MAY 1986 £1.30

Amateur RADIO

For all two-way radio enthusiasts

Satellite communications – an introduction

Bow-tie beam – add an extra string

On test: Icom ICF2001D portable Rx

YAESU FT757GX: A FRESH LOOK

Tune into Withers Bargain Centre!

RAYCOM EXCLUSIVE PRODUCTS

Beta 3000 10FM 5W RPT/shift ...£79
Revco RS2000E Scanner £225
Raycom RF Amplifiers 1-3W input
V25F 25W.....£49.50
V45G 45W FM.....£62.50
V15L 15W SSB.....£49.50
V35L 35W SSB.....£59.50
10mtr FM BETA 3000 mod £79
Unmodified BETA 3000 .....£69
10FM FBX/SANYO MOD BOARD fits into most CB's with the Sanyo LC7136/7 chip fitted £22.50 or we can fit it for £30 inc post
FBX/SANYO 10FM kit of parts £17.50
DNT/LCL 10FM MOD KIT..... £12.95
YAESU FT757GX fast tuning mod kit c/w instructions £29.50
or we can fit it for .....£37.50 inc
NEW FRG9600 Mod Kit extends the UHF range up to 945 mhz, + improves 'S' meter + sensitivity Send Radio and £25.00 inc post.

HAND HELDS

WE'VE THE LARGEST SELECTION OF HAND-HELDS IN THE UK!
KENPRO KT202 6ch 2mtr XTAL £49.00
TRIO TH41 70cms £165.00
TRIO TH21 2mtr.....£185.00
KENPRO KT200EE 2 mtr 2W £169.00
KENPRO KT400EE 70cm 2W £189.00
YAESU FT209RH 2mtr 3W.. £269.00
YAESU FT203R 2mtr 2W..... £219.00
YAESU FT703R 70cm 2W.... £249.00
YAESU FT709R 70cm 2W.... £279.00
ICOM IC2E 2mtr 2W..... £199.00
ICOM IC4E 70cm 2W..... £279.00
ICOM ICO2E 2mtr 2W..... £289.00
ICOM IC04E 70cm2W.....£299.00
ALINCO ALM203E 2mtr 3W £249.00
++ MANY MORE MODELS AVAILABLE.
FREE PORTABLE ANTENNA WITH EVERY HANDHELD PURCHASED.

POWER SUPPLY UNITS

3A G-Com (UK made).....£19.50
5A G-Com (UK made).....£29.50
10A Bremi (Italy).....£52.50
10A Moonraker (Italy) £62.50
10-12A Moonraker (Italy).....£69.00
Yaesu FP757HD 20A Cont...£175.00
Yaesu FP757GX 20A S/M £140.00
Yaesu FP700 20A PSU £150.00
ICOM PS55 matches IC 735 .....£165.00
SPECIAL universal NI-CAD chargers, takes any cell £6.50
WE HAVE MANY BRANDS OF PSU'S IN STOCK TO SUIT YOUR NEEDS.

CALL US NOW FOR ANY ACCESORIES YOU REQUIRE. SEND FOR OUR STOCK LISTS, CATALOGUES AND ANY LEAFLETS YOU REQUIRE OR SEND LARGE S.A.E. PLEASE

ANTENNAS

SUN ANTENNAS (JAPAN)
Gamma Twin.....£9.50
HB9CV 2 metre £6.99
HB9CV 70 centimetres.....£5.99
10/11mtr loaded 1/4 wave £13.50
2mtr 7/8 mobile tilt/over £14.50
2mtr 5/8 mobile tilt/over £13.50
Gutter-Clip and cable ass.....£9.50
REVCO (British Made)
2mtr 5/8 coil/whip/base £11.89
10mtr 1/4 coil/whip/base £10.99
70cm Colinear double 5/8 ....£12.50
Revco Discone scan/ant £29.95
Revco NEW 2045 scan/ant....£59.00
SMC (Japan)
70N2M Dual band mobile £20.95
358 70cm triple 5/8 mob.....£30.95
HS770 diplexer 2&70cms £19.55
WE HAVE NUMEROUS TYPES OF ANTENNAS IN STOCK INC FULL RANGE JAYBEAM AND TONNA.
SPECIAL OFFER ARM MULTI-P6 ANTENNA SPECIAL OFFER COMPLETE COLINEAR ELEMENTS £35.00

£1000 INSTANT CREDIT. HP/PERSONAL LOANS AVAILABLE
RWC CREDITCARD (written details on request) **CALL NOW**

021 421 8201/2/3 24HRS
ORDERS UNDER £50 SEND £2.50 p&p

ACCESS VISA AMERICAN EXPRESS

ICOM **OLD PRICES HELD ON EXISTING STOCK**

R Withers Communications – agent to the stars!

RWC are main agents/distributors for Yaesu, Icom, Kenwood, M Modules, Jaybeam, Tonna, Revco Antennas, Cleartone, MuTek, AKD, Drae, FDK, Welz, Tait, and Neve Radiotelephones to name but a few! We also stock a wide range of BT approved cordless telephones and telephone systems!

Tune into our specialist service!

* We manufacture our own range of VHF/UHF beam antennas, mobile antennas and fittings
* We're the only company in the UK that produces modular VHF/UHF Raycom power amplifiers (15-50 watts output)
* We supply a large range of power transistors/ modules imported directly from Japan
* We supply/repair amateur/business radio systems
* We check transceivers on our spectrum analyser – £12.50 for a comprehensive report
* Only supplier of modified Revco RS2000 60-179 and 380-520MHz AM/FM extended coverage scanning receiver modified by RWC
* Probably the UK's largest seller of used radio equipment, both business and amateur radio
* We offer the largest selection of radio allied services under one roof, both trade and retail

GET YOUR LATEST BARGAIN USED LIST. SEND LARGE ENVELOPE NOW!

Even more basement bargains!

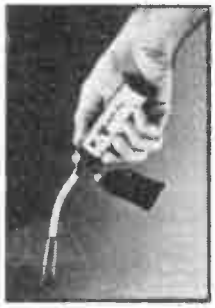
TURN THAT BEAM KOPEK ROTATORS 50kg loading **£38.50**	**14"B/W MONITER KIT,** complete PCB, tuner, transfomer, tube+full circuit details. **Brand new £29.50 Carriage £5**
DATONG AND DRAE MORSE TUTORS £49.50 PASS YOUR MORSE TEST QUICKLY!	**G5RV HG MULTI-BAND DIPOLE ANTENNA** ½size **£12.95** full size **£14.95**
TRAVELLING JIM 2m £6.95 Incl lead 2m **£8.95** 10 MTR version **£9.50**	**100W 0-500MHz** Dummy Loads (200 watts intermittent) 2ith lead an PL259 connector **£12.50**
FT290R + Nicads, charger, listen on input **£329** **FT690**+Nicads (6mtr) **£269**	**DISCONE ANTENNA** 60-600 MHz 16 ELE very good construction. Complete with S0239. Fits on standard mast **£27.50 inc post**
SUN GUTTER MOUNT + CABLE ASSEMBLY Top quality complete with PL259 fittings **£9.25** **FULL SUN RANGE IN STOCK**	**SPECIAL OFFER REVCO RS2000** Ext Coverage 60-179 & 380-520MHz AM/FM. 70 memories. Auto search, lock priority **£225**

R. WITHERS COMMUNICATIONS LTD

DEALER & EXPORT ENQUIRIES INVITED

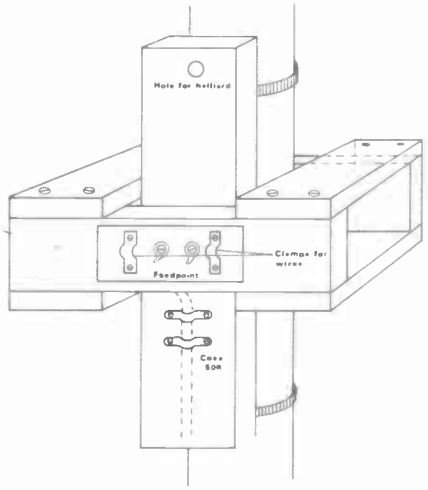
584 HAGLEY RD WEST, QUINTON, BIRMINGHAM B68 QB5. Tel: 021 421 8201 (24hr) Telex: 334303 TXAGWM G

Amateur RADIO



Editor:
Anita Ley
Assistant Editor:
Jane Berry
Advertisement Manager:
Marian Vidler
Advertisement Executive:
Richard Hart
Subscriptions:
01-760 0409
Accounts:
Clare Brinkman
Publisher:
Peter Williams
On sale: Last Thursday of the month preceding cover date
Next issue: Cover date June 1986 on sale 29 May 1986
Published by: Amateur Radio Magazines, Sovereign House, Brentwood, Essex CM14 4SE, England (0277) 219876
Printed: In England
ISSN: 0264-2557
News Trade Sales by: Argus Press Sales & Distribution Ltd, 12-18 Paul Street, London EC2A 4JS. 01-247 8233

Front cover: Sony ICF2001D and Yaesu FT757GX (p17)
Photo by Jay Moss-Powell G6XIB



SERVICES

INTEGRATED CIRCUITS

AN124	2.50	MC1351P	1.50	STK437	7.95	TBA720A	2.45
AN214O	2.50	MC1357	2.35	STK439	7.95	TBA750Q	2.65
AN239	2.50	MC1358	1.58	STK461	11.50	TBA800	0.89
AN240P	2.80	MC14518CP		TA7061AP	1.50	TBA810AS	1.65
AN264	2.50		7.50	TA7108P	1.50	TBA810P	1.65
AN612	2.15	MC1495	3.00	TA7120P	1.65	TBA820M	0.75
AN362L	2.50	MC1496	1.25	TA7129P	2.50	TBA820Q	1.48
AN7140	3.50	MC145106P		TA7130P	1.50	TBA890	2.50
AN7145	3.50		7.95	TA7137P	1.00	TBA920	1.65
AN7145M	3.95	MC1723	0.50	TA7176AP	2.95	TBA950/2X	
AN7150	2.95	MC3357	2.75	TA7193P	3.95		2.35
BA521	3.35	MC3401L	2.50	TA7203	2.95	TBA990	1.49
CA1352E	1.75	ML231B	1.75	TA7204P	2.15	TBA990Q	1.49
CA3086	0.48	ML232B	2.50	TA7205AP	1.15	TCA270	1.50
CA3123E	1.95	MSM5807	8.75	TA7222AP	1.80	TCA270SQ	
CA3140T	1.15	PLL02A	5.75	TA7227P	4.25		1.50
ETT6016	2.50	SAA500A	3.50	TA7310P	1.80	TCA650	2.50
HA1339A	2.95	SAA1025	7.25	TA7313AP	2.95	TCA800	2.95
HA1366W	2.75	SAS560S	1.75	TA7314P	2.95	TCA830S	1.95
HA1377	3.50	SAS570S	1.75	TA7137P	1.00	TCA900	2.50
HA1156W	1.50	SAS580	2.65	TA7314P	2.95	TCA940	1.65
HA1551	2.95	SA/SB/T/U		TA7321P	2.25	TDA440	2.20
LA1230	1.95		1.00	TA7609P	3.95	TDA1001	2.95
LA4102	2.95	SL901B	7.95	TA7611AP	2.95	TDA1002A	2.95
LA4140	2.95	SL917B	6.65	TAA310A	1.95	TDA1003A	3.95
LA4031P	1.95	SL1310	1.80	TAA320A	1.95	TDA1006A	2.50
LA4420	1.95	SL1327	1.10	TAA350A	1.95	TDA1010	2.15
LA4430	2.50	SL1327Q	1.10	TAA570	1.95	TDA1035	2.50
LA4400	4.15	SN76003N	3.95	TAA661B	1.95	TDA1037	1.95
LA4422	2.50	SN76013N	3.95	TAA700	1.70	TDA1044	2.15
LA4461	3.95	SN76023N	3.95	TBA120AS/B/C	1.00	TDA1170	1.95
LC7120	3.25	SN76033N	3.95	TBA395	1.50	TDA1190	2.15
LC7130	3.50	SN76110N	0.89	TBA396	0.75	TDA1270O	3.95
LC7131	5.50	SN76115N	1.25	TBA440N	2.55	TDA1327	1.70
LC7137	5.50	SN76131N	1.30	TBA480O	1.25	TDA2010	1.95
LM1011	3.15	SN76226DN		TBA510	2.50	TDA2020	2.95
LM324N	0.45		2.95	TBA510O	2.50	TDA2030	2.80
LM380N8	1.50	SN76227N	1.05	TBA520	1.10	TDA2140	3.95
LM380N8	1.75	SN76533N	1.65	TBA520Q	1.10	TDA2151	1.95
LM383T	2.95	SN76544N	2.65	TBA530	1.10	TDA2160	2.50
LM390N	3.50	SN76570N	1.00	TBA530O	1.10	TDA2190	3.95
M51513L	2.30	SN76650N	1.15	TBA540	1.25	TDA2521	3.25
M5155L	2.95	SN76660N	0.90	TBA540Q	1.35	TDA2522	1.95
M51521L	1.50	STK014	7.95	TBA550Q	1.95	TDA2523	2.95
MB3712	2.00	STK015	5.95	TBA560C	1.45	TDA2524	1.95
MB3756	2.50	STK025	11.95	TBA560Q	1.45	TDA2530	1.95
MC1307P	1.00	STK043	9.50	TBA570	1.00	TDA2532	1.95
MC1310P	1.95	STK078	11.95	TBA651R	2.50	TDA2540	1.95
MC1327	1.70	STK415	7.95			TDA2541	2.15
MC1327Q	0.95	STK433	5.95			TDA2560	2.15
MC1349P	1.20	STK435	7.95			TDA2571	2.95
MC1350P	0.95						

TDA2581	2.95
TDA2582	2.95
TDA2593	2.95
TDA2600	0.50
TDA2610	2.50
TDA2611A	1.95
TDA2640	3.50
TDA2680A	2.75
TDA2690	2.45
TDA3310	2.95
TDA4600	2.50
TDA9503	3.15
TDA3560	3.95
TEA1009	1.35
UPC566H	2.95
UPC575C2	2.75
UPC1025H	1.95
UPC1028H	1.95
UPC1032H	1.50
UPC1156H	2.75
UPC1158H	0.75
UPC1167C2	1.95
UPC1181H	1.25
UPC1182H	2.95
UPC1185H	3.95
UPC1191V	1.50
UPC1350C	2.95
UPC1353C	3.95
UPC1365C	2.95
UPC2002H	1.95
555	0.35
556	0.60
723	0.50
741	0.35
747	0.50
748	0.35
7808	0.60
7805	0.65
7812	0.65
7815	0.65

