 17 element Yagi.

The claim from Byron is interesting from the point of view of the time it took to get the contacts, 21 countries were achieved in four months, 50 countries in six months and the sixty squares in just under seven months. Two nice ones in the list are UC2AA and HG9MAP.

Ian G1FXG goes for a 144 Silver and threatens great things, having just bought the Gold award winning TS700G from G1IPA. There is also a 50 foot tower and 14 ele to go with it.

Des G6YEK, from Paignton, goes for 144 Silver which he gets using only 25 watts into an eight ele. The first award issued to a lady is to Hazel G1NOD, from near Oxford, who gets a 144 Bronze. Her husband Julian G6LOH, gets a 144 Bronze and also collects the first 432 Bronze award issued, suitably endorsed, of course.

The last one this month is for Howard G6STI, of Hayes, who claims a 144 Bronze award. He mentions difficulty in getting the QSL cards for the award – the good news is that you do not need them. All I need is a copy of your log signed by you and one other amateur, to prove it is a genuine claim, and you're in.

Another comment has been as to whether there is any time limit to get the award. The answer to this one is that there is not. There was a starting date (1 January) earlier this year so that everyone got off to a clean start, but from there on it is an ongoing situation. If you want details of the award please send an SAE to the address at the end of the feature.

Spacemen

The last space operation was a great success and we have good news for those of you who are into this kind of thing. The next space mission to have amateur radio operation on board will be Mission 61-a, which is due for lift-off on 7 November. There will be two amateurs on board: Dr Ernest Messerschmid DG2KM and Dr Reinhard Furrer DD6CF. Operation is likely to take place from 10 November on both two metres and seventy centimetres, and could be in the form of a satellite transponder system. There is even talk of an automatic logging system to make a note of calls received whilst the spacemen are asleep or on other duties. There isn't any news as to whether these logged calls will be QSLed, but it would come as no surprise if they were. The idea of rigs talking to one another without an operator gets ever closer.

The German society DARC will be broadcasting news bulletins on 80, 20 and 2 metres but no details are available. The RSGB will be using the usual 80 and 2 metre frequencies to give the latest news at 1200 and 1900GMT. As an added bonus there is also a possibility of a third active amateur on the trip: Dr Wubbo Ockels PE1LFO. If all three do fly there should be plenty of activity to look forward to.

General post

A few months ago there was a bit of an uproar about the repeaters that were going to have to change frequency to accommodate the Isle of Man repeater. This seems to have been allowed a period of rest while it slips quietly out of mind, but new information is to hand. The changes proposed are to move GB3VT from R1 to R5, GB3BM from R5 to R3, GB3MH from R3 to R5 and GB3PW from R3 to R7. All this so that an amateur population of around 200 people can have a repeater? They call it repeater planning, I call it repeater chaos.

You may say that with modern rigs there is no problem, all you do is tweak the dial to the right place. That's fine, but what about the large numbers of people who still use crystal controlled rigs, what do they do? One thing is for sure, we will have to re-open the crystal exchange system that was so popular in the 1950-1965 period. Someone could make a bomb out of this because you can be sure that this will not be the last piece of similar lunacy perpetrated in the name of 'planning'.

Super DX

A late piece of news comes from G4DGU, Chris Bartram, who reports making a nice SSB contact with G3JVL on Hayling Island. The distance was 244kms – nothing special about that is there? Well, the frequency was 10400MHz and the power at G4DGU was one third of a milliwatt (0.0003 watts), and not a repeater in sight. Congratulations to both stations on a fine achievement.

Going down

To 70MHz, in fact, and a letter from David GM4WLL, who is a staunch advocate of the band. They are a special breed, these four metre men, as followers of this feature will know. He says that the low level of activity is not so much because people have not got the gear, but simply because the activity is not organised. He feels that the activity levels on 50MHz are due mainly to operating constraints, which restrict use

to outside TV hours, ensuring that most people are active at the same time.

Many years ago there was an attempt to promote Wednesday evenings as four metre activity periods, although this has long since died out, but David feels that it may now be worth a try to get the bandwagon rolling again. To this end he will be active every Wednesday evening from either Dumfermline or Glasgow, and he asks that you join him. As with so many of our bands it is a case of 'use or lose', so if you have some gear on the band then give it a try.

A new beacon is now operating on the 50MHz band with the callsign GM3RMK. It is located on the IBA mast at Rosemarkie in Ross and Cromarty, and transmits on a frequency of 50.06MHz, having already been heard as far south as Devon.

The locator depends on whether you trust it to know where it is, in which case it is announced as IO77UO, or whether you check the site on a map. This would give IO77XO or the generally preferred XR40a, but neither of these ties up with the location details of the IBA station as given in the EBU lists – all great fun!

GB3LEX has suffered from low power output for months, which is how long it took before the powers that be would admit that something was wrong and sort it out at last. All complaints that it was at least 10dB down fell on deaf ears, but that is nothing new. GB3EM on Emley Moor has been refurbished and is now putting out excellent signals from its two horn aerials.

The big switch

As you may know, the recent trans-atlantic two metre attempt was sponsored by a well-known brewing concern. It seems that this time the product could not refresh the parts either! Contact me at 81 Ringwood Highway, Coventry, or on Prestel 203616941. Good hunting.

SECONDHAND EQUIPMENT GUIDE

by Hugh Allison G3XSE

This magazine has recently received some correspondence from readers who are interested in cheap amateur receivers. There is a lot of fun to be had from cheap gear and, as one of the other columnists put it, you don't need a Rolls Royce to go to the beach. The following is therefore a quick run through some of the more popular receivers likely to be available on the secondhand market.

Please note that neither the author or the magazine know where an example of a particular piece of equipment is available at the moment, although a wanted advert in the back of the magazine can often work wonders. Prices quoted are given as a guide only, you can obviously pay more if you feel an example is worth more, and conversely you might strike lucky and get one cheaper. Since most of the letters received are mentioning a £50 upper limit, this is as high as I shall go.

Two metres

If you have an HF receiver the cheapest way to receive two is probably via a converter. Microwave Modules models normally change hands for £10 to £15 and are excellent. On a more restricted budget, £5 can often buy an old valve converter, and one with a nuvistor in it can give reasonable results. For complete receivers for two FM the financially restricted newcomer will be hard put to beat the lovely Diawa Search 9 receiver. This is a moderately sensitive continuously tunable FM only Rx, with crystal control as an option.