SEMICONDUCTORS

AAY12	0.25	BC182	0.10	BD238	0.40	BFX88	0.25	TIP32C	0.42
AC126	0.45	BC182LB	0.10	BD242	0.65	BFY50	0.21	TIP33C	0.95
AC127	0.20	BC183	0.10	BD246	0.75	BFY51	0.21	TIP34B	0.95
AC128	0.28	BC183L	0.09	BD376	0.32	BFY52	0.25	TIP41A	0.45
AC128K	0.32	BC184LB	0.09	BD410	0.65	BFY90	0.77	TIP41C	0.45
AC141	0.28	BC204	0.10	BD434	0.65	BLY48	1.75	TIP42C	0.47
AC141K	0.34	BC207B	0.13	BD437	0.75	BR100	0.26	TIP47	0.65
AC142K	0.45	BC208B	0.13	BD438	0.75	BR101	0.49	TIP120	0.60
AC176	0.22	BC212	0.09	BD520	0.65	BR103	0.55	TIP125	0.65
AC176K	0.31	BC212L	0.09	BD538	0.65	BR303	0.95	TIP142	1.75
AC187	0.25	BC212LA	0.09	BD597	0.95	BRC4443	1.15	TIP146	2.75
AC187K	0.28	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	0.80
AC188K	0.37	BC214	0.09	BD707	0.90	BT106	1.40	TIP3055	0.55
AD142	0.79	BC214C	0.09	BDX32	1.50	BT116	1.20	TIS91	0.20
AD143	0.82	BC214L	0.09	BF115	0.35	BT119	3.15	TV106/2	1.50
AD149	0.70	BC237B	0.09	BF119	0.65	BT120	1.65	ZRF0112	16.50
AD161	0.39	BC238	0.09	BF127	0.39	BU105	1.95	2N1100	6.50
AD162	0.39	BC239	0.12	BF154	0.20	BU108	1.69	2N1308	1.35
AD161/2	0.90	BC251A	0.12	BF158	0.22	BU124	1.25	2N1711	0.30
AF106	0.50	BC252A	0.15	BF160	0.27	BU125	1.25	2N2219	0.28
AF114	1.95	BC258	0.25	BF167	0.27	BU126	1.60	2N2905	0.40
AF121	0.60	BC258A	0.39	BF173	0.22	BU204	1.55	2N3053	0.40
AF124	0.65	BC284	0.30	BF177	0.38	BU205	1.30	2N3054	0.59
AF125	0.35	BC300	0.30	BF178	0.26	BU208	1.39	2N3055	0.52
AF126	0.32	BC301	0.30	BF179	0.34	BU208A	1.52	2N3702	0.12
AF127	0.65	BC303	0.26	BF180	0.29	BU208D	1.85	2N3703	0.12
AF139	0.40	BC307B	0.09	BF181	0.29	BU326	1.20	2N3704	0.12
AF150	0.60	BC327	0.10	BF182	0.29	BU326S	1.80	2N3705	0.20
AF178	1.95	BC328	0.10	BF183	0.29	BU407	1.24	2N3706	0.12
AF239	0.42	BC337	0.10	BF184	0.28	BU500	2.25	2N3708	0.12
AU106	4.50	BC338	0.09	BF185	0.28	BU508A	1.95	2N3733	9.50
AU107	3.50	BC347A	0.13	BF194	0.11	BU526	1.90	2N3773	2.75
AU110	3.50	BC461	0.35	BF195	0.11	BU807	2.25	2N3792	1.35
AY102	2.95	BC478	0.20	BF196	0.11	BUY20	2.15	2N4280	3.50
BC107A	0.11	BC527	0.20	BF197	0.11	BUY69B	1.70	2N4427	1.95
BC107B	0.11	BC547	0.10	BF198	0.16	MJ3000	1.98	2N4444	1.15
BC108	0.10	BC548	0.10	BF199	0.14	MJE340	0.40	2N5294	0.42
BC108A	0.11	BC549A	0.10	BF200	0.40	MJE350		2N5296	0.48
BC108B	0.12	BC550	0.14	BF241	0.15	MJE520	0.48	2N5298	0.60
BC109	0.10	BC557	0.08	BF245	0.30	MJE2955		2N5485	0.45
BC109B	0.12	BC557B	0.08	BF257	0.28	MPSA13	0.29	2N5496	0.95
BC109C	0.12	BC558	0.10	BF258	0.28	MPSA92	0.30	2SA329	0.95
BC114A	0.09	BC639/10	0.30	BF259	0.28	MRF237	4.95	2SA715	0.80
BC116A	0.15	BCY33A	1.50	BF271	0.26	MRF450A	13.95	2SC495	0.80
BC117	0.19	BD115	0.30	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	0.42	BF337	0.29	MRF455	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	0.37	MRF477	10.00	2SC1172Y	2.20
BC141	0.25	BD135	0.30	BF362	0.38	OC16W	1.95	2SC1173	1.15
BC142	0.21	BD136	0.30	BF363	0.65	OC23	1.50	2SC1307	1.75
BC143	0.24	BD137	0.32	BF371	0.25	OC29	2.28	2SC1364	0.50
BC147A	0.12	BD138	0.30	BF394	0.19	OC36	2.25	2SC1449	0.50
BC147B	0.12	BD139	0.32	BF422	0.32	OC42	0.75	2SC1678	1.25
BC148A	0.09	BD140	0.30	BF423	0.25	OC44	0.75	2SC1945	2.65
BC148B	0.09	BD144	1.10	BF457	0.32	OC45	0.55	2SC1953	0.95
BC149	0.09	BD150C	0.29	BF458	0.36	OC70	0.45	2SC1957	0.80
BC153	0.30	BD159	0.65	BF467	0.68	OC71	0.55	2SC1969	1.95
BC157	0.12	BD160	1.50	BF595	0.23	OC75	0.95	2SC2028	1.15
BC158	0.09	BD166	0.55	BF597	0.25	OC81	0.80	2SC2029	1.95
BC159	0.09	BD179	0.72	BFR39	0.23	OC16W	2.50	2SC2078	1.45
BC161	0.28	BD182	0.70	BFR40	0.23	R2008B	1.45	2SC2091	0.85
BC170B	0.15	BD201	0.83	BFR81	0.25	R2010B	1.45	2SC2098	2.95
BC171	0.09	BD202	0.65	BFR88	0.30	R2322	0.58	2SC2166	1.95
BC171A	0.10	BD203	0.78	BFR90	1.50	R2323	0.66	2SC2314	0.80
BC171B	0.10	BD204	0.70	BFR91	1.78	R2540	2.48	2SC2371	0.36
BC172	0.10	BD222	0.46	BFT42	0.35	RCA16334	0.90	2SC931D	0.95
BC172B	0.10	BD223	0.59	BFT43	0.35	RCA16335	0.80	1SD234	0.50
BC172C	0.10	BD225	0.48	BFW61	0.60	S2060D	0.95	2SD325E	1.65
BC173B	0.10	BD232	0.35	BFW92	0.85	SKE5F	1.45	3N211	2.95
BC174	0.09	BD233	0.35	BFX29	0.30	TIP29	0.40	3SK88	0.95
BC174A	0.09	BD234	0.35	BFX84	0.26	TIP29C	0.42		
BC177	0.15	BD236	0.49	BFX85	0.32	TIP30C	0.43		
BC178	0.15	BD237	0.40	BFX86	0.30	TIP31C	0.55		

NEW BRANDED CATHODE RAY TUBES – Please allow additional £3 per tube for carriage

A1865/20	65.00	D14-173GR	55.00	M19-103W	55.00	M50-120GV	65.00
AW36 11	25.00	D14-181GH/98	65.00	M23-110GH	55.00	M50-120LC	65.00
CME822W	19.00	D14-181GJ	55.00	M23-112GM	55.00	M61-120W	75.00
CME822GH	25.00	D14-181GM	53.00	M23-112GV	55.00	S6AB	45.00
CME1428GH	45.00	D14-181GM50	59.00	M23-112GW	55.00	SE4/D-P7	45.00
CME1428W	39.00	D14-182GH	59.00	M23-112KA	55.00	SE42BP31AL	55.00
CME1523W	39.00	D14-200BE	89.00	M23-112LD	55.00	SE42BP31	55.00
CME1431GH	39.00	D14-200GA/50	65.00	M24-120GM	59.00	SE5Fp31	55.00
CME1431W	39.00	D14-200GM	75.00	M24-120LC	59.00	T937	65.00
CME202GH	45.00	D14-210GH	75.00	M24-120WAR	59.00	T948N	65.00
CME2024W	45.00	D14-270GH/50	75.00	M24-121GH	55.00	T948H	65.00
CME2325W	45.00	D14-310W	110.00	M28-12GH	55.00	V4150LC	55.00
CME3128W	45.00	D14-320GH/82	85.00	M28-13LC	49.00	V5004GR	59.00
CME3132GH	45.00	D14-340GH/KM	45.00	M28-13LG	49.00	V5004LD	59.00
CME3155W	45.00	D14-340KA	45.00	M28-13GR	49.00	V6001GH	65.00
CRE1400	25.00	D16-100GH	65.00	M28-131GR	55.00	V6007DP31	59.00
CV429	89.00	D16-100GH/65	69.00	M28-133GH	55.00	V6008GH	59.00
CV1450	35.00	D16-100GH/67	65.00	M31-101GH	55.00	V6034WA	59.00
CV1526	19.00	D16-100GH/79	69.00	M31-182GR	55.00	V604CLA	59.00
CV2185	15.00	D16-100GH97	65.00	M31-182GV	53.00	V6048J	49.00
CV2191	19.00	D18-160GH	69.00	M31-184W	65.00	V6052GR	65.00
CV2193	15.00	D21-10GH	65.00	M31-184GH	65.00	V6064BP31	55.00
CV5119	85.00	DB7 36	35.00	M31-184P31	65.00	V6064CLA	55.00
CV5320	85.00	DB7 36	55.00	M31-186W	69.00	V6069GH	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	65.00
D10-210GH	45.00	DH3 91	55.00	M31-190LA	55.00	V7030	59.00
D10-210GH68B	65.00	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	65.00	V7035A	49.00
D10/293GY/90	55.00	DN13 78	35.00	M31-271P31	65.00	V7037GH	45.00
D13-30GH	49.50	F16-101GM	75.00	M31-271GW	65.00	V8004GR	65.00
D13-47GH/26	69.00	F16-101LD	75.00	M31-271W	65.00	V8006GH	65.00
D13-47GH	55.00	F21-130GR	75.00	M36-141W	75.00	V8010A	65.00
D13-51GL/26	85.00	F21-130LC	75.00	M36-170LG	75.00	VCR139A	11.50
D13-51GM/26	85.00	F31-10GM	75.00	M38-103GR	65.00	2BP1	13.50
D13-450GH/01	55.00	F31-10GR	75.00	M38-120W	65.00	3BP1	11.50
D13-471GH/26	55.00	F31-10LC	75.00	M38-120WA	65.00	3DP1	11.50
D13-600GM	59.00	F31-10LD	75.00	M38-121GHR	65.00	4EP1	30.00
D13-610GH	59.00	F31-12LD	75.00	M38-121LA	65.00	3H/OBM	55.00
D13-611GH	59.00	F31-13GR	75.00	M38-122GW	65.00	3WP1	18.50
D13-611GM	59.00	F31-13LD	75.00	M38-140LA	65.00	5BP1	9.00
D13-630GH	59.00	F31-13LG	75.00	M38-142LA	65.00	5BHP1	30.00
D14-150GH	75.00	F41-123LC	185.00	M38-341P31	65.00	5BHP1FF	30.00
D14-150GM	75.00	F41-141LG	185.00	M38-344P39	65.00	5BHP31	30.00
D14-172GH/84	59.00	F41-142LC	185.00	M40-120W	59.00	5CP1	10.00
D14-172GR	55.00	M7-120W	18.00	M43-12LG/01	65.00	6EP7/S	39.00
D14-172GV	55.00	M14-100GM	45.00	M44-120LC	65.00	13BP1	13.50
D14-173GH	55.00	M14-100LC	45.00	M44-120GR	65.00	13BP4	17.50
D14-173GM	53.00	M17-151GVR	175.00	M50-120GH	65.00	17DWP4	25.00
		M17-151GR	175.00	M50-120GR	65.00	32J/1085	69.00
						88D/88B/89D/89L	15.00
						1273	39.00
						1564	39.00
						1844	45.00
						55451GM	75.00
						9442E1	80.00
						95447GM	75.00
						95449	75.00
						7709631	79.50

TAPE HEADS

Mono Head	1.80
Auto Reverse	3.50
Stereo Head	2.95

ELECTRO-OPTICAL

9677M	22.00
P4231BAM	18.00
XP1002	29.00
XP1117M	24.00
XP42040	36.00
9524H	36.00

VIDEO SPARES

3HSS £29.50

4HSS £32.95

PS3B £39.50

HEADS

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

Suitable for National Panasonic NV333 340 2000 3000 7000 7200 7500 8170 8400 8600 8610F 8620 Blaupunkt RTV 100E 200 202 211 222 322 RTX100 200 224

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

Sony DSR-10R BETA £35.00
Suitable for SLC5 SLC6 SLC7

Sanyo VIC 9300/9500 £41.50
Sanyo VIC 5300/5000 £41.50

VIDEO BELT KITS

Akai VS 9300/9500/9800	£3.75
Ferguson 3V16	£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 7300	£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

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	0.08	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	0.08		0.60	IN4007	0.06
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	BZY88	0.10	IN5402	0.14
BY133	0.15	BZY95C30	0.35	IN5403	0.12
BY164	0.45	CS4B	4.50	IN5406	0.13
BY176	1.20	CS10B	9.45	IN5407	0.16
BY179	0.63	OA47	0.09	IN5408	0.18
BY182	0.55	OA90	0.05	ITT44	0.04
BY184	0.35	OA91	0.06	ITT923	0.18
BY199	0.40	OA95	0.06	ITT2002	0.10
BY206	0.14	OA202	0.10		
BY208-800	0.33	1N21DR	2.95		

BASES

B5D	5.80
B7G	0.25
B7G SKTD	0.25
B8G	0.35
B8H	0.70
B9A	1.80
B9ASKTD	0.40
B9G	0.75
B10B	0.20
B13B	0.80
B14A	3.00
12 Pin CRT	0.95
Nuvistor	2.95
Octal	0.35
SK610	35.00
UX5	1.75
Valve Can	0.30
8 Pin Dil	0.14
14 Pin Dil	0.16
16 Pin Dil	0.17
18 Pin Dil	0.18
Socket for 813	9.50

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	0.46
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	9.95
DECCA 1730	8.95
DECCA 2230	8.25
GEC 2040	8.95
GRUNDIG 1500	15.45
GRUNDIG 5010-6010 2222 5011-6011	13.45
ITT CVC20	8.20
ITT CVC30	8.25
PHILIPS G8	8.50
PHILIPS C9	8.99
PHILIPS G11	13.39
PYE 725	10.95
RBM T20A	12.40
TANDBERGE 90	11.45
TELEFUNKEN 711A	11.15
THORN 1590	9.50
THORN 8000	23.50
THORN 9000	9.95
THORN 9800	22.40
THORN MAINS TRANSFORMER 3000/3500	9.70

SOLDERING EQUIPMENT

25W Antex Iron	4.59
Weller Instant Heat Gun	11.30
240V Weller Marsman	4.74
1/2 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	8.00
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	0.84
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	8.65
ELC1043/06 MULLARD	8.65
U321	8.25
U322	8.25
U324	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

PHONE
0474 60521
3 LINES

P.M. COMPONENTS LTD
SELECTRON HOUSE
SPRINGHEAD ENTERPRISE PARK, SPRINGHEAD ROAD
GRAVESEND, KENT DA11 8HD

VISA

TELEX
966371
TOS PM

A SELECTION FROM OUR STOCK OF BRANDED VALVES

A1714 24.50
A1998 11.50
A2087 11.50
A2134 14.95
A2293 6.50
A2426 29.50
A2599 37.50
A2792 27.50
A2900 11.50
A3042 24.00
A3283 24.00
AC/THI 4.00
ACT22 59.75
AC/S2 PEN 9.50
AH221 39.00
AH238 39.00
AL60 9.00
AN1 14.00
ARP12 0.70
ARP34 1.25
ARP35 2.00
AZ11 4.50
BL63 2.00
BS450 67.00
BS810 65.00
BS814 65.00
CIK 19.00
C3JA 39.50
C6A 9.00
C1112G 70.00
C1108 65.00
C1134 32.00
C1148A 115.00
C1150/1 135.00
C1534 32.00
CCA 2.60
CC3L 0.90
CL33 2.00
CV Nos Prices on request
D3a 29.50
D63 1.20
DA41 22.50
DA42 17.50
DA90 4.50
DA100 126.00
DAF91 0.45
DAF91 0.70
DAF96 1.00
DC70 1.75
DC90 1.20
DCX4-1000 12.00
DCX4-5000 25.00
DET16 28.50
DET18 28.50
DET23 35.00
DET24 39.00
DET25 22.00
DF91 0.70
DF92 0.60
DF96 0.65
DF97 1.00
DH63 1.20
DH77 0.90
DH79 0.56
DH149 2.00
DK91 0.90
DK92 1.20
DL35 2.50
DL63 1.00
DL70 2.50
DL73 2.50
DL91 1.50
DL92 0.95
DL93 1.10
DL94 2.50
DL96 2.50
DLS10 13.50
DLS16 10.00
DM70 1.95
DM160 2.75
DY51 1.50
DY86/87 0.65
DY802 0.72
E80CF 11.00
E80F 18.50
E81CC 3.15
E81L 12.00
E82CC 3.50
E83CC 3.50
E83F 5.50
E86C 9.50
E88C 7.95
E88CC 3.50
E88CC Siemens Special 5.95
E90CC 7.95
E90F 7.95
E91H 4.50
E92CC 3.95
E99F 6.99
E130L 25.00
E180CC 9.50
E182CC 9.00
E180F 6.50
E186F 5.50
E188CC 7.50
E280F 19.50
E283CC 10.00
E288CC 13.50
E55L 42.00
E810F 26.00
E1148 1.00
E1524 6.95
EA50 1.00
EA76 1.95
EA79 1.95
EAA91 0.60
EABC80 0.70
EAC91 2.50
EAF42 1.20
EAF801 2.00
EB34 1.50
EB41 3.95
EB91 0.65
EBC33 2.50
EBC41 1.95
EBC81 1.50
EBC90 0.90

EBC91 0.90
EB91 0.60
EBF80 0.65
EBF83 0.65
EBF85 0.95
EBF89 0.70
EBF93 0.95
EBL1 2.50
EBL21 2.00
EC52 0.75
EC70 1.75
EC80 9.50
EC81 7.95
EC86 1.00
EC88 1.00
EC90 1.10
EC91 5.50
EC92 1.95
EC93 1.50
EC95 7.00
EC97 1.10
EC157 439.50
EC8010 12.00
ECC32 3.50
ECC33 3.50
ECC35 3.50
ECC81 1.15
ECC81 Special quality 1.95
ECC82 0.65
ECC82 Mullard 1.50
ECC82 Philips 1.95
ECC83 Siemans 2.50
ECC83
ECC83 Philips 1.95
ECC83 Siemans 2.50
ECC83 Tungsram 1.50
ECC84 0.50
ECC85 0.75
ECC86 2.75
ECC88 0.95
ECC91 2.00
ECC180 0.72
ECC189 1.95
ECC801S 3.50
ECC803S 4.95
ECC804 0.60
ECC2000 12.00
ECF80 1.15
ECF82 1.15
ECF86 2.25
ECF200 1.85
ECF202 1.85
ECF801 0.85
ECF805 2.50
ECF806 10.25
ECH3 2.50
ECH4 3.00
ECH35 3.50
ECH42 1.00
ECH81 0.65
ECH83 0.78
ECH84 0.69
ECH2000 1.50
ECL80 0.60
ECL82 0.65
ECL81 0.55
ECL83 2.50
ECL84 0.74
ECL85 0.69
ECL86 0.80
ECL805 0.69
EF22 2.50
EF37A 2.00
EF39 1.10
EF40 4.50
EF41 3.50
EF42 3.50
EF50 2.50
EF55 4.95
EF70 1.20
EF71 1.50
EF72 1.20
EF73 1.00
EF80 0.55
EF83 3.95
EF85 0.50
EF86 2.25
EF86 Mullard 4.50
EF89 1.50
EF91 1.95
EF92 2.15
EF93 0.95
EF94 0.95
EF95 1.50
EF97 0.90
EF98 0.90
EF183 0.65
EF184 0.65
EF730 1.80
EF731 3.50
EF732 3.50
EF800 11.00
EF805S 13.50
EF812 0.65
EFL200 1.50
EH90 0.72
EK90 9.95
EL32 0.95
EL33 4.00
EL34 2.25
EL34 Mullard/Phillips 4.50
EL36 1.95
EL37 9.00
EL38 4.75
EL41 3.50
EL42 2.00
EL81 6.95
EL82 0.58
EL83 5.95
EL84 0.75
EL85 4.50
EL86 0.85
EL90 2.15
EL91 6.00

EL95 1.75
EL153 12.15
EL183E 3.50
EL183P 3.50
EL500 1.40
EL504 1.40
EL509 6.25
EL519 6.95
EL802 3.65
EL821 8.50
EL822 12.95
EM1 9.00
EM4 9.00
EM80 0.70
EM81 0.70
EM84 1.65
EM85 3.95
EM87 2.50
EN32 16.50
EN91 1.50
EN92 4.50
ESU150 14.95
ESU872 25.00
EY51 0.80
EY81 2.35
EY83 1.50
EY84 8.95
EY86/87 0.50
EY88 0.55
EY91 5.50
EY500A 1.50
EY802 0.70
EZ35 0.75
EZ40 2.75
EZ41 2.15
EZ80 0.75
EZ81 0.75
EZ90 1.50
F6064 2.95
FW4-800 2.95
G55/1K 9.00
G180/2M 6.95
G232 Mullard 3.95
G240/2D 9.00
GC10B 17.50
GC10D 17.50
GC10/4B 17.50
GC10/4E 17.50
GC12/4B 17.50
GD86W 6.00
GDT120M 5.00
GN4 6.00
GN10 15.00
GR10G 4.00
GS10C 16.50
GS10H 12.00
GS12D 12.00
GT1C 14.00
GT1C S/S 13.00
GTE175M 8.00
GTR150W 1.00
GU20 35.00
GXU1 13.50
GXU3 24.00
GXU50SS 14.50
GY501 1.20
GY802 1.00
GZ30 1.00
GZ31 1.00
GZ32 1.00
GZ33 4.50
GZ34 2.15
GZ37 4.50
HAA91 1.00
HABC80 0.90
HBC90 0.75
HBC91 0.80
HF93 0.75
HF94 1.50
HK90 1.06
HL2K 4.95
HL23DD 4.00
HL90 0.70
HL92 1.50
H133/DD 3.50
HR2 4.00
HY90 1.00
HVR2 3.00
K3118 86.00
KR6/3 45.00
KT8C 7.00
KT33C 3.50
KT36 2.00
KT44 4.00
KT45 4.00
KT61 4.00
KT63 2.00
KT66/CV1075 special yellow ssss pot 19.50
KT66 USA 9.95
KT77 Gold Lion 10.95
KT81 7.00
KT88 USA 10.95
KT88 Gold Lion 18.95
KTW61 2.50
KTW62 2.50
KTW63 2.00
KTZ63 2.50
L102/2K 6.95
L120/2K 12.00
LB7-20 95.00
LS9B 6.95
M502A 60.00
M537A 60.00
M5143 155.00
M8079 6.00
M8082 7.50
M8083 3.25
M8091 7.50
M8096 3.00
M8098 5.50
M8099 5.00
M8100 5.50
M8136 7.00
M8137 7.95
M8161 6.50
M8162 5.50

M8163 5.50
M8190 4.50
M8195 6.50
M8196 5.50
M8204 5.50
M8223 4.50
M8224 2.00
M8225 3.50
ME1401 29.50
ME1402 29.50
ME1501 14.00
MH4 3.50
MHLD6 4.00
ML4 4.50
MS4B 5.50
MU14 3.50
N37 12.50
N78 9.85
OA2 0.85
OA2WA 2.50
OA3 2.50
OB2 0.85
OB2WA 2.50
OC2 2.50
OC3 1.50
OD3 1.70
OM4 1.00
OM5B 3.00
OM6 1.75
ORP43 2.50
ORP50 3.95
P61 2.50
P41 2.50
PABC80 0.50
PC86 0.75
PC88 0.75
PC92 3.50
PC97 1.10
PC800 1.10
PC900 1.25
PCC84 0.40
PCC85 0.54
PCC88 0.70
PCC89 0.70
PCC189 0.70
PCC805 0.70
PCC806 0.80
PCE82 0.80
PCF80 0.65
PCF82 0.60
PCF84 0.65
PCF86 1.20
PCF87 0.40
PCF200 1.80
PCF201 1.80
PCF800 0.40
PCF801 1.35
PCF802 0.60
PCF805 1.25
PCF806 1.00
PCF808 1.25
PCH200 1.50
PCL82 0.85
PCL83 2.50
PCL84 0.75
PCL85 0.80
PCL86 0.85
PCL800 0.80
PCL805 0.90
PD500 3.50
PD510 3.65
PEN25 2.00
PEN40DD 2.50
PEN45 3.00
PEN45DD 3.00
PEN46 2.00
PEO5-25 39.50
PEO5-40N 42.50
PFL200 0.95
PL21 2.50
PL36 0.95
PL38 1.50
PL81 0.72
PL81A 0.72
PL82 0.60
PL83 0.52
PL84 0.78
PL88 1.00
PL95 1.75
PL302 1.00
PL345 12.50
PL500 0.95
PL500 1.10
PL504 1.15
PL508 1.75
PL509 4.85
PL519 4.95
PL802T 3.50
PL820 2.95
PL5557 29.50
PL5727 2.50
PY32 0.60
PY33 0.50
PY81 0.70
PY82 0.70
PY83 0.70
PY88 0.86
PY500A 1.95
PY800 0.79
PY801 0.79
QB3-300 54.95
QB5-1750 139.50
QBL5-3500 495.00
QEO3-10 4.95
QE08-200 £145.00
QF40 65.00
QP25 1.00
QQEO2/5 19.50
QQEO3-12 7.95
QQEO3-20 35.00
QQEO6/40 45.00
QQVO2-6 19.50
QQVO3-10 Mullard 16.00
QQV03-10 5.50

QQVO3-20A 25.00
QQVO3-20B 32.00
QQVO6-40A 27.50
QQVO7-50 63.50
QQZO3-20 42.50
QS75/20 1.50
QS75/40 3.00
QS92/1D 6.00
QS95/10 4.85
QS108/45 4.00
QS150/15 6.95
QS150/30 1.15
QS150/45 7.00
QS1200 3.95
QS1202 3.95
QS1203 4.15
QS1205 3.95
QS1206 3.95
QS1206 1.05
QS1207 0.90
QS1208 0.90
QS1209 3.15
QS1210 1.50
QS1211 1.50
QS1212 3.20
QS1213 5.00
QS1215 2.10
QS1218 5.00
QU37 9.50
QU37 11.50
QVO3-12 4.95
QVO5-25 1.75
QVO6-20 29.50
QV2-250C 45.00
QVO8-100 145.00
QY3-125 65.00
QY4-250 70.00
QY4-400 76.00
R10 4.00
R16 12.00
R17 1.50
R18 2.50
R19 2.50
R20 1.20
R1169 65.00
RG1-125 4.95
RG1-240A 14.50
RG3-250A 3.50
RG3-1250A 35.00
RK2K25 62.50
RK-20A 12.00
RL16 1.50
RPL16 12.00
RPY13 2.50
RPY43 2.50
RPY82 2.50
RR3-250 15.00
RR3-1250 35.00
RS613 45.00
RS685 54.95
RS688 52.15
S6F17 5.95
S6F33 29.95
S11E12 38.00
S30/2K 12.00
S104/1K 10.00
S109/1K 15.00
S130 5.95
S130/P 5.95
SC1/800 5.00
SC1/1100 6.00
SC1/1200 5.00
SC1/1300 6.00
SC1/2000 9.00
SD6000M 45.00
SP4B 4.95
SP41 5.00
SP42 3.00
SS501 35.00
ST11 1.50
STV280/40 11.95
STV280/80 19.95
SU42 4.95
TB2 5/300 85.00
TB2-300 45.00
TB3/2000 395.00
TBL-2-300 275.00
TBL2-500 395.00
TD03 10E 40.00
TD1-100A 25.00
TD3-12 4.00
TP25 1.50
TSP4 7.00
TT11 1.50
TT21 45.00
TT22 45.00
TT100 57.00
TTR-31MR 65.00
TY2-125A 85.00
TY4-400 85.00
TY8-600W 365.00
TYS2/250 375.00
U18-20 2.75
U19 11.95
U24 2.00
U25 0.90
U25 0.90
U37 9.00
U41 6.95

U50 2.00
U82 3.00
U191 0.70
U192 1.00
U193 0.65
U251 1.00
U801 0.75
UABC80 0.65
UAF42 1.00
UBF80 0.60
UBC41 2.95
UBC81 1.50
UBF89 0.60
UBL21 1.75
UC92 1.20
UCC84 0.70
UCC85 0.60
UCF80 1.00
UCH21 1.20
UCH41 2.80
UCH42 2.50
UCH81 0.65
UCL82 1.75
UCL83 2.50
UF85 1.20
UF41 1.15
UF42 1.15
UF80 0.80
UF89 2.50
UL44 3.50
UL84 0.85
UU5 3.50
UU7 8.00
UU8 9.00
UY41 3.50
UY85 0.70
V235A/1K 250.00
V240C/2K 226.00
V241C/1K 195.00
V246A/2K 315.00
V339 3.50
VLS631 10.95
VP133 2.00
VR75/30 3.00
VR101 2.00
VR105/30 1.50
VR150/30 1.15
VT52 2.50
VU29 4.50
VU39 1.50
W77 5.00
W729 1.00
W739 1.50
X24 1.00
X66/X65 4.95
X76M 1.95
XC24 1.50
XC25 0.50
XFW47 1.50
XFW50 1.50
XG5-500 22.50
XL 1-5V 1.50
XL628FT 7.50
XNP12 2.80
XR1-1600A 49.50
XR1-3200A 79.50
XR1-6400A 99.50
Y65 6.95
Y503 25.00
Y602 12.00
Y4070 130.00
YD1100 75.00
YJ1060 265.00
YL1000 9.50
YL1020 29.00
YL1030 59.50
YL1060 95.00
YL1070 195.00
YL1071 195.00
YL1290 59.50
Z77 1.20
Z303C 9.00
Z359 9.00
Z505S 15.00
Z520M 4.00
Z521M 8.00
Z700U 3.00
Z749 0.80
Z759 19.95
Z800U 3.00
Z803U 18.95
Z900T 9.50
ZA1000 12.50
ZA1001 1.50
ZA1002 1.50
ZC1040 8.00
ZM1005 8.00
ZM1020 8.95
ZM1021 8.00
ZM1023 7.95
ZM1041 14.00
ZM1082 9.00
ZM1084 10.00
ZM1177 9.00
ZM1202 55.00
ZM1263 4.00
ZM1612 3.00
1A3 4.50
1AC6 1.20
1B3GT 1.95
1B22 10.00
1B27 55.00
1B35A 29.50
1C5GT 2.50
1FD1 2.50
1G3GT 2.50
1K3GT 2.50
1N1 4.50
1N2 4.50
1P28 25.00
1N5GT 2.50
1P28 25.00
1S2 0.55
1S5 0.70
1T4 0.70
1U5 1.00
1X2B 1.40
1Z2 8.95
2AS15A 11.50
2B22 69.50

2C39A 29.50
2C39BA 29.80
2C40 37.00
2C42 29.50
2C51 0.75
2CY5 1.50
2B7 1.50
2D21 1.50
2D21W 2.50
2E22GY 45.00
2E26 7.95
2J42 93.00
2K25 27.50
2K25 Ray 75.00
2K26 95.00
2K29 250.00
2K56 250.00
3A108A 9.00
3A/107B 12.00
3A/109B 11.00
3A/110B 12.00
3A/141K 11.50
3A/147J 7.50
3A/167M 10.00
3A2 3.95
3A3A 3.95
3A4 1.10
3AL5 0.95
3AT2 3.35
3AU6 0.65
3B2 3.00
3B4 7.00
3B7 4.50
3B24 10.00
3B26 24.00
3B28 12.00
3BZ6 1.50
3C4 2.50
3C45 24.00
3CB6 1.50
3CN3A 2.50
3CS6 0.95
3CY5 1.50
3CX3 2.50
3D6 4.50
3D21A 29.50
3E22 49.50
3EH7 1.95
3EJ7 1.95
3W4GT 2.50
4B32 35.00
4B551B 115.00
4BQ7A 1.75
4BZ6 1.95
4-65A 59.00
4-125A 72.50
4-250A 79.50
4-400A 87.50
4C27 25.00
4C28 25.00
4CB6 1.95
4CX250B 49.00
4CX250B EIMAC £59.50
4CX250BM 78.00
4CX250K EIMAC 95.00
4CX350A 95.00
4CX350F 79.50
4CX1500B 398.50
4GS7 2.25
4GV7 2.25
4JC6A 2.95
4J52 75.00
4KT6 1.50
4X150A 35.00
5A/102D 9.50
5A152M 9.00
5A163K 10.00
5A170K 6.25
5A-206K 10.00
5A-180M 9.00
4AM8 4.15
5AM8 2.15
5AN8 1.20
5AR4 2.00
5AU4 1.80
5B 110M 10.00
5B-254M 14.50
5B-255M 19.50
5B255M 19.50
5B/256M 9.00
5B-257M 9.00
5B-258M 14.50
5C22 125.00
5R4GB 3.50
5R4GY 3.50
5T4 5.95
5U4G 2.95
5U4GB 3.50
5V4G 1.25
5Y3GT 1.95
5Z4GT 0.85
6/30L2 0.70
6A/203K 9.00
6A7 4.95
6A8G 1.50
6AC7 2.00
6AF4A 2.50
6AG5 1.50
6AG7 1.95
6AH6 2.50
6AJ4 2.00
6AJ7 2.00
6AK5 1.50

6AK6 2.50
6AL5 0.60
6AM4 3.25
6AM5 6.00
6AM6 1.50
6AN5 2.65
6AN8A 2.65
6AQ5 2.15
6AQ8 0.85
6AR5 5.95
6AR8 3.95
6AS5 1.50
6AS6 2.50
6AS7G 4.50
6AT6 0.75
6AT8 1.75
6AU4 2.00
6AU6 0.95
6AV6 0.75
6AW8A 2.50
6AZ8 5.95
6B7 2.80
6B8G 1.50
6BA6 0.95
6BA7 4.50
6BA8A 3.50
6BC8 1.00
6BE6 0.72
6BG6G 3.00
6BH6 1.95
6BH8 1.50
6BJ6 1.20
6BK4 4.00
6BK7A 1.95
6BL8 1.15
6BM8 0.58
6BN4 1.65
6BN6 1.65
6BN7 4.50
6BN8 3.95
6BQ5 0.75
6BQ7A 0.72
6BL7GTA 3.95
6BL8 1.15
6BR5 0.70
6BR7 4.95
6BR8 2.15
6BR8A 2.15
6BS7 5.50
6BW4 1.50
6BW6 5.35
6BW7 1.50
6BW8 4.00
6BX6 0.48
6BX7GT 3.50
6BZ6 2.50
6BZ7 2.95
6C4 1.10
6C5 1.95
6C6 2.50
6C8G 1.50
6C11 2.50
6C18 2.50
6CA4 4.95
6CA7 3.50
6CB5 3.95
6CB6 1.95
6CD6GA 4.50
6CF6 1.50
6CG7 2.25
6CH6 6.95
6CL3 3.95
6CL6 3.25
6CL8A 2.00
6CM5 1.60
6CM7 2.95
6CS6 0.75
6CS7 0.95
6CW4 6.50
6CY5 1.00
6CY7 2.95
6D6 2.50
6DC6 2.95
6DJ8 0.95
6DK6 1.15
6DQ5 5.95
6DQ6B 2.50
6DW4 2.15
6EA4 4.95
6EA7 2.50
6EA8 2.50
6EB8 1.75
6EM5 2.50
6EM7 2.50
6EU7 £1.95
6EU8 1.75
6EV7 2.95
6EW7 4.50
6EW6 1.50
6F1 2.00
6F5 4.95
6F7 5.50
6F6G 2.00
6F12 1.50
6F13 3.00
6F14 1.00
6F17 2.75
6F21 2.50
6F23 0.60
6F24 1.25
6F25 1.25
6F28 1.25
6F32 1.25
6F33 17.00
6FH8 12.50
6G6G 5.50
6GH8A 0.80