The crystal controlled channels can be quite useful since the tuning dial is not really accurate enough to give reliable resetting accuracy. Say you were working in the shack and wished to monitor the local repeater, which was off air when you turned the Rx on. You couldn't really be sure that you could tune it to the exact repeater output frequency, but if you had the appropriate crystal by switching it in you could be sure. A guide price is £25 to £35, with perhaps £40 as the absolute limit for one choc full of crystals.

Going down in price there is the Lowe two metre Rx. Although only crystal controlled they make excellent repeater monitors etc. Some were mains/12 volts and some 12 volt only, if my memory serves me, but at £15 to £20 they can give hours of cheap fun.

General coverage Rxs

A quick run through some old favourites, starting with the HRO. Georgeous, I love them. For the uninitiated, these old valve receivers used plug in coils and, by various arrangements of links on the coils, they can be made to tune the amateur band only on one coil pack or, by another arrangement, it can become general coverage. Reliable and solidly built, they will still be around in another forty years time and are excellent value at £25 to £35. Incidentally, they are just beginning to appreciate, for example, ten years ago my lists show an average price of £15 and five years ago £20. Don't forget they need an external power supply and you should get three or four coils for this price.

AR88s: If you've got the room (and a strong table), super. Coverage up to 30MHz, where they are a bit deaf, and switched bandchange. Some people ask silly prices for these secondhand, like £85 seen at a recent rally (it didn't sell), but they normally fetch £20 to £45.

The variant with the original S-meter fitted is worth another £5. Internal mains power supply is fitted and the main cause of ill health is dodgy decoupling capacitors. Most fail short circuit and are consequently easy to find, although it is often worth attacking a low gain receiver with a 0.1μF held across the decoupling points (not advised for the beginner!).

R1154 receivers are another cheap surplus receiver. Often modified out of all recognition to their original appearance, they are invariably stable, probably due to their design requirement of being fitted into Lancasters etc. Although requiring an external power supply (unless someone has built one in) and having restricted frequency coverage, they are frequently available for £10 to £20.

Lafayettes etc

In the mid 60s there was quite a spate of valve short wave receivers available sporting this name. There are quite a lot of differing model numbers, some models even having different numbers on the same receiver. Some were four valve (mixer, IF, audio and rectifier) and are more suited to short wave AM broadcast listening, whereas some have RF stages and Q multipliers etc, and work well.

For useful work on the amateur bands a BFO (beat frequency oscillator) is a must, since without it you cannot resolve CW or SSB.

A further warning, some were sold as kits so the standard of workmanship can vary from grotty to superb. Don't dismiss these out of hand, some are quite good performers.

Heathkits

Mohecan: One of the first solid-state short wave receivers. Performance drops off on this receiver above 14MHz and it is a bit touchy to tune when resolving SSB. For some reason it is prone to having untunable BFOs (change the OA91 diode used as a varicap to cure), overload and second channel problems on big long wire aerials (use an ATU). They are, nevertheless, quite presentable, fun machines, normally changing hands for £15 to £27.

RA1s: These were sold as 'basic amateur receivers', to quote from the handbook, which feature an amateur bands only Electroniques front end. This 'module' came fully aligned and features excellent stability and a good EF183 RF amplifier. When you then consider a two crystal filter and a highish IF of 1.6MHz you have quite a potent machine on your hands.

Obviously, as they are kit built, the foregoing comments about variable building standards apply. The immortal excellence of the Heathkit manuals means that a competent amateur should be able to lick a dead example into shape, but I'll pass on two tips to help.

For some absolutely inexplicable reason the resonant frequencies of the IF coils increase over the years. This is due to the fixed parallel tuning capacitors going low capacitance, but why they do this I cannot explain. The IF coils end up resonant at 2.2MHz, which isn't too handy when you are amplifying up the output of a two crystal filter at 1.6MHz. The first example of this that I came across was one I purchased in a junk sale for £5, and the seller woefully (but honestly) told me that he had built it up from a kit himself and it had never worked.

The quality of his building was good and all the voltage points measured correctly, but it took a volt of RF surge up the first IF valve to get a miniscule squeak out the speaker. Winding up the frequency of the generator produced action at the afore-mentioned 2.2MHz, and handfuls of 56pF capacitors (two for each IF coil) brought the set to life.

Nowadays, with the hindsight of experience, it is a matter of moments to tune in a signal of some sort, wind the cores of the IF coils (two cores per can) from one end to the other and check that each gives a double peak, and a sharp peak at that. A poor peak in one place indicates an open circuit IF tuning capacitor. A warning: *never, ever* attempt to turn hexagonal holed tuning

slugs with anything but the proper tool. They break if you hold anything else within a foot of them! NB: don't expect double peaks on all other receivers.

The second common problem on RA1s, although found on a lot of other sets as well, concerns alignment. I've come across dozens of examples of these that don't track properly. For example, 1.8MHz comes up at the correct point on the dial but, say, 2MHz is half an inch or so out. What has happened is that the alignment has *appeared* to have drifted, thus tempting the owner to re-align it, when all that has actually happened is that the dial pointer has moved along on the dial cord! The problem is particularly acute on the RA1 for two reasons. For starters the tuning capacitor only rotates through about 100°of its rotation to cover every band, thus there is 40°of rotation left at either end to mask the problem, and secondly, the pointer acts as its own end stop on these machines.

Having said all the above, don't let me put you off them; these 'basic' receivers, as Heathkit so drastically under-rated them, can knock spots off of some hyped-up over-rated more recent rubbish. Incidentally, re-aligning a receiver such as the RA1, which has been demon tweaked by an owner with more enthusiasm than knowledge, is a fairly pleasant way of wasting a whole afternoon, even in a well-equipped workshop. It isn't a job to undertake lightly. If you must turn the cores, note on a bit of paper the exact position of each trimmer and core before you start, then you can always put it back as it was.

Eddystone EC10s

See the June issue of this learned tome to find out common failings of this excellent little receiver. £35 for a scruff, but I've just seen a pristine MKII change hands for £60, which seemed a little high, and is also above our £50 maximum.

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■ Yaesu FRG7 gen coverage receiver with manual in original box, mint condition, £125. Phone G1LUG (0203) 450476 Coventry.