6GK5 1.50
6GK6 1.95
6GM6 0.95
6GS7 2.15
6GV7 2.50
6GW8 0.80
6H1 9.50
6H3N 1.10
6H6 1.95
6H6GT 1.95
6HB7 0.95
6HF5 5.50
6HF8 2.50
6HS6 4.95
6HS8 1.95
6HZ6 2.65
6J4 2.15
6J4WA 3.15
6J5 2.50
6J6 2.05
6JB6A 3.95
6JE6C 5.50
6JM6 3.95
6JS6C 4.95
6JU8 2.50
6J7 2.50
6K7G 2.00
6K8YG 3.00
6KD6 5.95
6KM8 2.50
6KT8 2.95
6KZ8 1.95
6L1 2.50
6L19 3.95
6L6GC 2.95
6L6GC (GE) 4.95
6L6GT 1.95
6LD20 1.15
6LF6 7.50
6LJ8 2.50
6LQ6 5.50
6L15 3.15
6MJ6 4.95
6N7 2.50
6N7GT 2.50
6P15 1.50
6P25 4.00
6P26 4.00
6P28 2.00
6Q7 1.75
6Q7GT 1.20
6R7G 3.15
6S4A 1.50
6SA7GT 1.35
6SC7 1.50
6SG7 2.50
6SH7 1.35
6SJ7GT 1.35
6SK7 1.35
6SK7GT 1.35
6SL7GT 0.85
6SN7GT 1.35
6SQ7 1.35
6SS7 1.95
6U4GT 1.75
6U8 1.15
6U8A 1.50
6V6GT 1.50
6X2N 1.00
6X4 1.50
6X5GT 1.00
6X5GTY 1.00
6X8A 2.25
7A6 4.50
7A7 2.00
7AD7 1.75
7AU7 1.50
7B6 3.50
7B7 2.50
7C6 2.50
7E7 2.50
7J7 5.50
7V7 4.15
7Y4 2.50
8B10 2.50
8BQ5 1.95
8D8 2.50
8EQ7 1.95
8298A 8.50
85A8 1.50
10D2 1.25
10DE7 2.50
10F1 0.75
10GK6 1.95
10P14 2.50
10P18 0.70
10LD12 0.65
11E3 55.00
12A6 3.95
12AD6 1.50
12AG8 1.50
12AL5 1.00
12AT6 0.95
12AT7 1.15
12AT7WA 2.50
12AU6 1.95
12AU7 0.65
12AV6 1.95
12AX4GT 1.00
12AX7 0.65
12AX7WA 2.50
12AY7 3.95
12AZ7A 1.95
12B4A 4.50
12BA6 1.50
12BE6 1.95

12BH7A 2.50
12BL6 1.75
12BY7A 2.75
12CA5 1.95
12CX6 1.20
12DQ6B 3.50
12DW4A 3.50
12DW7 2.50
12E1 17.95
12E14 38.00
12GN7 4.50
12HG7A 4.50
12J7GT 3.50
12K5 1.95
12K7GT 1.50
12K8 1.95
12SA7GT 1.95
12SG7 4.75
12SH7 1.95
12SK7 1.95
12SJ7 1.50
12SN7GT 1.85
12SQ7GT 1.95
12SR7 2.50
13D3 3.20
13D7 3.20
13D7 2.50
13D9 3.20
13DR7 2.95
13EI 145.00
13EM7 3.50
14S7 1.95
7BR3 3.95
17EW8 0.95
17DW4 2.50
17DW4A 2.95
17JZ8 4.50
18D3 6.00
19AQ5 3.50
19AU4GT 2.50
19G3 17.00
19H5 33.50
19Q6 9.00
20A2 10.50
30D1 0.70
20LF6 3.50
20L1 0.95
20P1 0.55
20P3 0.60
20P4 1.95
20P5 1.15
21JZ6 3.15
21LU8 2.50
24B1 39.50
24B9 39.50
25L6GT 1.75
25BQ6 1.75
29C1 19.50
29KQ6 6.50
30C17 0.40
30C18 1.48
30F5 0.95
30FL1 1.00
30FL2 1.35
30FL12 0.95
30FL13 1.10
30FL14 1.25
30L1 0.45
30L15 0.60
30L17 0.80
30P4MR 1.00
30P12 1.00
30P18 0.60
30P19 1.00
30PL1 2.50
30PL13 0.60
30PL14 1.75
31JS6A 5.50
33A/158M 19.50
35A5 4.50
35L8GT 2.00
35W4 0.70
35Z3 1.85
38HE7 4.50
40KD6 5.50
42 6.95
47 6.00
50A5 1.50
50C5 0.95
50CD6G 1.15
50EH5 1.50
52KU 2.00
53CG 15.00
60B5 1.00
60JY6 2.96
61SPT 4.50
75B1 3.50
75C1 2.50
83 8.50
83AI 9.00
84 3.00
85A1 6.50
85A2 1.50
90AV 10.00
92AG 19.50
92AV 12.50
95A1 6.50
108C1 1.50
150B2 6.95
150C2 1.50
150C4 2.15
185T 1.50
274A 15.00
307 5.00
328A 15.00
388A 17.50

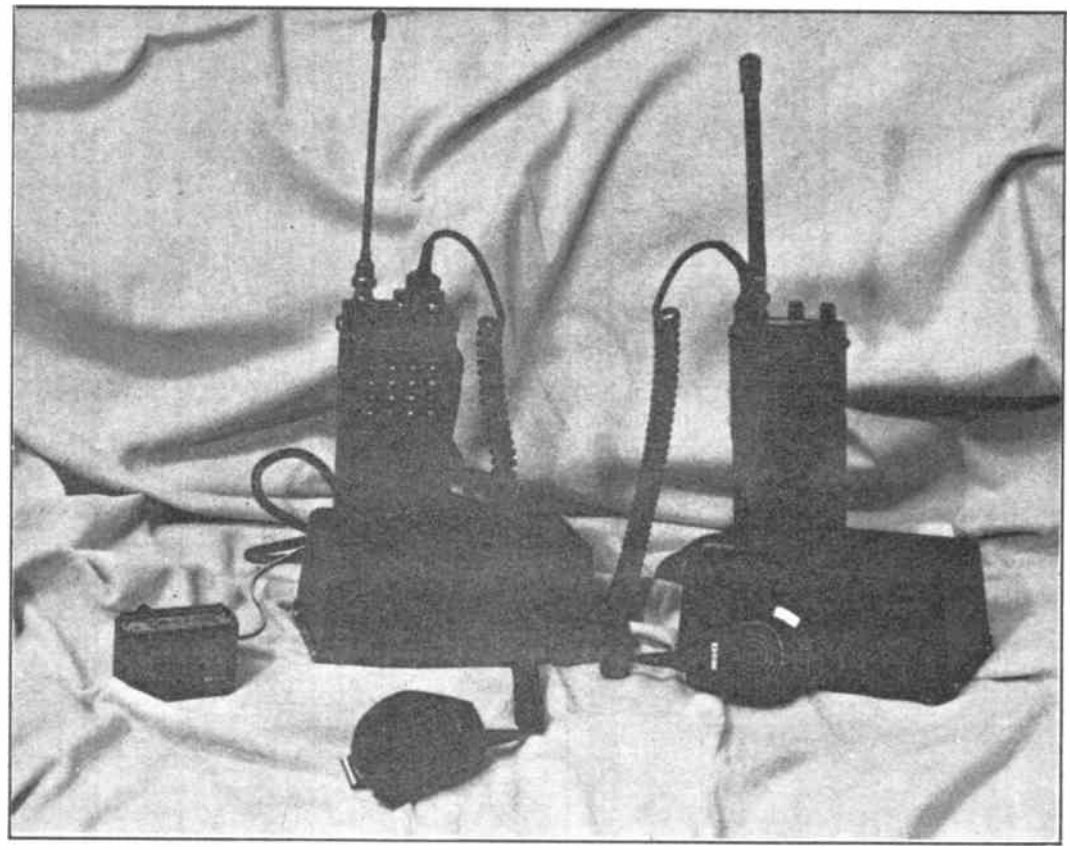
404A 10.95
425A5 8.00
431U 4.50
572B 65.00
5636 1.50
6146A 7.50
6158 3.20
6386 14.50
6883B 9.95
6973 5.95
705A 8.00
706A 8.00
715C 45.00
725A 275.00
7527 89.50
7703 395.00
803 14.95
805 39.00
807 1.95
810 85.00
811A 15.00
813 23.50
829B 14.50
832A 14.50
833A 95.00
866A 4.50
872A 25.00
873 60.00
884 5.50
927 15.00
930 9.95
931A 17.50
954 1.00
958A 1.00
1299A 0.60
1619 2.50
1625 3.00
1626 3.00
1927 25.00
2050 3.95
2050W 4.50
3545 4.00
4313C 4.00
4328D 9.00
5642 9.50
5651 2.50
5654 1.95
5663 1.95
5670 3.25
5672 4.50
5687 4.50
5692 3.50
5696 3.50
5704 3.50
5718 6.15
5725 2.50
5726 1.50
5727 1.95
5749 2.50
5750 1.85
5751 2.95
5763 4.95
5814A 3.25
5829WA 6.50
5840 3.50
5842 11.00
5847 10.95
5879 8.50
5886 13.95
5894 39.50
5899 4.50
5963 2.00
5965 2.25
6005 1.85
6012 16.00
6021 3.65
6057 2.50
6058 3.95
6060 2.25
6062 4.50
6063 2.00
6064 2.95
6067 1.95
6072 4.20
6080 7.95
6132 10.00
6146B 9.50
6688 6.50
6887 9.50
6080 7.95
6080WA 9.50
6096 5.50
6132 10.00
6136 2.50
6146B 9.95
6157 2.50
6201 6.45
6211 2.50
6267 2.25
6350 3.50
6688 6.50
6870 11.50
6887 9.50
6873 4.50
7189 3.50
7199 6.15
7239 17.50
7247 2.95
7360 13.50
7527 85.00
7586 15.00
6591A 4.95
7868 3.95

Open Mon-Thurs 9.00am-5.30pm
Fri. 9.00am-5.00pm
• 24 HOUR ANSWERPHONE SERVICE •
ACCESS & BARCLAYCARD PHONE ORDERS WELCOME

UK ORDERS P&P £1.00
PLEASE ADD 15% VAT
Export order welcome carriage at cost
Please send your enquiries for special quotations for large quantity

CALLERS WELCOME

STRAIGHT & LEVEL



DESK POWER SUPPLY

The MRZ desk-top power supply is designed to be used in conjunction with the following items in the Icom range of hand portable radios: PMR series models H2 and H6; marine series models M2, M5 and M12; amateur series models IC2E, IC4E, IC02E and IC04E.

In one quick and easy operation, any Icom portable's battery pack can be removed, allowing the body of the radio to slide firmly onto the mounting on the MRZ PSU. With an external microphone plugged into the miniature jack socket, the radio is ready for base station operation.

The MRZ desk power supply incorporates over-voltage protection and over-current shutdown. The unit's output voltage is regulated. Two models are available: the BPU, a desk dc supply for base station operations; and the BPU/BC, which is similar to the BPU but incorporates a battery charging system for BP3 packs.

For further information contact: *MRZ Comms Ltd, Newton House, 248 Uttoxeter Rd, Longton, Stoke-on-Trent. Tel: (0782) 336221.*

MAPLIN MAG

The March/May 1986 issue of *Electronics – The Maplin Magazine* is now available, and includes a variety of projects of interest.

Maplin research engineers have developed the world's first VHF weather satellite receiver, using a standard TV set, which will relay and convert the satellite weather signals into a map image. Full constructional details are provided within the magazine, including aerial requirements and details of how you can obtain your receiving licence, which is free.

Other project action points include high quality audio mixer modules, a sealed-lead-acid battery charger and a stepper motor driver.

An anticipated top seller is the new Maplin-developed Amstrad expansion system. With Amstrad micros riding high in the sales charts, this project is guaranteed to generate considerable interest among current and prospective Amstrad users.

Electronics will be presenting details of the latest range of Maplin 'Precision Gold' multimeters, which range from a high quality versatile multi-purpose unit to an easy-to-use hobby item, at an easy-to-afford price.

As usual, the issue includes a variety of regular features and Maplin news.

Electronics – The Maplin Magazine is available at newsagents, from Maplin stores, or from Maplin direct. The price is 75p.

For further information, please contact: *Maplin Electronic Supplies Ltd, PO Box 3, Rayleigh, Essex SS6 8LR. Tel: (0702) 554155.*

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

AMCOMM 9000 ATU

The engineers at Amcomm have announced the Amcomm 9000 antenna coupler, which is a development of the popular Amtech 300, incorporating a 1:4 toroidal balun to permit connection of your transmitter to the antenna, via 300 ohm balanced feeder.

The antenna coupler utilises a capacitively tuned 'T' network for matching high impedance (300-600 ohm) or low impedance (50-75 ohm) antennas to low impedance transmitter outputs.

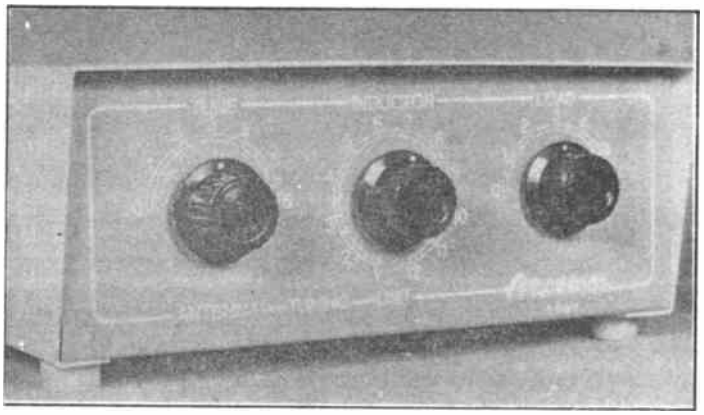
The antenna coupler is general coverage and will tune over the range 1.7MHz to 30MHz, frequency range being selected by a 12 position 'inductor' switch. Position 1 is for highest frequency of operation and position 12 for lowest frequency.

In operation the 'tune' and 'load' capacitors are adjusted to obtain minimum VSWR at the transmitter.

The components in the antenna coupler are rated for operation with power outputs of 100 watts.

Low impedance connections are made via PL259 sockets, while high impedance balanced feeder connections are made via insulated screw terminals.

For more information on the Amcomm 9000 contact: *Amcomm/ARE, 373 Uxbridge Rd, Acton, London W3 9RN. Tel: 01-992 5765.*



VHF PRE-AMP

A metal-housed AM or FM radio pre-amplifier, giving a 22dB gain boost for improved reception, is now available in kit form from Electronic and Computer Workshop Ltd (ECW).

The kit, K2622, comprises a high quality PCB, all the necessary components and a strong metal housing, together with full constructional and operational instructions.

The kit is simple to build and will greatly improve the reception performance of VHF, FM or AM radio in the house or car.

The 22dB gain is from 10 to 150MHz and the amplifier operates from an unstabilized power supply of between 12 and 15V dc, which allows direct operation from a car supply if desired. The supply can be connected directly to the amplifier or, for use where the amplifier is mounted close to a loft or roof mounted antenna, can be fed by coaxial cable. Supply current requirement is 1 to 3mA.

ECW offers the K2622 kit at £8.84 including VAT and post/packing.

For further information please contact: *Caroline Stewart, Electronic and Computer Workshop Ltd. Tel: (0245) 262149.*

HIGH GAIN FETs

Covering the frequency bands from 7.5 to 15.3GHz, a new range of thin film, microwave FET amplifiers for communications and radar systems can now be supplied by Anglia Microwaves Ltd.

The Zeta 1523 range, comprising four models, is available on a 30-45 day delivery time and features low noise – typically 3.0dB maximum.

The 1523 amplifiers are designed to be efficient, giving an RF output power of +11dBm (%1dB compression) for an 85mA (+5V) input current.

All specifications are guaranteed over a temperature range from −54 to +71°C. Gain flatness is ±0.5dB and VSWR is 2.0:1 maximum.

For further information on any of their products please contact: *Anglia Microwaves Ltd. Tel: (02774) 58955.*

MINI-VAC

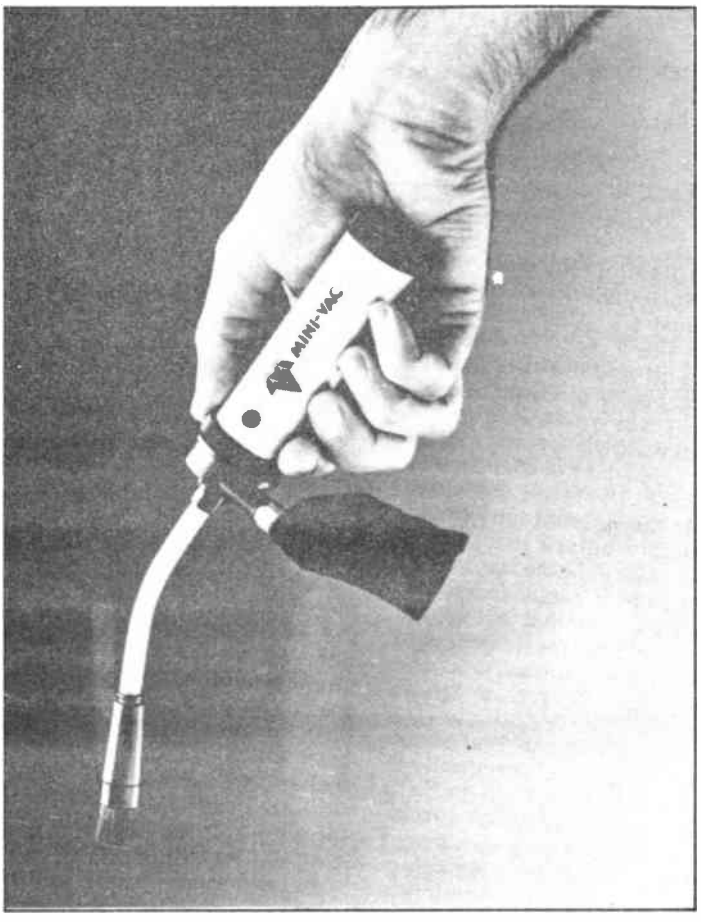
Mini-vac is a powerful hand-held micro cleaner which operates from a single 9 volt battery (or suitable low voltage mains adaptor) to remove dust particles, fluff, etc from difficult-to-reach areas.

The Mini-vac is supplied complete with re-usable vacuum bag, one straight and one curved extension pipe, two fine hair brushes, and it can even be used to expel air as an alternative to vacuuming.

This precision tool enables expensive high tech equipment to be kept free of surface dirt for only a minimal outlay. Applications include computers, typewriters, TVs, videos, hi-fi, personal stereos, clock radios, cameras, calculators and telephones.

It will soon be available from leading stores and retail outlets or through mail order at £11.95, including postage and packing.

For further information contact: *Authenticity, PO Box 34 E, Worcester Park, Surrey KT4 7YH. Tel: 01-337 3352.*



STRAIGHT & LEVEL

LASER COMMUNICATIONS

Northgate Associates Ltd have established a secure, yet transportable communications system.

Most existing radio systems are virtually omni-directional, which makes interception by unauthorised listeners a major problem. Microwave links are meant to be more secure, but they are susceptible to jamming, and the equipment is often too large to be portable.

However, Northgate's new system uses the latest laser technology. Light is highly directional, so it can only be received by a unit that is in direct line of sight, greatly reducing the likelihood of interception. Also, jamming must involve a visible means, reducing covert action.

As semi-conductor lasers and high sensitivity avalanche PIN diode photomultiplier receivers are plentiful and inexpensive, the new system will be lightweight, reliable, and relatively cheap.

For further information contact: *Mr Dug Godfrey, Northgate Associates Ltd. Tel: (04626) 77396.*

NEW BEZELS

A new range of snap-in bezels, available from Cirkit Distribution, enables up to four components to be fitted into one panel cut-out, thereby simplifying assembly procedures and creating considerable cost savings.

Presently offering twenty-four component permutations – from single and double pole switches, neon switches, fuse-holders, filtered and unfiltered inlets – the Bulgin 'Polysnap' range enables one part number purchasing and pre-assembly wiring. Additional component variations will be added in the future.

For further information and a copy of a product leaflet contact: *Cirkit Distribution, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111.*

PORTABLE MULTIMETER

Electronic Brokers has introduced the Thandar TM451 bench portable multimeter, which has a 200mV to 1000V range and a basic dc accuracy of 0.03%.

The instrument features a clear 4½-digit liquid-crystal display (LCD), with 11mm high characters, incorporating legends (mV, A, etc) to indicate functions selected. The display has a blinking overrange indication and low battery warning which advises when the battery is below 6V dc.

The TM451 has a sampling rate of 2.5 times per second, full autoranging, plus manual range selection, a sample hold function on all ranges, polarity indication, and audible continuity bleeper.

Optional accessories include a universal test lead set, ac adaptor and a service manual.

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

SPECTRUM 128

As expected, Sinclair launched the new Spectrum 128 onto the UK market during February (a similar machine has been available in Spain since before Christmas). It features, of course, 128K of RAM, with 32K of ROM, and will retail at £179.99.

The most notable features of the Spectrum 128's hardware, apart from the added memory, are the RS232/MIDI-out port and the keypad interface (both software driven), and the RGB/composite video output. It retains the earlier Spectrum's cassette port, TV output and expansion bus. There is, somewhat surprisingly, no joystick port.

There is also a 3-channel sound chip, which means no more weedy beeping, and a RAM disc file system usable from Basic. This latter means that some of the on-chip memory can be used for data storage in the same way as a disc is used. Access to such data is virtually instantaneous (and therefore much faster than disc), but obviously it must be saved to tape or disc if required before switching off or resetting the computer.

The built-in software ('firmware') includes 48 Basic for those who want it, but has in addition a new 128 Basic with a full screen editor and on-entry syntax checker. 'Tape Loader' and 'Tape Tester' facilities will help with loading programs from cassette.

The new Spectrum 128 is claimed to be fully compatible with earlier Spectrum software, so there is already a massive amount of software available for it.

SATELLITE SYSTEMS

Now available in the UK through Skidmore 4WD Ltd are the Superwinch satellite antenna control systems. Superwinch are known in the States for their good quality electric winches, and have applied this experience in building a robust actuator for satellite dishes.

The actuator employs a ⅛ horsepower motor to provide a 2000lb thrust rating through solid steel motor gears. Much attention has been given to weatherproofing.

The accuracy and repeatability of positioning is claimed to be excellent. The control console resets automatically to a zero count whenever the lower limit switch is tripped, and the sensor circuit gives a resolution of $^{62}/_{1000}$ inch per digit count.

Two indoor control systems are offered. The manual version provides a 3-digit readout of dish position, with two buttons to control movement. The programmable controller also has the 3-digit display and a manual facility, but also offers 16 preset positions, selectable at the touch of a button.

The outdoor actuator unit is available separately for those who might have requirements other than for a total system.

For further information contact: *Skidmore 4WD Ltd, 60 Sandwell Street, Walsall, West Midlands WS1 3EB. Tel: (0922) 613633.*

COMPUTER DONATION

Rare historic computer and communications equipment was donated to the Communications and Electronics Museum on Tuesday, 25 March 1986, by one of the museum's corporate supporters, Rank Xerox Limited.

The equipment included an early Solartron computer which was used for analogue circuit design, a Wayne-Kerr function generator which was used for circuit testing, and communications equipment ranging from Tannoy amplifiers through early recording instruments to Creed teleprinter and automatic Morse equipment.

Two private collections of civil and military communications equipment were amalgamated to form the Communications and Electronics Museum.

The first exhibition entitled 'Communications Across the Commonwealth' will be at The Edinburgh College of Art during the Commonwealth Games and the Edinburgh Festival from mid-July to the end of August.

For further information please contact: *Dr Graham Winbolt. Tel: (0705) 382133.*

Morse testing

On hearing the news that the RSGB had been chosen to adminstrate the Morse test from the 1 April, 500 volunteers offered their services in the capacity of examiners.

Just two weeks before the off, the RSGB issued a letter to those who put their names forward. The letter explained that the seventeen weeks available before the start of the new scheme were not sufficient to organise the test centres, and that a booklet, the final draft for which is with the DTI for approval, would be sent out in two or three weeks.

This will mean that those who have volunteered will not know how things are going to be administered until a week after the scheme was meant to start, when suitable selection and region appointment administration will presumably commence.

One would have thought that the majority of these arrangements would have been detailed in the proposal made to the DTI and not left until after the event. I'm sure those waiting on them to take the test are not impressed with this display of disorganisation.

If you were waiting to take the test and happened to be at the NEC on 5 and 6 April for the RSGB National Convention, you may have been lucky enough to be included in the test centre set up there. If, however, you were unaware of the facility, or unable to make the journey, you may find you have a long wait, or a long time to practise, according to how you feel about it.

To be continued.....

CLUB NEWS

The UK 6m Group

This group was formed many years ago by dedicated amateurs who were interested in propagation on the 6m band. In its early days it encouraged crossband QSOs between 6, 10 and 4 metres when there was no 6m transmitting licence available in the UK.

They have just had their annual general meeting at the RSGB annual convention at Sandown Park, Esher, at which Brian Bower G3COJ was re-elected chairman, Angus McKenzie G3OSS vice chairman, Alan Wright GW3LDH secretary, Maureen Wright GW8ZCP magazine editor, and Peter Turner G4IIL treasurer. Several times a year the group publishes *Six News*, an interesting and informative newsletter which should interest all 6m band enthusiasts. The subscription is £5pa.

If you wish to join contact: *Alan Wright GW3LDH, 6 Cwm Eithin, Wrexham, Clwyd LL12 8JY.*

SPRAT

The spring edition of the G-QRP club journal, SPRAT, includes details of club events and competitions.

There are also many interesting articles by club members on such diverse subjects as RF pre-amps and 'dandelion seeds in the wind' (a comparison with the Alaskan radio station KL7DG). Photographs of past activities are also included.

For more information contact: *Rev George Dobbs G3RJV, St Aidan's Vicarage, 498 Manchester Road, Rochdale, Lancs OL11 3HE. Tel: (0706) 31812.*

MARS probe

Probe, the journal of the Midland Amateur Radio Society, has brought to our attention the Drayton Manor Mobile Radio Rally. This event will be held at Drayton Manor Park, Tamworth, on Sunday 11 May, at 11am.

The rally will feature trade stands, Raynet, repeater groups, children's entertainment, side shows, and a zoo. You're also invited to take your own equipment along for the flea market.

For further details contact the organiser: *N Gutteridge G8BHE. Tel: (021) 422 9787.*

Hamster

The spring edition of *Hamster*, produced by Cheshunt and District Amateur Radio Club, is packed with useful information and interesting articles, including members' news, an article on computing and amateur radio and designs for a Bandpass filter and a low-pass filter.

The club meets every Wednesday evening at 8pm in the Church Room, Church Lane, Wormley, near Cheshunt, Herts.

If you want further information contact: *John and Terry Ann Watkins G4VMR/G4VSL, 'One Ash', Frogs Hall Lane, Haultwick, Herts SG11 1JH. Tel: Dane End 250.*

CQ-TV

The May edition of the CQ-TV magazine includes several interesting articles on such diverse subjects as the new FM-TV modules, 'how wide is wide' questioning the bandwidth taken up by transmission, and TVI. Also featured are regular articles and a letters page.

For more information about membership contact: *D Lawton, Grenehurst, Pinewood Road, High Wycombe HP12 4DD. Tel: (0494) 28899.*

CQ-TV have also produced a book entitled *The Best of CQ-TV.* Since membership has increased so drastically over the past few years, back issues of the magazine have run out. Consequently this new book contains the best of the old articles, often updated, in a comprehensive, 100 page form. It can be obtained at a cost of £3.50 (including post and packing) from: *BATC Publications, 14 Lilac Avenue, Leicester LE5 1FN.*

BARC (woof) programme

The BARC meets at the Forest Ring Community Centre, Sycamore Way, Winklebury.

The main monthly meeting is held on the first Monday in each month, commencing at 7.30pm.

Activities planned for future meetings include a lecture on home construction which takes place on 5 May and contest operator training on 17/18 May.

In addition, a 2m DF 'Foxhunt' is scheduled for the last Sunday in every month, starting at 2pm from the club premises, but this is subject to weather and sufficient support. Normally a brief 2m net is held at 12 noon to decide whether to 'go/no go'. Non-members are always welcome and should contact Dave Burleigh G4WIZ for rules, etc, if required, or join in the 2m net.

The club also holds *ad hoc* meetings, mostly informal, on a Tuesday every month or so, but these are arranged only a month ahead so it is difficult to publicise these meetings in advance.

Anyone requiring further information should contact: *Dave Burleigh G4WIZ, 14 Winchfield Gardens, Tadley, Basingstoke, Hampshire RG26 6TX. Tel: (07356) 5185.*

EARS

Echelford Amateur Radio Society meets at The Hall, St Martin's Court Kingston Crescent, Ashford, on the second Monday and last Thursday of the month, at 7.30pm.

Future meetings will include lectures on CW contest operating on 27 May, receiver parameters on 24 April and the Racal Vodaphone system on 9 June.

On Sunday at 10.00 local time, on 1.980MHz±QRM (AM/SSB) and at 21.00 local time on 2m (S20 and QSY) FM, the club radio nets will be operating. Participation is welcomed from both members and non-members.

For further details contact the secretary: *Peter Coleson G4VAZ, 122 Green Street, Sunbury. Tel: (0932) 83823.*

CARS

Coventry Amateur Radio Society meets every Friday at 8.00pm, at Baden Powell House, 121 St Nicholas Street, Radford, Coventry.

Their current programme of events includes a 2m direction finding contest on 25 April, a talk on FAX and packet radio by G6VHI (which starts at 7.40pm) on 9 May and an evening out at Hartshill Hayes Country Park on 23 May. Visitors are always welcome.

For further information contact: *Robin Tew G4JDO, 4 Chetwode Close, Coventry CV5 9NA. Tel: (0203) 73999.*

2m foxhunt

The Pontefract and District Amateur Radio Society will be holding a 2m foxhunt on 22 May. Other events include a Raynet exercise on 8 May, and a visit to Spen Valley junk sale on 5 June.

Details about membership and events can be obtained from: *Colin Mills G0AAO, 27 Pendennis Ave, South Elmsall, Nr Pontefract, W Yorks WF9 2PL.*

Scandinavian VHF/UHF

All VHF/UHF amateur radio enthusiasts are invited to the annual Scandinavian VHF/UHF meeting to be held at Geilo over the weekend of 6/9 June.

Food and lodging will be organised by Hallingdalsgruppen av NRRL (the Hallingdal ARS), whilst the Asker and Baerum ARS, LA8YB, are arranging the technical side of the programme.

Visitors are expected from all over Europe and the USA. The main language will be English. The programme includes talks on antenna measurements, packet radio, receiver front-end design, and much more. There are even opportunities for DXpeditioning.

Geilo is midway between Oslo and Bergen, and about 250km (3½ hours by rail) from Oslo. Accommodation will be in apartments, and will cost NOK60. Payments must be received by 1 May.

For further details contact: *Lars Breie LA9BM, N3580, Geilo, Norway.*

Anglo-Scottish rally

Following yet another highly successful event last year, Kelso, Borders and Galashiels Amateur Radio Societies will be hosting the third Anglo-Scottish Rally in Kelso's Tait Hall on Sunday 4 May, from 11am to 5pm.

There will be the usual talk-in on S22, bring and buy and club and traders' stalls, bar, hot and cold snacks, raffles and hopefully a Morse test room.

Entrance will be £1.00, but junior ops and accompanying non-licensed YLs and XYLs will be most welcome and admitted free. There is something to do for everyone, so why not spend the bank holiday weekend in the Scottish Borders?

For further information, including accommodation, contact: *André Saunders GM3VLB, tel: (0573) 24664, or Bruce Cavers GM4UIB, tel: (0573) 24654 any evening.*


MID CHESHIRE AMATEUR RADIO SOCIETY

VALE ROYAL DISTRICT COUNCIL

VALE ROYAL AWARD

MCARS

G3ZTT G4ZTT
G6ZTT G8ZTT

VR

DELAMERE FOREST MICROWAVE ACTIVITY GROUP

THE HEART OF CHESHIRE

This Certificate is Awarded to

Achieved by working the prescribed Vale Royal Stations

AWARDS MANAGER

DATE

The Vale Royal Award

A new award entitled The Vale Royal Award is being sponsored jointly by the Vale Royal District Council and the Mid-Cheshire Amateur Radio Society.

The objective of the award is to publicise the district of Vale Royal in the Heart of Cheshire, and to encourage radio amateur activity within the district.

The printing of the certificates has been financed by the council and any surplus remaining, after the costs of administrating the award have been met, will be distributed between the Radio Amateur Invalid and Blind Club (RAIBC) and Hebden Green Special School for Handicapped Children in Winsford, Cheshire.

There are two classes of award: Class A – single band, multimode and Class B – multiband, multimode. To qualify for the award amateur stations must either: 1. Have worked nine stations situated in the district of Vale Royal or who are members of the Mid-Cheshire Amateur Radio Society, plus one Mid-Cheshire Amateur Radio Society station (G3ZTT, G8ZTT); or 2. Have worked both Mid-Cheshire Amateur Radio Society stations (G3ZTT, G8ZTT), plus the Delamere Forest Microwave Activity Group station (G4ZTT), plus the Vale Royal Contest Group station (G6ZTT).

Applications should be sent to Hans M Field, Awards Manager, Mid-Cheshire Amateur Radio Society, 6 Llandovery Close, Winsford, Cheshire CW7 1NA. An extract of your log showing the details of the contacts claimed, signed by yourself and one other licensed radio amateur to confirm that the extract is a true copy of your log; a £1 cheque or postal order made payable to the Mid-Cheshire Amateur Radio Society, or 5 IRCs for non United Kingdom countries; and an A4 sized stamped addressed envelope (UK only) should be enclosed with your application.

For further information please contact: *Dr E J Loader, 13 Vale Road, Hartford, Northwich, Cheshire CW8 1PL. Tel: (0606) 75660.*

Mayfair GB event station

A special event station is being held at the St John's middle school 'Mayfair' in Kenilworth, Warwickshire on 18 May.

The station (GB6STJ) will be operating on 144MHz and 432MHz between 9.00-16.00 hours. Details and QSLs are available from: Mike Newell G1HGD, 11 Lancaster Place, Kenilworth, Warwickshire, or through the RSGB Bureau.

GB2RGS

A special event station will be held on 17 May in conjunction with the bi-annual show day at the Royal Grammar School, High Wycombe, Bucks.

The station will be open from 1300-1730 and will be operating on the 2m, 20m and 80m bands.

All QSOs will receive a QSL card through the bureau, and special cards will be issued for: the six most distant stations worked, the six stations worked closest to 1500 hours, and old boys of the school.

A message service facility will be available, and all visitors will be welcome.

The station will be manned by members of the Chiltern Amateur Radio Society.