■ Multi-mode two metre transceiver. Base station. Will exchange Sommekamp FT277 HF rig plus M'Modules 28-144 t'verter. Cash balance either way. Marine six channel VHF station. Offers please or up for exchange. A Shannon, The Bungalow, Fairview, Marton, Nr Ulverston, Cumbria. Tel: (0229) 62932 evenings, 20351 Ext 5342 daytime.

■ Exchange Harvard h/held 40ch CB rig for anything interesting. Wanted: HF SSB rig, anything considered, Yaesu, Trio, KW, Swan, etc. Must be cheap, cash waiting. Tel: Thanet (0843) 69068.

■ 500 valves, mostly American, UX, octals, some British, eg: 6k6GT, 50L6GT, 35L6GT, 25L6GT, 3LN5GT. Many others. SAE for lists please, all unused, boxed or wartime utility wrap. 6A7, 6L7 also available. BC348M, £35. Codar AT5 Tx 10W Top Band and eighty, offers. A E Jeffrey, 42 Dennis Road, Padstow, Cornwall. Tel: 532723 after 6pm.

■ AVO valve characteristic meter mark four with data manual. Heathkit sine/square audio gen (valved). Offers, buyer collects. Tel: Clacton-on-Sea (0255) 860903.

■ Commodore C64 and tape, £115 ono.RTTY terminal unit and interface for C64, £18. Intro to Basic Part 1 £6. C64 Ref Guide £4. Working Commodore C64 £2. Getting most from C64 £3. Also tapes Grand Master Chess £3. Music Maker £18. Music Composer £5. Music 64 £3. Multi-sound Syn, £7. Joystick £3. Panasonic Dolby stereo tape deck £7. Reeves, 138 Blandford Avenue, Castle Bromwich, B'ham B36 9JE. Tel: (021) 747 8489.

■ FT101 A1 condition £250. LLL clipper, low-pass filter, 100dB, 50ohms offers. Ham multi 2, £90. Hygain 5 £85. Concord 2 FM, converted, stamped, beautiful condition, £120. ATU SEM 160-10, £75. Nato 2000 as new, £130 ono. Going QRT. Tel: (0283) 221870.

■ Azden, as new, in box, 144MHz band, PLL synthesized, FM Transceiver, £190. Bearcat 220FB, 20 channels, 30MHz to 512MHz, £130ono. Tel: (228) 4835.

■ Yaesu FT290R multimode 2 metre portable, muTek nicads charger, mic-144-148, £225 ono. Hirschman rotator £25. 4 ele quad co-ax £10. Panasonic NV370 VHS video recorder + tapes £225. Datong UC1, converts 0-30MHz, 28MHz or 144MHz IF. 144, 146, 28MHz £70. Ferrograph R+R series 6 stereo, £80 + tapes. 20 amp PSU, cut out faulty, £25. Firestick £5. Eddystone EB35 £40. All items ono. Mrs Fordham, 31 Anerly Park, SE20.

■ Trio 144MHz FM transceiver hand-held with battery charger and a spare battery pack. 3 months old £130. Tel: Farnborough 58825 Kent.

■ FT101E mint condition £350. External VFO FV101 £60. Frequency counter counts to 500MHz with probe £60. SWR meter £5. PCR shortwave receiver 1.6MHz to 18MHz not working £10. Ex army head phone £1. FM 2m repeater guide £1. Ian Abel G3ZMI, 52 Hollytree Ave, Maltby, Rotherham, Yorks. Tel: (070981) 4911.

■ Yaesu FRG 7700 in mint condition and unused. Owner bought in Middle East. Receiver has handbook and circuit diagrams. £300 ono. DW Ashton, Ladson Cottage, The Bridge, Mepal, Ely. Tel: Ely (0353) 778526.

■ Icom IC251E mint boxed £350.VHF ants – Jaybeam LW8 £7, Sun 3 x ⅝ collinear £15, Granvic ⅝base £7. UHF ants, Jaybeam PBM18 £15, Procom ⅝base £15. Cliff Strood. Tel: (0634) 711438.

■ Icom IC701 with IC701PS ac PSU and IC5M2 desk-mike. Only six months use and in mint condition, £475. Willy Wilson. Tel: (031) 445 2612.

■ TW4000A in excellent condition with original packing, £395. Kenpro memory keyer in good condition, £110. Phone Peter Crosland G6JNS (0905) 620041 anytime.

■ Tokyo Hy-power antenna coupler HC200, excellent condition only used with Rx £55 ono. Archer all band monitor antenna, little use, works well, £30 ono, cost £49 new, only put up for 2 months. FR50B receiver serviced Feb. Four hours use only this year, £45 ono. Wolfsen VHF 12 scan + VFO crystals for R0 R3 R4 R6 R7 S20 S21 inside, £45 ono. Alf. Tel: Avonmouth 828586 any time.

■ Morse key, Swedish hand made. Perfect condition, £38. Tel: G4WUU (09277) 65823.

■ DX300 digital communications receiver vgc. Also Datong A370 active aerial, with power supply, £160 ono. SEM 2 metre converter, £25. John Matthew Atkinson, 31 Marina Terrace, Golcar, Huddersfield, Yorks HD7 4RA. Tel: Hudds 656494.

■ Datong RF speech processor complete with combined head set, £25. Futaba radio control gear 2 channel, complete with partly built Slingsby Capstan glider, £30. High band Pye Cambridge receiver boards, £2.50 each, or £12 the lot. BBC software tapes and listings with duel joystick, £20. Tel: G4ANW (0730) 61859.

■ Yaesu FRG receiver with joystick antenna and joymatch ATU complete SWL station, £120. Tel: Swansea 464816.

■ National HRO model in good condition, all coils, spare set of valves, any offers considered but would like to do an exchange for an aircraft band receiver. J Clark, 7 Honeygate, Luton, Beds LU2 7EP. Tel: 28488.

■ KDK2025 2m FM Tx 144-146 Rx 144-149, 3 watts or 25 watts, scans through 10 memories, or all or part of band. Mint cond, never used mobile, bargain at £135 ono, or exchange for IC2E or similar handheld. Tel: 01-247 6097 day time only.

■ Radio amateur course. 20 sections and simulated test papers, covering all aspects to qualify for licence. £25. Tel: Bradford (0274) 309334.

■ Communication receiver, Panasonic RF3100 LBE, FM long/medium/short (bands 1-29). Digital frequency display, double superhet, BFO, bandwidth, RF gain, bass and treble controls. Mains/battery/car battery. As new in original packaging, (cost £225 discount) £100. Tel: Walton-on-Thames 245301.

■ Dressler ARA 30 Ant £40. Sky coupler SWL ATU 0-30, £25. Search S9 2mtr receiver, £30. 240 to 12V PSU £10. Roger Digby. Tel: Bradford 670329.

■ Shack clearance. Yeasu FT290R, as new £240. Microwave Modules 144/30 linear, £60. Jaybeam 10 ele 2 mtre beam, £25. 2 x 5 ele tonna beam, £15. Yeasu FT209RH handheld, as new, £210. 5/8 wave mobile antenna with gutter mount, £15. 5/8 wave vertical CB antenna with ground planes, £10.SWR meter suitable 2 mtr £8. 2 mtr Slim Jim, £3. Or p/x any of the above for good HF radio or WHY. Tel: Bournemouth (0202) 301691 day or 572871 eve.

■ Trio TR2300 2m FM portable trans, Nicads charger etc, vgc, £100 ono. Tel: Weymouth (0305) 786930.

■ Yaesu 290 2mtr multimode. Complete MM3OLS/14 linear amplifier, Datong ASP speech processor, Hirschmann rotator, 9 element tonna, 5amp power supply, will sell complete or separate. Exchange considered for BBC Microcomputer. Please ring Keith GW1ATK on Namtyderry 880614 with offers evenings/weekends.

■ Cannon computer AS100, twin 5 inch disc drives, printer office type system, no books or discs supplied. All parts matching working and in mint condition. Offers or swap HF gear or WHY? Tel: Paul 01-961 4659 any time.

■ 14 foot sailing dinghy, Merlin rocket, MKXII, £250. With new trailer, cover, 1 suit, sail No 1437, or exch for 7700, IC70. H R McAlroy, 75 Roundthorn Road, Baguley, Manchester M23 8EP. Tel: (061) 998 6674.

■ Yaesu FT902DM, FC902 ATU both brand new never been used. Father died, cost £1200, for sale at £700 or will take Cybernet Delta 934 plus colinear as part payment. Ken Woodcock, 38 Hughenden Road, Hastings, Sussex TN34 3TG. Tel: 444285.

■ Datong FL3 audio filter, auto notch, still boxed, receipt provided, £75. Tel: (0383) 733412.

■ Communications receiver DX302, 10kHz-30MHz digital readout, US/LSB/CW/AM, 240V, 12V or batteries, as new with box and manual, £130 ono. Tel: Battle, E Sussex (04246) 4723.

■ Ham International multimode II, FM, AM, USB, LSB, HLM, £120. Suitable for convert to 2m. Ham Concord 2, all channels, Hygain 5, all channels, £100 each ovno. FT101 fan cooled mains or battery, £225. Tel: (0283) 221870.

■ Swan Astro 150, 240 watts input, mobile/base Tcvr. New Oct 1983, with 30A PSU. Never used mobile. Complete mobile mount, workshop manual etc, £450 ono. Or would exchange for base HF rig, similar value Trio preferred. Tel: (061) 624 2808.

■ DX200 five band 150kHz – 30MHz communications receiver with handbook. Excellent condition, £42 ono.Buyer collects. Tel: 01-570 6239 Hounslow West.

■ Amstrad CPC464 computer. Green screen monitor, as new, complete in original packing. Price £175 ono. John Forester. Tel: (021) 476 5871.

■ Yaesu FT290R one and a half years old, still has six months warranty, little used and in mint condition with universal nicad charger and nicads, £225. A Walmsley G1FPW. Tel: Shaftesbury (Dorset) 51461.

■ 10m FM SMC Oscar 2, £40. Nevada 25W linear, £18. SMC half-wave vertical ant, £15. FT708R 70cm handheld, nicads, charger, 2V mobile PSU, £160. WD 70cm FM amp, 1W in 10W out, £35. G3MEW, QTHr. Tel: Portsmouth 820315.

■ Ham international Concord 3. 27MHz radio, AM, FM, USB, LSB, CW, too many extras to name. Unwanted gift, never used, still boxed, offers or swap for 2m linear + pre-amp, must be good condition. Tel: Dronfield (0246) 410409 between 9am-5pm any weekday.

■ MC55 goose neck mobile microphone. Remote control, on/off, up/down, only purchased May 1985, £26 ono. Also CX3 co-axial switch, one XCVR, three antennas, (unused), £4 ono, or both £27. Dow G4LHK, QTHr. Tel: (0536) 757225.

■ Complete 2m station comprising Icom IC271H 100W base-station, muTek FE, fitted and in superb condition complete with ICPS30 25A PSU and ICSP3 speaker, offers. Also IE02E handheld, will split or part/ex for NRD515 Rx. All equipment used little. A good chance to save money on new equipment, genuine reason for sale. Ian G6WKB, QTHr. Tel: (0509) 502989 (Leics) after 6pm.

■ Sony ICF2001 digital keypad entry receiver, 150kHz to 29.999MHz, 78 to 108MHz, AM/SSB/CW, memory for any 6AM/SSB or 6FM frequencies, automatic scanning between any two frequencies, frequency shown on LCD display, £80. Ashford Middx. Tel: Ashford 56851.

■ Yaesu FT726R VHF/UHF transceiver with 2m and 70cm modules. Original packing, mint condition, £870. Would consider HF transceiver in part ex.Gerry McGowan (G8YTF). Tel: Rochdale (0706) 350650.

■ 934MHz Cybernet Delta 1, only 4 months old, only £280 ono. Also 934MHz P7ME collinear, £20 ono. Ham Concord 3 AM, FM, CW, USB, LSB, £100 ono. Rich Miller. Tel: Chipping Sodbury (0454) 318770.

■ Yaesu FRG7700 receiver, immaculate condition, plus centre feed 110ft trap dipole and Yaesu YH55 ear phones. Saving for a transceiver, £260 ono. Nic Aldridge, Camelot, Leinthall, Starkes, Nr Ludlow, Salop. Tel: Wigmore 221.

■ TS520SE SWL so no transmitting aerial. Bring your own test equipment. Buyer collects, £250. Bill Cusack. Tel: Letchworth 678949.