Many other attractions will be included at the show to make it a good day out for radio amateurs and their families.

For further information contact: *C R Payne G8ZNH, 31 Maybrook Gardens, High Wycombe, Buckinghamshire HP13 6PJ.*

GB2GF

On the weekend of 14/15 June the above station will be operated by the Cray Valley Radio Society on behalf of the Greenwich Festival.

Activity will be on HF and VHF and special QSL cards will be available for all contacts.

For further details contact: *Owen Cross G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF.*

SKE86

Edgware and District Radio Society will be holding their fifth annual straight key evening on Thursday, 29 May, from 7pm on 80m CW around 3.55MHz. SKE86 is for all CW operators of any standard.

Other events on the society agenda include: an informal, round table discussion on 'Antennas in the Small Garden' by John G3SJE on 24 April; a construction contest on 22 May; and an NFD at Copthall SG on 7/8 June.

For more information about the Society and events please contact: *The Secretary, John Cobley G4RMD, 4 Briars Close, Hatfield. Tel: 65707.*

Plymouth mobile rally

On 25 May the Plymouth Mobile Rally will be held at Plymstock Comprehensive School, Plymstock, Plymouth, from 10am until 5pm.

Features will include a bring and buy stall, trade stands and a talk-in on S22. Ample parking will be available for visitors.

Details can be obtained from: *Mervyn Collicott G0BNT. Tel: (0752) 777777.*

Swindon rally

Swindon and District Amateur Radio Club is holding its annual rally on Sunday 11 May at Oakfield School, Marlowe Avenue, Swindon, Wiltshire. Doors open at 10.00am and there is an admission fee of 50p.

There will be a large variety of equipment and components for sale on the trade stands and many RSGB books will be available on the club stand. There will also be a bring-and-buy stall.

The British Amateur Radio Teleprinter Group and local repeater groups will be in attendance.

It is hoped that there will also be a Morse testing centre at the event, but this was not certain at the time of writing.

A bouncer castle, mini motorcycles and a free cartoon show should ensure a good day out for all the family, so take everyone along.

Further details can be obtained from: *K A Saunders G8SFM, 'Tamarisk', Tetbury Lane, Leighterton, Gloucestershire GL8 8UP.*

Southend & District RS rally

The Southend & District Radio Society meets at the Rocheway Centre, Rocheway, Rochford, Essex every Friday at 7.30pm, and all are welcome.

On 1 June 1986, SDRS holds Amateur Radio & Electronics Rally at Rocheway, with talk-in on S22. Trade stands, bring and buy, RTTY, refreshments, and a licensed bar are included among the many attractions, so bring the family as they too will be catered for.

For further information contact: *Ron G6SOH, 1 Eastwood Road, Leigh-on-Sea, Essex SS9 3AJ; or Brian G4RDS, 27 Fernlea Road, South Benfleet, Essex.*

Mobile rally

The Mid-Ulster Amateur Radio Club will be holding its annual mobile radio rally on Sunday 18 May, starting at 12.00 noon, in the grounds of Parkanaur House located approximately 6 miles from Dungannon on the main Ballygally Road.

There will be a talk-in station on S22 FM 144.550MHz, and the usual trade stands and bring and buy stall will be featured.

The monthly meetings of the club are held on the second Sunday of each month at 3.00pm in The Guide Hall, Castle Hill, Gilford. There is usually a talk or demonstration of interest to radio amateurs, and everyone is welcome.

Further details can be had from: *The secretary, 19 Trasna Way, Lurgan, Craigavon, Co Armagh BT66 8DL. Tel: (0762) 22855.*

STRAIGHT & LEVEL

Stroud ARS

Stroud Amateur Radio Society meets on alternate Wednesdays at 8pm at Nelson School, Stratford Rd, Stroud.

The club holds regular Morse classes, has an operational HF station using the club callsign G4SRS, and will be hosting a number of lectures by guest speakers.

For further information contact: *PR Gainey G0DZM. Tel: (045) 383 2773.*

WACRAL

Formerly known as Wamrac, the World Association of Christian Radio Amateurs and Listeners have just produced their latest newsletter.

It includes articles by members, reports on activities and details of WACRAL nets and skeds.

For more information contact: *Len Colley G3AGX, Micasa, 13 Ferry Road, Wawne, Nr Hull HU7 5XU. Tel: (0482) 822276.*

Natter nights

Sutton and Cheam Radio Society meets at Downs Lawn Tennis Club on the third Friday of every month at 7.30pm.

Forthcoming events include several 'natter nights' in the Downs bar, the 5 May and 2 June being the dates for your diary. The members are also looking forward to the HF National Field day on 7/8 June.

For further information contact: *Alan Keech G4BOX, 26 St Albans Road, Cheam.*

Skittles

A sample of the events detailed in the Stourbridge and District Amateur Radio Society Newsletter include a CQ-MIR contest which will take place over 10/11 May, and an all Asia SSB contest on 14/15 June.

For further details about membership and venues, please contact: *Derek Pearson G3ZOM. Tel: Kilmelford 288900.*

Bury Radio Society

The meetings of the above society are held every Tuesday at the Moses Centre. Licensed members can operate the club station, borrow books, seek advice on construction projects, or just chat with other members over a drink or two.

New members are always made welcome.

Their agenda includes a variety of lectures on topics of interest and a film show on 13 May.

Unfortunately a hand-held FT202, serial no 8L040259, was stolen from the bring and buy stall at the Society Rally in February. Any one with information in connection with this crime, or enquiries about membership of the club, should contact: *36 Dovebank Road, Bolton, BL3 1DB. Tel: 706191.*

Wee Aberdeen ARS

The Aberdeen Amateur Radio Society (GM3BSQ) meets at 7.30pm each Friday in the club rooms at 35 Thistle Lane, Aberdeen.

An interesting series of lectures, instruction, junk sales and raffles etc, have been arranged, including a lecture on dealing with TVI by GM8FFX on 9 May.

Anyone who would like further information on the club's activities, or membership, should contact: Don Travis on Pitcaple (04676) 251.

Crime prevention

A lecture on crime prevention by the local police force on 30 April is one of the activities on the South Bristol ARC calendar.

Other events include lectures and demonstrations, the modification of CB radios for 10m being scheduled for the 4 June.

The club meets every Wednesday at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol.

For further details contact: *Len Baker G4RZY. Tel: Whitchurch 834282.*

Correction

In our April issue's Straight and Level we reported on a Scottish Raynet on 3 May. However, the venue will be the Aviemore Centre, Aviemore, rather than Fort William as was previously stated.

Further information is available from: *D Garrington. Tel: (0397) 3833.*

The Best HF

The New ICOM HF Flagship.

IC-751A

ICOM are proud to launch their new flagship. The IC-751 was good, the new ICOM IC-751A is even better. With a general coverage receiver 100KHz – 30MHz it is a full featured all-mode solid state transceiver that covers all the WARC bands. The IC-751A has an excellent 105db dynamic range and features pass band tuning, notch filter, adjustable AGC, noise blanker and RIT. A receiver pre-amp provides additional sensitivity when required. On C.W. the electronic keyer is standard and 40 w.p.m. at full break-in is possible. The FL32 500Hz C.W. filter is fitted as is sidetone on receive mode. On SSB the new FL80 2.4KHz high shape factor filter is fitted.

The high reliability transmitter, full 100% duty cycle designed for SSB, CW, AM, FM, RTTY and Amtor, with a high performance speech processor to enhance the IC-751A transmitters operation. With 32 memory channels and twin V.F.O.'s, scanning of frequencies and memory are possible from the transceiver or from the HM12 mic supplied.
The IC-751A is fully compatible with ICOM auto units such as the AT500 automatic antenna tuner and the IC-2KL linear amplifier. Options available: PS35 internal A.C. P.S.U., PS15 external A.C. P.S.U., EX310 voice synthesizer, SM8 and SM10 desk mics and various filter options.

British TELECOM Callnet

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Tha

ICOM

IC-02E/04E Handportables

These direct entry micro-processor controlled handhelds, one for 2 metres, the other for 70 centimetres. Scanning, 10 memories, duplex offset storage in memory and odd offsets also stored in memory. Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority. They have a LCD readout indicating frequency, memory channel, signal strength, transmitter/output and scanning functions. A range of accessories include the HS10 Headset and boom microphone, HS10SB PTT switch box with pre-amp, HS10SA voice operated (VOX) switch box. The IC-2E and IC-4E still continue to be available.

New Retail Shop

We are pleased to announce that we have moved to a new larger retail shop. This will be managed by Andy G6MRI and is situated on the corner of Stanley Road and Kings Road, Herne Bay, Kent. Tel: (0227) 369464. Give it a visit for demonstrations and advice on anything to do with your shack. BCNU.

You can get what you want just by picking up the telephone. Our Mail Order department offers you free same day despatch whenever possible, instant credit, interest free H.P. Telephone Barclaycard and Access facility, 24 hr answerphone service.

WANT TO LEARN MORE?

Telephone us free-of-charge on:

HELPLINE 0800-521145.

Mon-Fri 09.00-13.00 and 1400-17.30

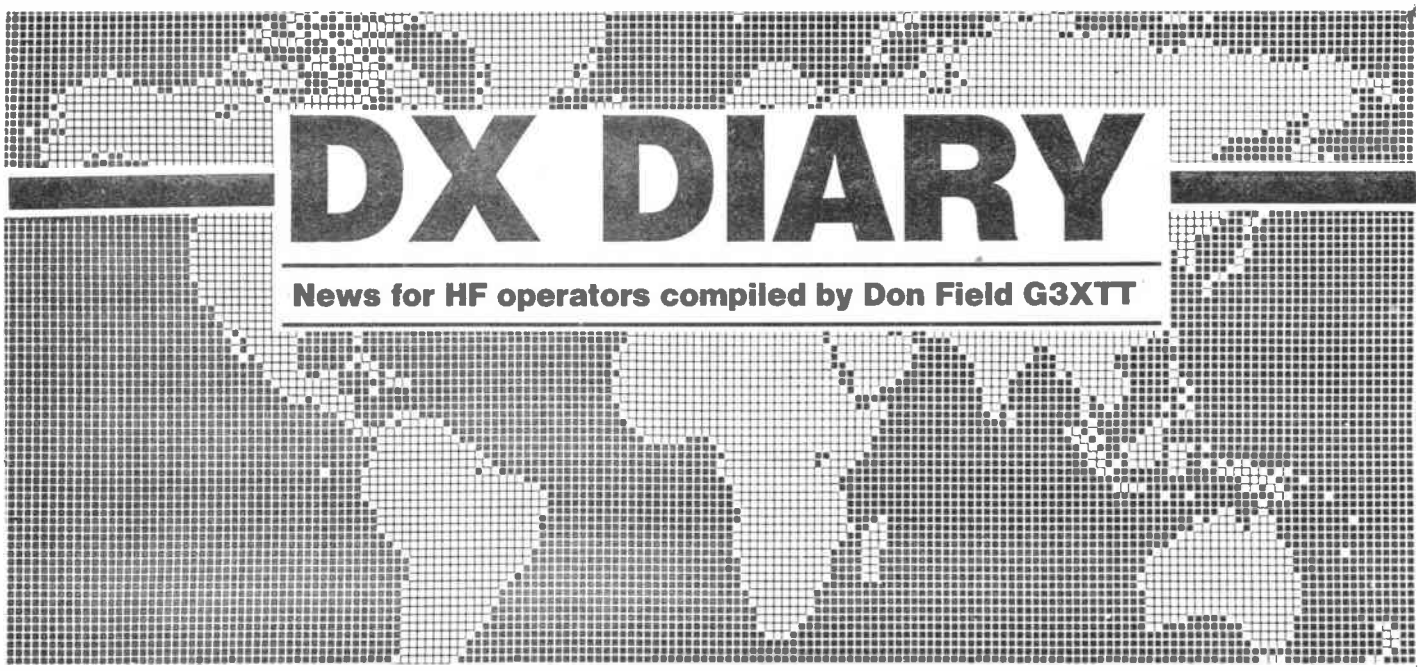
This is strictly a helpline for obtaining information about or ordering ICOM equipment. We regret this service cannot be used by dealers or for repair enquiries and parts orders. Thank you.

IC-290D/25 Watt Mobile

290D is the state of the art 2 meter mobile, it has 5 memories and VFO's to store your favourite repeaters and priority channel to check your most important frequency automatically. Programmable offsets are included for odd repeater splits, tuning is 5KHz or 1KHz. The squelch on SSB silently scans for signals, while VFO's with equalising capability mark your signal frequency with the touch of a button. Other features include: RIT, 1KHz or 100Hz tuning/CW sidetone. AGC slow or fast in SSB and CW, Noise blanker to suppress pulse type noises on SSB/CW.

ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet Electronics

Sea Street, Herne Bay, Kent CT6 8LD
Tel: (0227) 363859
Dept. AR



DX DIARY

News for HF operators compiled by Don Field G3XTT

The hottest news of the month is that Clipperton Island should be on the air again from Friday May 2nd for five or six days. The operators will be W6SZN, W6RGG, W6OAT, N7NG and AI6V. They hope to run two stations on a round-the-clock basis, paying particular attention to Europe, which was unfortunately neglected on last year's expedition.

The background to the above announcement is quite fascinating. A French group mounted the first major expedition to uninhabited Clipperton Island (see *DX Diary,* March 1984) in the spring of 1978, and made 29,000 contacts; at that time a new record for a DXpedition operation. A joint French/American group planned an operation in 1984 but suffered a series of misfortunes (chronicled at the time in this column) which prevented the expedition from taking place. Eventually the group made it to the island in April 1985 making nearly 31,000 contacts in 130 countries in six days of operation (see *DX Diary* June 1985).

Europe went without

Despite the high QSO total, many amateurs, especially in Europe, went without a contact. There were reports of the DXpedition operating RTTY, or even being off the air altogether, at the times when propagation to Europe was at its best. For my own part, I remember hearing them on 80 metres with an excellent signal working the USA and failing to stand by for Europe. At least I managed to work them on 40 metres CW (though the QSL card has only recently arrived!), but for those who missed out there was the prospect of a long wait before Clipperton reappeared again.

Why go back?

Why go back so soon? The *DX Bulletin,* a US publication, reports that the 1985 operators were only too well aware of the criticisms levelled against them. Although they succeeded in taking Clipperton from 20th to 94th place in the 'US Most Wanted Country poll', it remained in 18th place in Europe, ahead of Afghanistan and Libya. This year's operators will be seeking the co-operation of US amateurs in standing by to allow European amateurs to get through.

Another reason for the return trip is the availability of transport in the form of the *Royal Polaris* fishing boat (the same boat as last year). This ship regularly cruises that part of the Pacific in search of prize-winning Tuna, and arrangements have been made to drop off the expeditioners, carry on with fishing, and pick them up again later.

The unanswered question is: how have the group managed to obtain permission for their operation? Previously, the French authorities in Tahiti (who administer the island) have insisted on French participation in any expedition. What seems to have happened is that French support has been forthcoming from the Paris-based Clipperton DX Club (formed after the 1978 expedition), and this involvement has satisfied the powers that be.

FO0XX

The callsign used this time will be FO0XX, the same as last year. I can only assume that the QSL route will be the same, ie, via the YASME Foundation. If not, I will publish a correction next month. In terms of when and where to look for them, I would suggest mornings from about 0530GMT on 40 and 80 metres, and evenings from about 1600GMT on 20 metres.

Compared with Clipperton, other recent happenings seem less important. Nevertheless, March proved to be interesting. ZL1AMO turned up at last from A35EA and ZK3RW. In Tokelau he was joined by Roly ZL1BQD, who operated as ZK3RR. Baldur DJ6SI had another stint from Ghana as DL0MAR/9G. The Colvins were on from Zambia as 9J2LC. JJ1TZK showed up from various spots in the Pacific, including A35ZK and C21NI. DL7FT caused a furore by operating as DL7FT/SV/A, supposedly from Mt Athos, but almost certainly without a proper permit.

JY8GO, TR0A, 5X5GK, ZS3BI, HS0A, A25/ZS6BRZ and others put out good signals, especially on 15 metres, during the CQ WPX SSB Contest, and the prefix hunters, as always, had a ball with the plethora of unusual prefixes to be heard and worked. Walter DJ6QT put in a splendid effort from the Comoro Islands as D68WS, even managing to work into the UK on Top Band (but not your scribe, I'm sorry to say).

While on the subject of Top Band, news is now indicating that the band will be released to Hungarian amateurs on 1 August. In Europe that will leave Romania, Belgium and Albania as the only countries without 160 (in fact, I have worked the first two of these, but only by way of special permits).

Taken to task

Turning from Top Band to 30 metres, I have been taken to task by Angelika Voss G0CCI regarding the Canadian DX Century Award, details of which I included in the February column. Angelika points out that the amateur radio movement was very lucky to get an allocation at 10MHz, that we are very much secondary users of the band and that, as such, any move to radically increase activity on the band by way of contests, awards, etc, is frowned on by the IARU. By including 30 metres within its terms of reference, Angelika believes the new Canadian award goes against the advice from IARU.

Only doing my job

Well, Angelika, I can but report on what is happening in the amateur radio world, and I believe the new award is important in that it goes further than 5 band DXCC in allowing endorsements for a multi-band award based on the same basic principles. Nevertheless, I would urge readers of *Amateur Radio* to show restraint in their use of the 10MHz band. The exact nature of the sensitivities

regarding this band has never been made public, but it may well be wise to err on the side of caution. At least we should always be aware that we are secondary users and should always strive to avoid interference to non-amateur users of the band.