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■ 10 bags of electrolytic capacitors. New, mixed sizes + some transistors and resistors about 100 items per bag. Sell for a fraction of original buying price. £2.50 a bag. Twin horns, not long trumpet type, but round compact type. Very well made, new still in box 6V, weather proof, originally made for motorcycle use but would suit home alarm. £18, post 60p. Plans for matchbox size radio transmitter picked up on FM radio range up to 6 miles £1. Some radio valves new still boxed SAE for list D Martin, 6 Downland Garden, Epsom KT18 5SJ.

■ Colour Genie computer with Radsoft RTTY package £90 or with cassette recorder and tech manual £105. Also BARTG built STSC, offers. Tel: (204) 4025.

■ Heath DX100 Tx and SB10 SSB adaptor in regular use, £75 ono. Buyer collects, G4ERA, 8 The Close, Fairlight, Sussex. Tel: (0424) 812350.

WANTED

■ Beefy, straight arm Morse key, old and heavy, condition not important as long as it works FB. Also Heathkit or Millen GDO, mains or battery, valve version preferred. Also required: variable inductor with turns counter if possible, 813 valve bases, HT trans, quiet snail blower, transmitting variable capacitors, part-built HF linear projects seriously considered. Eddie Green G0AQI, 53 Holden Road, London N12 7DP. Tel: 01-445 0528, evenings or weekends.

■ FRG7, Trio 9R59DS, Lowe SRX30D, KW 2000E/A, good price for good working rigs. Tel: Londonderry 46871 after 7pm.

■ Receiver, will swap NPR934 radio and yagi 11 element, plus H100 co-ax and an antenna rotator with a loop. Yagi beam receiver wanted, a MX4000 or AR2005, FRG8800, FRG9600 or any good receiver. Mr M Tansley, 10 Telscombe Drive, Holme Wood, Bradford, West Yorkshire.

■ VHF/UHF scanner receiver, good condition, any type considered. Tel: Hednesford (05436) 77995, after 5pm.

■ Civic Orion valve radio EA53F, in working condition or not. Wiring must be in place. Mr C J Kidson, 18 Banks Street, Willenhall, West Midlands. Tel: Willenhall 65584.

■ TS430S in good condition. Also 23cms transverter. Tel: Peter Crosland (0905) 620041, any time.

■ Wanted to provide spare parts: old Codar AT5 Txs and Heathkit RA1 Rxs. Condition not important as long as complete and not bashed in metalwork. Details and prices to Marris, 35 Kingswood House, Farnham Road, Slough, Berks SL2 1DA.

■ Dead FT707 for spares. Tel: Ian. (0304) 821588, or write: Rosemount Church, Whitfield, Dover, Kent.

■ HP182 oscilloscope. In good working condition, willing to pay a reasonable price, (electronic student – limited funds). All letters answered. If you have one that you are not using, you could make a student happy. McCauley EI4EK, Manorcunningham, Letterkenny, Co Donegal, Irl.

■ Wanted in good condition: recent copy of World Radio – TV handbook. Would swap above for four copies Radio and TV Service Mans 1965 1969, as new. Also have four old Practical Wireless mags, 1943 1944, offers. Have old brass key on wood plinth, offers or swap HF dipole 8-10mts trapped, WHY? G0CIG, North West London. Tel: 01-200 3825.

■ Exchange MM144 to 28MHz converter for 2-7.1 traps for trap dipole. Also want muTek masthead VHF, UHF, 50-500MHz, pre-amp. Have about 200yd UR57 75 ohm co-ax, 25p per yd. You collect. Collection of military campaign medals, valve £300, exchange for HF Rx gear. Tel: Milton Keynes (0908) 314095.

■ Small airband Rx, made by Sony, urgently wanted. John Higgins, 30 Underwood Road, Portishead, Nr Bristol, Avon. Tel: (0272) 845351.

■ Trio R300 receiver, please write with price. Ted Kimber, 1 Moorlands, Bishops Lydeard, Taunton TA4 3PG.

■ Newly licensed amateur requires cheap 2m FM rig to get started. Would also make good use of any type of 2m monitor/receiver that you no longer need. Dennis G1OQC. Tel: Tamworth (0827) 251328.

■ Two metre rig wanted, any type, any age, any condition. Can collect London area. Dave. Tel: 01-729 6925.

■ RA63 SSB adaptor for RA17L receiver. Tel: (0752) 812667.

■ Pensioner SWL requires Codar PR30 or PR40 preselector or good low noise pre-amp, or ATU. H Knowles. Tel: Penarth (0222) 709456.

■ Linear amp FL2100, HA14, KW1000 or good homebrew. Tel: Basingstoke (0256) 475466, (daytime), ask for Barry.

■ Valve 4CX1000A, up to £100 paid for one guaranteed in good condition. Also require cheap one for test purposes. Write: P O'Neill, Panteg, Ambleston, Haverfordwest, Dyfed SA62 5QZ.

■ Relay for KW2000B to replace RL4 with a coil resistance of 15000 ohms. Stan G3XON, 14 Dagden Road, Shalford, Guildford, Surrey. Tel: (0483) 36953.

■ Yaesu FL101 wanted to match my FR101 receiver. Tel: (061) 320 6941.

■ I'm still wanting a Yaesu YK901 keyboard. Can anybody help with this one? Also late Yaesu FRG7700M. Tel: Colchester 394336, evening.

■ Transmitters, AT5, DX40, DX60, DX100, SB401 and HW16 transceiver. Please send condition and price to Richard Marris, 35 Kingswood House, Farnham Road, Slough, Berks SL2 1DA.

■ B40 osc mixer cans for lowest band please. Have KW204 for p/ex transceiver. G3RNB. Tel: (0984) 33115 (Somerset).

■ Circuit diagram and service manual for Heathkit RA1 receiver, or info where coils can be obtained. Tel: Wolverhampton 20636.

■ Yaesu FT2700RH, 2m, 70cm, or FT726R 2m, 70cm and satellite unit, plus good antenna system for above. Good price paid, similar rig good make would be considered. Please write to Mr Bent, 97 Nottingham Road, Selston, Nottingham NG16 6BU.

■ Sony ICF2008 or ICF2001D, must be perfect. Have oscilloscope, Solartron CD1220 with three plug-ins. Big, but beautiful, exchange or sell. Also Russian oscilloscope C1-16, true dual beam, both with manuals, both cheap. If you don't require exchange please phone evenings with price for Sonys. Private buyer, cash purchase. Tel: (0945) 860475. Wisbech, Cambs.

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ADVERTISERS INDEX

Amateur RADIO

ADVERTISING RATES & INFORMATION

DISPLAY AD RATES

depth mm x width mm	ad space	1 issue	series rates for consecutive insertions: 3 issues	6 issues	12 issues
61 x 90	⅛ page	£66.00	£62.00	£59.00	£53.00
128 x 90 or 61 x 186	¼ page	£115.00	£110.00	£105.00	£92.00
128 x 186 or 263 x 90	½ page	£225.00	£210.00	£200.00	£180.00
263 x 186	1 page	£430.00	£405.00	£385.00	£345.00
263 x 394	double page	£830.00	£780.00	£740.00	£660.00

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colour rates exclude cost of separations

depth mm x width mm	ad space	1 issue	series rates for consecutive insertions: 3 issues	6 issues	12 issues
128 x 186 or 263 x 90	½ page	£305.00	£290.00	£275.00	£245.00
263 x 186	1 page	£590.00	£550.00	£530.00	£470.00
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issue	colour & mono proof ad	mono no proof & small ad	mono artwork	on sale thurs
Dec 85	31 Oct 85	6 Nov 85	8 Nov 85	28 Nov 85
Jan 86	28 Nov 85	4 Dec 85	6 Dec 85	26 Dec 85
Feb 86	2 Jan 86	8 Jan 86	10 Jan 86	30 Jan 86
Mar 86	30 Jan 86	5 Feb 86	7 Feb 86	27 Feb 86

CONDITIONS & INFORMATION

SERIES RATES
Series rates also apply when larger or additional space to that initially booked is taken.
An ad of at least the minimum space must appear in consecutive issues to qualify for series rates.
Previous copy will automatically be repeated if no further copy is received.
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Display Ad and Small Ad series rate contracts are not interchangeable.

If series rate contract is cancelled, the advertiser will be liable to pay the unearned series discount already taken.

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All single insertion ads are accepted on a pre-payment basis only, unless an account is held.
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FOR FURTHER INFORMATION CONTACT
Amateur Radio, Sovereign House, Brentwood, Essex CM14 4SE.
(0277) 219876

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CX2/Take 2 C Cells	29p
B203/Take 4 Cells	31p
DX2/Take 2 D Cells	29p
PP3 Battery Snap	7p, £6/100
PP9 Battery Snap	17p/pr £16/100

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5 amp 12 way	0.20
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0.75mm 2 core (6A) round 17 p/m **£13.50/100**
0.5mm 3 core (3A) round 18 p/m **£15.10/100**

IEC MAINS LEADS

6 Amp – 250V black 1mm **£1.25**

CURLY LEADS

2 metre (extended) screened 3 core **75p each, 5/£3.50**

SPECIAL OFFER

This complete set of three stripfix plastic signs containing over two thousand words transmitters, frequencies dials, letters and symbols etc Three for **£3.75**

ROTARY POTS

0.25W Carbon Log & Lin
1K-2M2 each **0.32**
10 **3.00** Any 100 **28.00**

ZENER DIODES

400 m/w 3v to 75v
8p each
100 for **£6.00**
1 watt 3v3 to 200v.
15p each
100 for **£12.50**

VOLTAGE REGULATOR

78L05/12/15	0.30
7505/12/15	0.55
7905/12/15	0.65
LM317K	3.50

PLASTIC BOXES

3x2x1"	0.35
3x2½x2"	0.65
4x3 1½"	0.70
4½x4x1½"	0.83
6x4x2½"	1.15
8½x5x3¼"	2.15

Colour Black, all boxes with lids and screws

SPEAKERS

4" Round 4 ohm 1·6W **£1.58**, 8 ohm **85p, £1.50/2**

★ Marco special offer. Desolder pump normally £4.50, this month offer ending Dec 31st **£2.99** with orders over £10.00 ★

DC MOTOR

6-12 volt **75p, 5 for £3**

SPEED CONTROL MOTOR

Using UPC 1447H
Working voltage 12v-0-5v
£2.50 each 10 for **£22.00**

SANYO DYNAMIC MICROPHONE

C/W 1 metre of cable and plug. ON-OFF switch and stand
1MP 500ohm MODEL NoHM95
PRICE ONLY £1.50

BRIDGES

1½A 50V	0.27
100V	0.28
200V	0.32
400V	0.40
600V	0.67
800V	0.58
2A 100V	0.52
200V	0.55
400V	0.61
600V	0.67
800V	0.70
6A 100V	0.66
200V	0.68
400V	0.74
600V	0.80
800V	0.86
10A 50V	2.20
100V	2.24
200V	2.35
400V	2.50
600V	3.50

SWITCHES

Sub-Miniature Toggle
SPST **60p** SPDT **63p**
DPDT **66p**
Miniature Toggle
SPDT **68p** SPST **65p**
DPDT **72p**
DPDT Centre off **85p**
Standard Toggle
SPST On/Off Plate **48p**

DPDT	On/Off
Plate	58p
Miniature	DPDT
Slide	15p
Push-To-Make	28p
Push-To-Break	25p

Rotary Switch
1 pole 12 way 2 pole 6 way 3 pole 4 way, 4 pole 3 way **50p**

ALL SERVISOL PRODUCTS

	Posted
Switch Cleaner	1.18
Circuit Freezer	1.34
Foam Cleanser	1.16
Aero Klene Silicone Grease (Aerosol)	1.42
Antistatic Spray	1.18
Plastic Seal	1.28
Excel Polish	1.12
Fire Extinguisher 640g	3.06
Video Head Cleaner	1.06
Heatsink Compound	1.64

SLIDER CONTROLS

60M Travel, Manufactured by NOBLE. These are metal, high quality Potentiometers and strictly subject to availability

STEREO
50K LOG
10 for **£3.00**
100 for **£20.00**
100K LIN
10 for **£3.00**
100 for **£20.00**
1M LOG
10 for **£3.00**
100 for **£20.00**

SPECTROL
9 – Position POT
12p each or 10 for **£1.00**

CLOCK RADIO LW/MW

Mains, bedtime, digital display alarm clock/radio Full circuit Alarm Control/Wake to music Sleep control – 10 min Snooze **£5.99** each (plus 75p additional postage per set
IDEAL CHRISTMAS PRESENT FOR CHILD OR ADULT