10 metre activity

From David Whitaker BRS25429 comes news of the 10 metre Activity Days being organised by the White Rose Amateur Radio Society of Leeds. These will take place on the last Sunday of May, June, July and August, and in each case will run for 8 hours commencing at 0900GMT. A prime aim of the activity days is to aid studies into propagation on the band at the bottom of the sunspot cycle, so participants are encouraged to note any unusual propagation effects and to report on beacons heard as well as stations contacted. The organisers will be awarding prizes in the following categories:

To the entry providing the most useful information to the RSGB in its propagation studies.

To the station working the most WRARS members (including the club station G3EXP). Stations within 50km of Leeds will not be eligible for this prize.

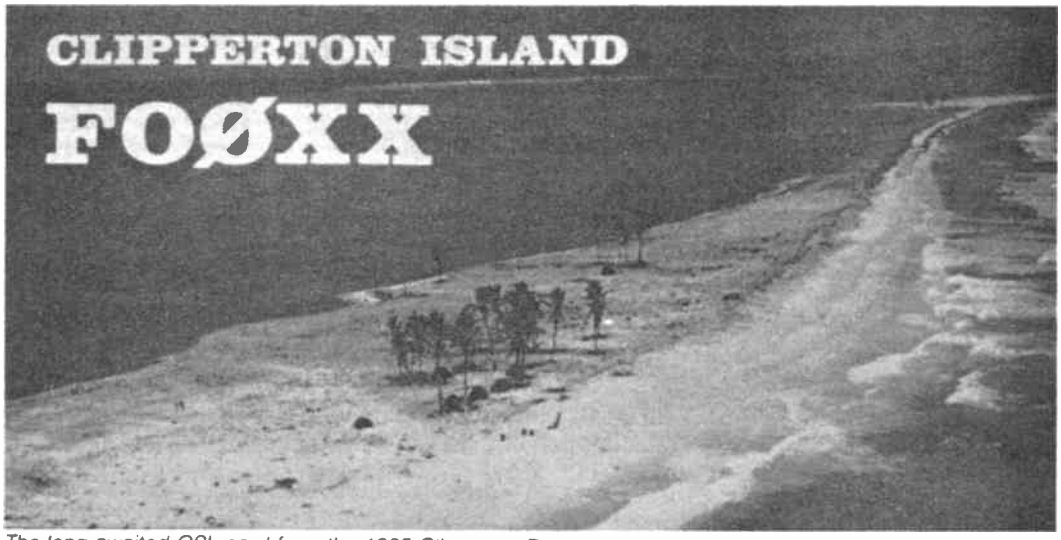
To the SWL presenting a log showing the most different stations/countries heard. Details of both sides of a QSO must be shown.

All entries should go to the WRARS, PO Box 73, Leeds LS1 5AR, and should detail date/time, callsign of station worked, and RS(T). They should arrive no later than one week after each activity day.

What's on?

Now to news of what else may be on the bands during the month. S79CW is reported to be active daily from the Seychelles from 1800GMT on 14188kHz. ZC4AK and ZC4MR frequent 14227kHz most days from 1530 to 1930GMT. 5R8AL is to be found Mondays and Fridays on 14160kHz from 1800GMT. F6AJN should be active throughout the month on 80 through 10 metres as TT8CW, mainly on CW.

G3CWI (ex VP8ANT) is currently working in Nigeria and will be there until the autumn. He hopes to operate from some of the adjacent countries during his trip. The determining factor will be the availability of licences. AH3AC, who has been active from Iceland until recently, should now have transferred to Lampedusa Island (IG9) and, on past experience, is likely to be very active.



The long awaited QSL card from the 1985 Clipperton Dxpedition

Finally, for the Islands on the Air enthusiasts, F6HMJ hopes to be active from Brehat Island during the first two weeks of May, and FF6KTI/P should be QRV from the Lerin Islands (IOTA reference EU58) from 17-19 May.

A couple of other items of interest. Visitors to Mongolia now operate with their own callsigns (/JT) rather than being issued with a JT0 prefix. So, for instance, JT0XC is now signing OK1XC/JT.

If you have sent cards to G3NBC for recent operations by VE3FXT from various parts of the world, you may have a long wait for a reply. Ken has not heard from George for several months, and doesn't even know which country he is in at the moment. Hopefully the logs will show up eventually.

Contests

The major events are the Russian CQ-M contest (a 24 hour event starting at 2100GMT on 10 May) and the CQ WPX CW Contest (24/25 May). Both of them are of the 'everybody work everybody' variety. The first includes both CW and SSB, the second is of course CW only.

Going to the USA?

There has been a reciprocal licensing agreement between the UK and the USA for many years, and reciprocal licences are easy to obtain. However, there are some minor snags. The terms of the reciprocal licence state that the licence holder can only use those US sub-bands which his home licence allows him to use.

This puts the top half of 2 metres (146-148MHz) and the 220MHz bands out of action, as well as parts of 160, 80 and 40 metres. Furthermore, because the US does not have a no-code licence, Class B licensees are unable to get a reciprocal licence (although a few seem to have slipped through the net over the years).

Now comes news that there is an alternative way forward for intending visitors to the USA. Several of the FCC's volunteer examiners are currently resident in the UK and are prepared to examine UK amateurs for the various classes of US licence (Novice, Technician, General, Advanced and Extra). All of these require the passing of both theory and Morse tests.

In contrast to the secrecy of the UK City & Guilds examination, the pool of questions for the US examinations is freely available, as are books of answers.

As for the Morse test, the speeds vary from 5 to 20 words per minute according to licence class, but the test is receive only and requires the candidate to be able to answer some simple questions on the text or to have copied at least half of it.

If you plan to travel to the USA, or its overseas territories, you may wish to take advantage of the above. In the first instance, enquiries should be made via the RSGB membership services department. If demand is sufficient I suppose we may even see test facilities being made available at the various UK Conventions.

RTTY

I reported last month on some of the RTTY DX to be found on 20 metres. In addition to the stations I reported then, the following have also been active recently: CE2IBN, CO2BB, EA8AAE, FG5XA, HC1SC, HH2BZ, HP1AC, J37BG, KP2N, KP4IG, OA4ADB, OD5IG, PZ1AP, TA1B, VU2IJ, 3C1MB, 8R1RPN and 9Q5YB.

Rumours

The rumour mill is as active as ever; the latest of which concern Afghanistan and Albania. I won't even bother to pass the rumours on because, frankly, I don't think anything will come of them. If any of the schemes start to look firm, I will pass the information on. For interest, though, you may like to be reminded that the last acceptable operation from Albania was in June of 1971, and from Afghanistan in 1973.

Does that seem a long time ago? South Yemen has not been on since 1967, Burma not since the late 60s, Vietnam was last on in 1974, and North Yemen in 1975.

The moral seems to be that if you wanted to work them all you should have come into the hobby a long time ago! However, the true blue DXer is always full of optimism ... Until next month, 73 and good DXing.

COMPUTER WAREHOUSE

1000's OF BARGAINS FOR CALLERS

THE "ALLADINS" CAVE OF COMPUTER AND ELECTRONIC EQUIPMENT

HOT LINE DATA BASE

DISTEL©

The **ORIGINAL FREE OF CHARGE** dial up data base. Buy, browse or place **YOUR OWN AD** for goods or services to sell. 1000's of stock items, spares and one off bargains. Updated daily. **ON LINE NOW.** CCITT, 8 bit word, no parity.
For 300 baud modems call 01-679 1888
For 1200-75 baud modems call 01-679 6183

FREE Your monitor from its computer!! For only £24.95 it becomes a **SUPERB HIGH QUALITY * COLOUR * TV SET**

The fabulous **TELEBOX**, an **INVALUABLE MUST** for the owner of **ANY** video monitor with a composite input, colour or monochrome. Made by a major UK Co. as a **TOP QUALITY**, stand alone **UHF** tuner and costing **OVER £75** to manufacture, this opportunity to give your monitor a **DUAL FUNCTION** must not be missed! The **TELEBOX** consists of a compact, stylish two tone charcoal moulded case, containing ALL electronics tuner, power supply etc to simply plug in and convert your previously dedicated computer monitor into a **HIGH QUALITY COLOUR* TV SET**, giving a real benefit to ALL the family!! Don't worry if your monitor doesn't have sound– **THE TELEBOX** even has an integral 4 watt audio amplifier for driving an external speaker, **PLUS** an auxiliary output for superb quality television sound via your headphones or **HI FI** system etc. Other features include: Compact dimensions of only 15.75" w x 7.5" d x 3.5" h, latest technology, **BRITISH** manufacture, fully tuneable 7 channel push button tuner, Auto AGC circuit, SAW filter, LED status indicator, fully isolated 240v AC power supply for total safety, Mains ON-OFF switch etc. Many other uses.

LIMITED QUANTITY– DON'T MISS THIS OFFER!!!

ONLY £24.95 OR £19.95 if purchased with **ANY** of our video monitors. Supplied **BRAND NEW** with full instructions and 2 YEAR warranty. Post and packing £3.50. *When used with colour crt.

COLOUR & MONOCHROME MONITOR SPECIALS

'SYSTEM ALPHA' 14" COLOUR MULTI INPUT MONITOR
Made by the famous **REDIFFUSION** Co. for their own professional computer system this monitor has all the features to suit your immediate and future requirements. Two video inputs: **RGB** and **PAL** Composite Video, allow direct connection to **BBC/IBM** and most other makes of micro computers or VCR's, including our very own **TELEBOX**. An internal speaker and audio amp may be connected to computer or VCR for superior sound quality. Many other features: PIL tube, Matching **BBC** case colour, Major controls on front panel, Separate Contrast and Brightness – even in **RGB** mode. Separate Colour and audio controls for Composite Video input, **BNC** plug for composite input, 15 way 'D' plug for **RGB** input, modular construction etc etc.
This Must Be ONE OF THE YEAR'S BEST BUYS. PC USER
Supplied **BRAND NEW** and **BOXED**, complete with DATA and 90 day guarantee. **ONLY £149.00** as above **OR IBM PC** Version **£165.00**
15 Day 'D' skt **£1.00**. **BNC** skt **75p BBC** interface cable **£5.50**

DECCA 80 16" COLOUR monitor. RGB Input.
Little or hardly used manufacturer's surplus enables us to offer this special converted **DECCA RGB** Colour Video TV Monitor at a super low price of only **£99.00**, a price for a colour monitor as yet unheard of!! Our own interface, safety modification and special 16" high definition PIL tube, coupled with the **DECCA** 80 series TV chassis give 80 column definition and quality found only on monitors costing **3 TIMES OUR PRICE**. The quality for the price has to be seen to be believed!! Supplied complete and ready to plug direct to a **BBC MICRO** computer or any other system with a **TTL RGB** output. Other features are: internal speaker, modular construction, auto degaussing circuit, attractive TEAK CASE, compact dimensions only 52cm W x 34 H x 24 D, 90 day guarantee. Although used, units are supplied in **EXCELLENT** condition.
ONLY £99.00 + Carriage

DECCA 80, 16" COLOUR monitor. Composite video input. Same as above model but fitted with Composite Video input and audio amp for **COMPUTER, VCR or AUDIO VISUAL use. ONLY £99.00 + Carr.**

REDIFFUSION MARK 3, 20" COLOUR monitor. Fitted with standard 75 ohm composite video input and sound amp. This large screen colour display is ideal for SCHOOLS, SHOPDS, DISCO'S, CLUBS and other AUDIO VISUAL applications. Supplied in **AS NEW** or little used condition **ONLY £145.00 + Carr.**

BUDGET RANGE EX EQUIPMENT MONOCHROME video monitors.
All units are fully cased and set for 240v standard working with composite video inputs. Units are pre tested and set up for up to 80 column use. Even when MINOR screen burns exist – normal data displays are unaffected. 30 day guarantee.
12" **KGM 320-1** B/W bandwidth input, will display up to 132 x 25 lines. **£32.95**
12" **GREEN SCREEN** version of KGM 320-1. Only **£39.95**
9" **KGM 324 GREEN SCREEN** fully cased very compact unit. Only **£49.00**
Carriage and insurance on all monitors £10.00

DC POWER SUPPLY SPECIALS

GOULD OF443 enclosed, compact switch mode supply with DC regulated outputs of +5v @ 5.5a, +12v @ 0.5a, –12v @ 0.1a and –23v @ 0.02a. Dim 18 x 11 x 6 cm. 110 or 240v input. **BRAND NEW** only **£16.95**
GOULD G6-40A 5v 40 amp switch mode supply **NEW £130.00**
AC-DC Linear PSU for **DISK** drive and **SYSTEM** applications. Constructed on a rugged ALLOY chassis to continuously supply fully regulated DC outputs of +5v @ 3 amps, –5v @ 0.6 amps and +24v @ 5 amps. Short circuit and overvoltage protected. 100 or 240v AC input. Dim 28 x 12.5 x 7 cm **NEW £49.94**
Carriage on all PSU's £3.00

KEYBOARDS

Manufacturer's BRAND NEW surplus.
DEC LA34 Uncoded keyboard with 67 quality gold plated switches on X-Y matrix – ideal micro conversions etc. **£24.95**
AMKEY MPNK-114 Superb word processor chassis keyboard on single PCB with 116 keys. Many features such as On board Micro, Single 5v rail, full ASCII coded character set with 31 function keys, numeric keypad, cursor pad and 9600 baud SERIAL TTL ASCII OUTPUT!! Less than half price
Only **£69.00** with data. Carriage on Keyboards £3.50

DON'T MISS THE CPM Deal OF the CENTURY

The FABULOUS CPM TATUNG PC2000 Professional Business System

A cancelled export order and months of negotiation enables us to offer this professional **PC, CPM** system, recently on sale at **OVER £1400**, at a **SCOOP** price just over the cost of the two internal disk drives!! Or less than the price of a dumb terminal!!

Not a toy, the **BIG BROTHER** of the **EINSTIEN** computer, the **DUAL PROCESSOR PC2000** comprises a modern stylish three piece system with ALL the necessities for the **SMALL BUSINESS, INDUSTRIAL, EDUCATIONAL** or **HOBBYIST USER**. Used with the THOUSANDS of proven, tested and available CPM software packages such as **WORDSTAR, FAST, DBASE2** etc, the **PC2000** specification, at our prices, **CANNOT BE BEATEN!!**

The central processor plinth contains the **64K, Z80A** processor, **DUAL TEAC 55F 5¼"** Double sided **40/80** track disk drives (1 Mb per drive), **PSU, 4K** of memory mapped screen RAM, disk controller, **RS232, CENTRONICS** and system expansion ports, and if that's not enough a ready to plug into **STANDARD 8" DRIVE** port for up to **FOUR 8"** disk drives, either in double density or **IBM** format. The ultra slim **92** key, detachable keyboard features 32 user definable keys, numeric keypad and text editing keys, even its own integral microprocessor which allows the main **Z80A** to devote **ALL** its time to **USER** programs, eliminating "lost character" problems found on other machines. The attractive, detachable 12" monitor combines a green, anti-glare etched screen, with full swivel and tilt movement for maximum user comfort. Supplied **BRAND NEW** with **CPM 2.2**, user manuals and full 90 day guarantee. Full data sheet and info on request.

PC2000 System with CPM Etc. COST OVER £1400
NOW only £399

PC2000 Business System with CPM and 'Ready to Run' FAST Sales and Purchase ledger, supports up to 9000 Accounts, VAT etc. COST OVER £1700
NOW only £499
Carriage & Insurance £12.00

PC2000 Wordprocessor System with CPM and TEC FP25 daisywheel printer
NOW only £799

SURPLUS SPECIALS ON PRESTEL – VIEWDATA – TELEX

PLESSEY VUTEL, ultra compact unit, slightly larger than a telephone features **A STANDARD DTMF TELEPHONE** (tone dial) with 5" CRT monitor and integral modem etc. for direct connection to **PRESTEL VIEWDATA** etc. Designed to sell to the EXECUTIVE at over £600!! Our price **BRAND NEW AND BOXED** at only **£99.00**
DECCAFAX VP1 complete Professional **PRESTEL** system in slimline desk top unit containing Modem, Numeric keypad, CPU, PSU etc. Connects direct to standard RGB colour monitor. Many other features include: Printer output, Full keyboard input, Cassette port etc. **BRAND NEW** with **DATA A FRACTION OF COST** only **£55.00**
ALPHATANTEL. Very compact unit with integral **FULL ALPHA NUMERIC** keyboard. Just add a domestic TV receiver and you have a superb PRESTEL system and via **PRESTEL** the cheapest **TELEX** service to be found!! Many features: **CENTRONICS** Printer output, Memory dialling etc. Supplied complete with data and DIY mod for **RGB** or Composite video outputs. **AS NEW** only **£125.00**
Post and packing on all PRESTEL units £8.50

EX-STOCK INTEGRATED CIRCUITS

4164 200 ns **D RAMS 9** for **£11 4116** ns £1.50 **2112** £10.00 **2114** £2.50 **2102** £2.00 **6116** £2.50 **EPROMS 2716** £4.50 **2732** £3.00 **2764** £4.95 **27128** £5.50 **6800** £2.50 **6821** £1 **68A09** £8 **6BB09** £10 **8085A** £5.50 **8086** £15 **8088** £8 **NEC765** £8 **WD2793** £28 **8202A** £22 **8251** £7 **8748** £15 **Z80A DART** £6.50 **Z80A CPU** £2.00. Thousands of IC's **EX STOCK** send SAE for list.