TRANSFORMERS

British made transformers

Primary	Secondary	Current	1+	10+	100+
240v	6-0-6v	500m a	65p	60p	48p

Carriage 45p per transformer £1.60 per 10

FUSES

QB 20mm 100 mA to 6.3A:
6p each 100 for **£3.50**
Slow Blow 20mm 100mA to 200mA:
20p, 100 for **£15.00**
Slow Blow 20mm 20mA to 800mA:
12p, 100 for **£7.50**
Slow Blow 20mm 1A to 6.3A:
10p 100 for **£5.00**

L.E.D.'s

RED 3mm + 5mm **10p** each, 100 for **£6.00**
YELLOW 3mm + 5mm **13p each** 100 for **£10.00**
GREEN 3mm + 5mm **13p** each, 100 for **£10.00**

C-MOS

4000	0.19	4021	0.58	4036A	2.45
4001	0.24	4022	0.68	4038	0.73
4002	0.24	4023	0.35	4039A	2.70
4007	0.24	4024	0.49	4040	0.58
4011	0.23	4025	0.24	4042	0.48
4012	0.24	4027	0.44	4043	0.42
4013	0.35	4028	0.44	4044	0.48
4014	0.58	4029	0.73	4046	0.58
4015	0.58	4030	0.33	4049	0.38
4016	0.38	4031	1.28	4050	0.34
4017	0.54	4033	1.25	4051	0.68
4018	0.59	4034	1.40	4052	0.68
4020	0.78	4035	0.68	4053	0.58

74LS

LS00	24p
LS01	24p
LS02	24p
LS03	24p
LS03	24p
LS08	24p
LS09	24p
LS10	24p
LS11	24p
LS12	24p
LS13	33p
LS14	48p
LS15	24p
LS20	24p
LS21	24p
LS22	24p
LS30	24p
LS32	24p
LS37	24p
LS74	33p
LS122	68p
LS138	44p
LS139	58p
LS151	70p
LS155	55p
LS157	45p
LS158	58p
LS160	62p
LS161	68p
LS162	70p
LS163	68p
LS166	1.50
LS170	1.40
LS244	0.80

LINEAR I.C.'s

CA3011	2.20
CA3014	2.70
CA3018	0.86
CA3020	2.10
CA3028A	1.10
CA3080E	1.80
CA3085	0.68
CA3086	0.60
CA3090AQ	3.40
CA3030E	0.90
CA3140E	0.45
HA1336W	1.59
LM324N	0.45
LM339	0.40
LM348	0.60
LM380(14 PIN)	1.80
LM381N	1.75
LM382N	2.00
LM386	0.99
LM387	2.00
LM389N	1.60
LM3914N	3.10
LM3915N	3.45
555NE	0.80
C-mos555	0.88
741	0.35
SAS560S	1.85
SA5570S	1.85
TA7205AP	1.30
TA7222P	2.32
TDA1004	4.95
TL072	0.75
TL081	0.35
TL084	1.10

BUZZERS

Solid State
6 volt **80p**
12 volt **80p**

IC SOCKETS D11 to D11

8 pin	0.08 0.70/10
14 pin	0.10 0.95/10
16 pin	0.11 1.00/10
18 pin	0.14 1.60/10
22 pin	0.21 1.95/10
24 pin	0.25 2.25/10
28 pin	0.30 2.75/10
40 pin	0.34 3.10/10

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Attractive prices on 22", remote control, brand new, guarantee
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TRANSISTORS DIODES

Type	Price (£)	Type	Price (£)	Type	Price (£)	Type	Price (£)	Type	Price (£)	Type	Price (£)	Type	Price (£)	Type	Price (£)
AC127	0.28	BB105B	0.30	BC184L	0.10	BD136	0.26	BF183	0.32	BFX87	0.44	BY122	0.60	OA202	0.10	IN5408	0.19
AC128	0.30	BB105G	0.48	A B or C	0.10	BD137	0.28	BF184	0.30	BFY50	0.22	BY126	0.10	OC26	2.65	IS920	0.07
AC128K	0.34	BB110B	0.42	BC207	0.15	BD138	0.30	BF185	0.28	BFY51	0.22	BY127	0.08	OC28	3.15	2N697	0.55
AC141	0.58	BC107	0.10	BC208	0.45	BD139	0.30	BF194A	0.15	BFY52	0.22	BY133	0.08	OC35	4.75	2N706A	0.20
AC141K	0.38	A or B	0.12	BC212	0.10	BD140	0.28	BF195	0.12	BFY90	0.80	BY135	0.35	OC36	2.75	2N2904	0.48
AC142	0.56	BC108	0.10	A B or C	0.10	BD144	1.62	BF200	0.30	BFY90S	1.34	BY164	0.45	OC42	0.72	2N2926G	0.14
AC142K	0.38	A B or C	0.12	BC212L	0.09	BD145	1.82	BF222	0.38	BR100	0.25	BY179	0.56	OC44	0.72	2N3053	0.30
AC151	0.45	BC113	0.42	A B or C	0.10	BD150A	0.68	BF224	0.20	BR101	0.40	BY182	0.80	OC45	0.68	2N3054	0.60
AC152	0.45	BC114	0.12	BC213	0.10	BD160	1.58	BF224J	0.20	BR103	0.50	BY184	0.38	OC71	0.60	2N3055	0.65
AC176	0.30	BC115	0.12	A or B	0.10	BD165	0.45	BF240	0.30	BRY39	0.50	BY187	0.65	OC72	0.70	2N3702	0.12
AC176K	0.44	BC116	0.12	BC213L	0.10	BD183	0.70	BF241	0.30	BRY56	0.42	BY189	6.75	OC81	0.68	2N3704	0.12
AC187	0.28	BC117	0.22	A or B	0.10	BD201	0.52	BF244	0.34	BSX19	0.32	BY198	0.64	OC200	2.46	2N3708	0.12
AC187K	0.38	BC118	0.16	BC237	0.11	BD202	0.57	BF244A	0.30	BSX20	0.30	BY199	0.72	ORP12	0.85	2N3772	2.65
AC188	0.28	BC119	0.28	BC238	0.14	BD204	0.57	BF244B	0.28	BSX59	0.78	BY206	0.14	R2008B	1.20	2N3773	2.80
AC188K	0.38	BC125	0.14	BC239C	0.16	BD222	0.80	BF257	0.22	BSX76	0.65	BY207	0.16	R2010B	1.20	2N3904	0.20
ACY41	0.90	BC140	0.27	BC251	0.14	BD225	0.40	BF258	0.26	BT100A/02	0.90	BY210/400	0.21	TIC44	0.38	2N3906	0.20
AD142	0.80	BC141	0.26	A B or C	0.14	BD232	0.45	BF259	0.30	BT101/300	2.75	BY210/600	0.24	TIC45	0.45	2N5294	0.80
AD143	0.88	BC142	0.24	BC301	0.30	BD234	0.30	BF262	0.34	BT101/500	3.25	BY210/800	0.28	TIC46	0.48	2N6107	0.80
AD149	0.72	BC143	0.26	BC302	0.30	BD235	0.30	BF263	0.38	BT102/300	3.60	BY227	0.22	TIC47	0.70	2SB337	1.80
AD161	0.42	BC147	0.18	BC303	0.30	BD236	0.38	BF270	0.30	BT106	1.15	BY228	0.46	TIC106A	0.95	2SC1172Y	1.70
AD162	0.52	A or B	0.14	BC307A	0.18	BD237	0.38	BF271	0.28	BT108	1.25	BY238	0.65	TIP30A	0.35	2SC1279	0.50
AD161/162	1.20	BC148	0.10	BC323	0.90	BD410	0.76	BF273	0.22	BT109	1.15	BYX10	0.20	TIP31C	0.39	2SC1306	0.92
AF114	1.20	A or B	0.12	BC327	0.16	BD434	0.58	BF274	0.34	BT116	1.20	BYX36/150	0.40	TIP32	0.35	2SC1307	1.50
AF115	2.10	BC149	0.10	BC328	0.16	BD438	0.58	BF324	0.46	BT119	3.30	BYX36/600	0.48	TIP32C	0.40	2SC1413A	2.70
AF116	2.10	BC157	0.12	BC337	0.12	BD439	0.85	BF336	0.32	BT120	3.50	BYX48/300	0.70	TIP33A	0.55	2SC1444	1.40
AF118	1.85	BC158	0.12	BC338	0.12	BD507	1.05	BF337	0.28	BT121	2.99	BYX55/350	0.26	TIP34A	0.70	2SC1507	0.60
AF121	0.56	BC159	0.12	BC350A	0.24	BD518	0.88	BF338	0.28	BT138/600	1.30	BYX55/600	0.30	TIP41C	0.46	2SC1678	1.00
AF124	0.42	BC160	0.30	BC440	0.36	BD520	1.20	BF363	0.35	BTY79/400R	2.80	BYX71/600	1.18	TIP42A	0.44	2SC1758	0.68
AF125	0.58	BC161	0.30	BC441	0.40	BD699	1.89	BF367	0.24	BU100A	2.30	BYZ12	0.78	TIP47	0.42	2SC1909	1.20
AF126	0.58	BC168B	0.20	BC461	0.58	BD707	0.74	BF371	0.27	BU104	1.80	C106D	0.48	TIP110	0.60	2SC1923	0.30
AF127	0.38	BC169C	0.12	BC547	0.12	BDX18	1.60	BF422	0.20	BU105	1.20	E1222	0.32	TIP2955	0.70	2SC1945	2.88
AF139	0.40	BC170	0.16	BC548	0.12	BDX32	1.48	BF450	0.38	BU105/02	1.55	E5024	0.30	TIP3055	0.58	2SC1953	0.70
AF178	2.28	BC170B	0.16	BC549	0.10	BF115	0.32	BF457	0.36	BU108	1.75	GET872	0.60	TIS43	0.88	2SC1957	0.70
AF239	0.50	BC171	0.10	BC550	0.10	BF117	0.50	BF458	0.37	BU124AE	0.90	ITT2002	3.34	TIS88	0.30	2SC2028	0.73
AF279S	1.40	BC171	0.14	BC550C	0.10	BF119	0.82	BF459	0.35	BU126	1.40	MEU21	0.62	TIS90	0.27	2SC2029	2.70
AL100	5.40	A or B	0.08	BC557A	0.10	BF120	0.38	BFR51	0.36	BU133	1.40	MJ400	1.45	TIS91	0.25	2SC2078	1.05
AL102	4.40	BC172	0.16	BC558	0.10	BF125	0.42	BFR61	0.32	BU204	1.30	MJ2955	1.00	ZTX107	0.14	2SC2091	0.70
ASY80	5.20	A or B	0.12	BCX34	0.29	BF127	0.44	BFR90	0.88	BU205	1.30	MJ3000	1.80	ZTX212	0.28	2SC2098	2.90
AU110	2.80	BC177	0.24	BCY70	0.16	BF154	0.23	BFT41	0.68	BU206	1.50	MJE340	0.46	IN4001	0.04	2SC2122A	3.20
AY102	4.32	BC178A	0.30	BCY71	0.17	BF157	0.46	BFT43	0.38	BU208	1.40	MJE371	0.85	IN4003	0.05	2SC2166	1.20
BA110	0.68	BC182	0.10	BCY72	0.16	BF158	0.30	BFW11	0.84	BU208A	1.40	MJE520	0.44	IN4004	0.05	2SC2314	0.80
BA121	0.42	A B or C	0.09	BCZ10	3.21	BF160	0.23	BFW44	0.88	BU208/02	2.05	MJE2955	1.60	IN4006	0.07	2SC2335	1.50
BA129	0.38	BC182L	0.12	BCZ11	2.60	BF167	0.32	BFX29	0.28	BU326S	1.75	MJE3055	1.40	IN4007	0.07	2SK134	3.80
BA148	0.16	A B or C	0.09	BD124P	0.70	BF177	0.42	BFX30	0.40	BU407	1.10	OA47	0.10	IN4148	0.04	2SK135	3.80
BA154	0.12	BC183	0.10	BC130Y	0.68	BF178	0.26	BFX80	6.46	BUX80	3.70	OA90	0.07	IN5400	0.12	3N211	3.52
BA155	0.12	A B or C	0.10	BD131	0.36	BF180	0.27	BFX84	0.28	BUY20	2.75	OA91	0.07	IN5402	0.13	3SK88K	0.60
BA157	0.28	BC183L	0.10	BD132	0.36	BF181	0.27	BFX85	0.35	BUY69A	2.60	OA95	0.12	IN5405	0.16		
BA164	0.14	A B or C	0.10	BD135	0.26	BF182	0.32	BFX86	0.44	BUY69B	1.98	OA200	0.06	IN5406	0.17		

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