DISK DRIVES

Japanese 5¼" half height, 80 track double sided disk drives by **TEAC, CANON, TOSHIBA** etc.
Sold as **NEW** with 90 day guarantee **ONLY £85.00**
TEC FB-503 Double sided HH 40 TRK **NEW £75.00**
SUGART SA400 SS FH 35 TRK **£55.00**
SIEMENS FDD100 SS FH 40 TRK **£65.00**
carriage on 5¼" drives £5.50
Brand **NEW** metal 5¼" **DISK CASES** with internal PSU.
DSKC 1 for 2 HH or 1 FH drive **£29.95** +pp £4.00
DSKC 2 for 1 HH drive **£22.95** +pp £3.50
DKSC 3 As DSK1 LESS PSU **£12.95** +pp £2.50
DSKC 4 As DSK2 LESS PSU **£10.95** +pp £2.00
8" **IBM** format **TESTED EX EQUIPMENT.**
SHUGART 800/801 SS **£175.00** +pp £8.50
SHUGART 851 DS **£250.00** +pp £8.50
TWIN **SHUGART 851's** 2 Mb total capacity in smart case, complete with PSU etc. **£595.00**
MITSUBISHI M2894-63 8" DS 1 Mb equiv. to **SHUGART SA850R. BRAND NEW at £275.00** +pp £8.50
DYSAN 8" Alignment disk **£29.00** + pp £1.00
Various disk drive PSU's **Ex Stock SEE PSU section.**
HARD DISK DRIVES
DRE/DIABLO Series 30 2.5 Mb front load **£525.00**
Exchangeable version **£295.00, ME3029 PSU £95.00**
DIABLO 44/DRE4000A, B 5+5 Mb from **£750.00.**
CDC HAWK 5+5 Mb£795.00. CDC 9762 80 Mb RMO3 etc. **£2500.00.**
PERTEC D3422 5+5 Mb £495.00
RODIME 5¼" Winchesters ex-stock from **£150** CALL
Clearance Items– Sold as seen– No guarantee.
ICL 2314 BRAND NEW 14" Mb Removable pack hard disk drive, cost over **£2000** with data **ONLY £99.00**
BASF 6172 8" 23 Mb Winchesters **£199.00**
Unless stated all drives are refurbished with 90 day guarantee. Many other drives and spares in stock – call sales office for details.

MODEMS

Join the communications revolution with our super range of **DATA MODEMS**, prices and specifications to suit all applications and budgets.....
BRAND NEW State of the art products.
DACOM DSL2123 Multi standard 300-300, 1200-75 Auto answer etc. **£268.00**
DACOM DSL2123AQ Auto dial, smart modem with multi standard AUTO SPEED detect, and data buffer with flow control etc. **£365.00**
DACOM DSL2123GT The CREAM of the intelligent modems, auto dial, auto call, index, buffer etc. etc. **£498.00**
Steebeck SB1212 V22 1200 baud **FULL DUPLEX**, sync or async, optional auto dial **£465.00**
TRANSDATA 307A Acoustic coupler 300 baud full duplex, originate only, RS232 interface **£49.00**

Ex **BRITISH TELECOM** full spec, CCITT, ruggedised, bargain offers. Sold **TESTED** with data. Will work on any MICRO or system with RS232 interface.
MODEM 13A 300 baud unit, only 2" high fits under phone. CALL mode only **£45.00**
MODEM 20-1. 75-1200 baud. Compact unit for use as subscriber end to **PRESTEL, TELECOM GOLD, MICRONET** etc. **£39.95** +pp £6.50
MODEM 20-2 1200-75 baud. Same as 20-1 but for computer end **£65.00** +pp £6.50
DATEL 2412. Made by SE Labs for BT this two part unit is for synchronous data links at 1200 or 2400 baud using **2780/3780** protocol etc. Many features include 2 or 4 wire working, self test, auto answer etc. **COST OVER £800.** Our price **ONLY £199** +pp £8.00
DATEL 4800, RACAL MPS4800 baud modem. EX BT good working order, **ONLY £295.00** +pp £8.00

SPECIAL OFFER
MODEM TG2393. Ex BT, up to 1200 baud, full duplex 4 wire or half duplex over 2 wire line. **ONLY £85.00 PER PAIR** +pp £10.00

For more information contact our **Sales Office.**

MATRIX PRINTERS

SPECIAL BULK PURCHASE of these compact, high speed matrix printers. Built in Japan for the Hazeltine Corporation this unit features quality construction giving 100cps bidirectional, full pin addressable graphics, 6 type fonts, up to 9.5" single sheet or tractor paper handling, RS232 and CENTRONICS parallel interface. Many other features **BRAND NEW** and **BOXED**. COST £420. **Our price Only £199.00**

RECHARGEABLE BATTERIES

Dry Fit MAINTENANCE FREE by Sonnenschein & Yuasa.
A300 07191315 12v 3Ah NEW **£13.95**
A300 07191312 6v 3Ah NEW **£9.95**
A300 07191202 6-0-6v 1 8Ah TESTED Ex Equip **£5.99**

VDU TERMINALS

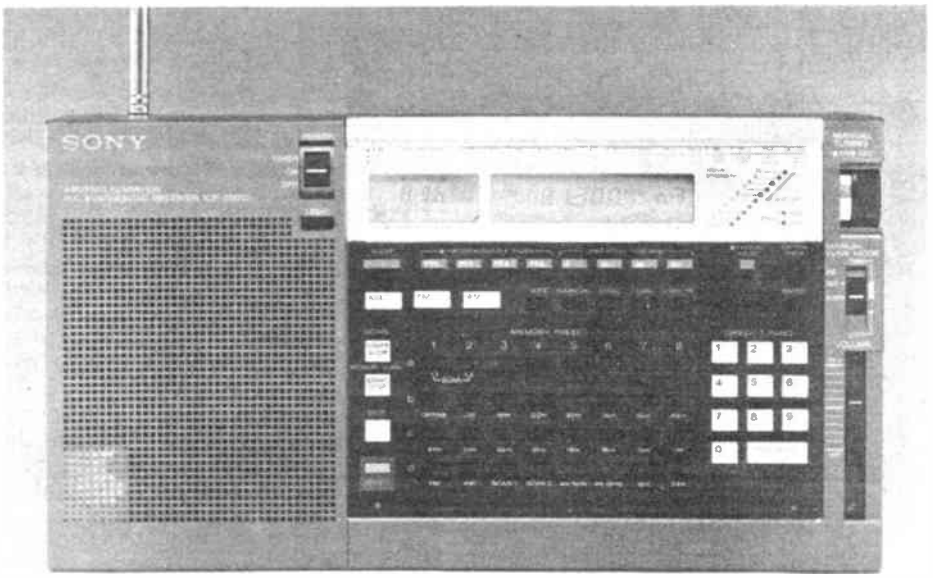
Standard VDU data entry terminals at give away prices!!
QUME QVT108. Current product, state of the art terminal with detachable keyboard, 12" Green screen, 2 page **RAM**, TVI 925, Hazeltine, **ADMSA** emulations, software setup, 25 x 80, Clock, Swivel and tilt base, Printer port, Function keys etc. **BRAND NEW** and **BOXED AT ALMOST HALF PRICE** Only **£425.00**
AJ510 – EX RENTAL, Z80 controlled, 15" green screen 24 x 80 display, graphics, cursor addressing, printer port etc. Very good condition **TESTED** complete with manual only **£225.00**
ADDS 520 – Dumb terminal, used, 12" b/w screen RS232 interface and printer port. **TESTED. ONLY £125.00.** Carriage on terminals £10.00
100's of other terminals in stock. CALL for more details.

DISPLAY ELECTRONICS

All prices quoted are for U.K. Mainland, paid cash with order in Pounds Sterling PLUS VAT. Minimum order value **£2.00**. Minimum Credit Card order **£10.00**. Minimum BONAFIDE account orders from Government Depts., Schools, Universities and established companies **£20.00**. Where post and packing not indicated please ADD £1.00 + VAT. Warehouse open Mon-Fri 9.30-5.30. Sat 10.30-5.30. We reserve the right to change prices and specifications without notice. Trade, Bulk and Export

32 Biggin Way, Upper Norwood, London SE19 3XF
Telephone 01-679 4414 Telex 894502 Data 01-679 1888

ANGUS McKENZIE TESTS



SONY ICF2001D

A useful tranny portable to take on holiday

Both radio amateurs and hi-fi enthusiasts have frequently asked me to recommend a transistor radio with a good short wave receiving capability which must include a BFO or SSB product detector. FM on Band II was also a requisite, and the wireless should not be too large. I have looked at dozens of candidates over the last few years, and have rejected every one of them for one reason or another, some having bad synthesizer noise whilst others had wobbly BFOs! Most of them had intolerable image response and spurious reception problems.

Previous model

The previous model to the one under review was rejected because of poor tuning ergonomics, amongst other things, and the advice I had to give in the past was that I could not recommend anything, but that you might find one of the less expensive Sonys useful if you were prepared to abandon the reception of SSB.

It has always seemed to me that sets having several bandspread bands were a lot easier to use than ones with unnecessary general coverage, one of the main points being that the majority of the sets that I have played with had appalling backlash, making tuning extremely awkward unless the required broadcast band was spread right out across the dial.

My attention was drawn to the Sony ICF2001D as the result of a friend, Roddy G3CDK, asking me to try and find something for him to take abroad. He had already tried a Philips set and his existing Sony with bandspread had not only developed a fault, but omitted a BFO anyway. I asked Sony if they could send me the ICF2001D, so that I could briefly review it to see if it was good enough for radio amateurs to use for SSB reception when on holiday. I found the set to have many unique features, and offers a lot more than its immediate predecessor.

Facilities and the front panel

The set tunes from 150kHz to 29.9999MHz in 100Hz or 1kHz steps on AM (wide or narrow filter) and SSB/CW. The SSB filter has about 3kHz bandwidth, which is much more useful than an AM broadcast reception filter used for SSB on so many of the other models. Particularly fascinating is the provision of synchronous AM detection, which can switch between upper or lower sidebands, the inserted carrier locking on to the frequency of the original one.

Synchronous detection allows an enhanced carrier level, so that even when selective fading is taking place there should never be any over modulation present. Wideband FM is included with a surprisingly wide frequency coverage, from 76 to 108MHz in 50kHz steps. In fact, this coverage is to allow for the inclusion of the Japanese FM Band II, which is mainly below our Band II.

Finally, there is an AM air band from 116 to 136MHz in 25kHz steps. Direct frequency entry is possible using a 0 to 9 and execute keypad. You have first to select 'Air', 'FM' or 'AM' for the appropriate range, and then enter the required frequency and 'execute.' A series of mode buttons for the AM band can select very wide or average AM filters for use with a normal AM detector, or with the synchronous one, whilst separate buttons are provided for lower and upper sideband, the SSB filter being set at the appropriate offset.

Thirty-two direct access memories are provided, which can memorise frequency and mode, including the chosen filter, and I programmed in a vast array of frequencies which could be accessed at a single touch after switch on. This is one of the most convenient functions of the radio, but a lot more is included.

You can either tune with your thumb on the side of a fat tuning wheel, or on the end of it; this part has a finger hole, the end being countersunk into the right side cheek. There is no backlash on this control, which runs beautifully smoothly, and just below it is a three position switch giving 1kHz and 100Hz steps with a lock position to stop you accidentally losing a required frequency. A shift key is provided, allowing the memory keys to have second functions such as the selection of LW, MW and any of the well known SW broadcast bands, including 120, 90, 75, 60, 49, 41, 31, 25, 21, 19, 16, 13, 11, FM or Air. When you select any of these, the internal microprocessor selects the bottom frequency on the chosen band.

Search facility

A general search facility is provided to scan a complete band, or you can define the frequencies over which the set scans. You can switch the scan to stop on the next station found, or to stop on stations for just 1.5 seconds, after which scanning continues. The defined scan function is very useful since, for example, you can leave it churning away from 88 to 108MHz in a holiday location and it will show you what stations can be picked up. At any time you can stop the scanning on an interesting station.

There is also a timer mode which can switch the set onto a required station at up to four separate times during each day. The set can be programmed to turn off again after 15, 30 or 60 minutes. There is a built in digital clock and also a sleep facility which allows you to attempt to go to sleep while the radio is playing, with the knowledge that it will turn off after 15 minutes etc.

There is a light switch which turns on a very poor illumination for 15 seconds, but if any control is touched, it turns off 15 seconds after the last touch, in order to save the batteries. The degree of illumination has to be strongly criticised, for it was only just possible to read frequency, etc, in the dark, and during the day we thought the light was not working at all.

Audio gain control

The main audio gain control is quite a reasonable up/down slider, and there is a battery check button which gives a fairly good battery indication. The digital frequency display gives the tuned frequency, together with the obvious status functions. Although this display is fairly easy to read, you do have to get on a level with it, which can be a problem when using the set in the upright position.

On the top of the set a large whip antenna is mounted, with six long telescopic sections. The whip is very well made and is quite robust, staying put in any required direction, but folding over across the top of the set into a clip for storage. On the left side cheek is an external power socket requiring 4.5V dc, either from a mains adaptor which is supplied, or from a car battery lead which is an accessory. 3.5mm jacks are provided for a tape recorder feed or external headphones, a stereo walkman type set being presented with mono sound on both ear pieces. Note that the headphone socket has a resistor in series with it so that it will not drive an external loudspeaker.

Also on this panel is an overall mains on/off switch and an antenna attenuator switch. Miniature jacks are provided to connect external short wave or FM antennas, and the set worked well with these. On the right cheek is a slider RF gain control and a tone switch with three positions: full response, HF cut and both HF and LF cut, which is particularly suitable for SSB and CW reception.

On the back panel is a World time zone map and there is also a pull out plastic tray onto which you can stick labels, which are provided, carrying your memorised frequencies information. A fabric carrying strap is provided, which is detachable. The rig takes two R6 type AA batteries for keeping the memories and clock going, and three 1.5V R20 type D batteries which provide around 45 hours average use. The set weighs approximately 1.7kg with batteries and measures 288 x 159 x 52mm.

Front-end antenna circuit

The ferrite rod antenna feeds into its own RF amplifier, which then feeds a second RF stage to the first mixer, having an IF output at 55.845MHz. The whip antenna is used for short wave, FM and air band; short wave signals being taken to the second RF stage input. The external antenna jack is immediately prior to the second RF amplifier, and thus an external antenna connection disconnects both the internal whip and the output of the ferrite rod amplifier.

On FM the whip's signal can again be disconnected by inserting an external antenna into a separate socket. The FM signal then proceeds via a separate RF mixer and IF to its discriminator; the 55MHz IF strip not being used for this. The air band signals yet again have their own RF stage and the amplified signals then feed directly into the first AM mixer with the same 55MHz IF strip. The RF gain control acts on the front-end of the 55MHz IF stages, but a brief perusal of the extremely complex circuit diagram infers that some of the AGC passes back for the AM bands to the second RF stage.

The local/DX switch seems to be a passive attenuator acting between the output of the second RF stage and the input to the first mixer. The ferrite rod amplifier seems to be very broadly tuned, and it is perhaps a pity that Sony could not have developed a high Q tuning circuit here, using special circuit techniques.

Subjective tests

On the long and medium wave bands the stronger AM stations were received with excellent quality, provided I switched in the wide AM filter. It was usually necessary to switch in the antenna attenuator on the MW broadcast bands, particularly if I was near one of the very strongest stations. The RF gain control was also useful here, allowing the best compromise.

An internal ferrite rod antenna provides the pick up on these bands, but for the short wave bands you pull out the long whip which I found worked best vertically. On the LF bands I usually found that switching in the attenuator gave an improved RFIM performance, but again in some cases I also had to use RF gain.

The broadcast short wave bands were all received well, and it was most useful to be able to use the wide AM filter for a much wider response if there was no interference adjacent to the station. The narrower filter, however, was not too narrow, and yet almost completely rejected any whistles.

On some of the bands I noted the usual selective fading problem, but selecting the synchronous detection mode, and 100Hz steps, enabled distortion to be greatly reduced with a far improved subjective listening quality. By rocking the steps around one seemed to be able to cause the set to select sidebands, and matters were further helped by appropriate use of the tone control switch. I was very surprised to see how sensitive the set was on its whip at HF compared with some of the other sets I have tried, although it is not as sensitive, of course, as most communication receivers.

Pleasant surprise

A pleasant surprise was the reasonably adequate reception of SSB signals on all bands including 1.8MHz, despite the presence of strong medium wave local signals. I could tune into my favourite nets and hear them coming over quite well, although I have to admit that, here and there, there were more RFIM problems from very strong signals than on a dedicated receiver such as the Yaesu FRG8800 which costs a lot more.

The frequency calibration was extremely accurate and within 100Hz, and the stability was superb, CW signals reproducing very cleanly indeed and without any noticeable drift. The set picked up the 10m beacon GB3RAL quite well on its whip when it was resting on my bedside table, although it was rather weak. On 14MHz during the day I was able to receive DX stations, which were up to 5000 miles away, quite strongly despite conditions being fairly poor at the time of the tests.

I was not troubled by image problems, and this is clearly due to the choice of 55.845MHz as the first IF, mixing down to

455kHz for the second one. The SSB filter however, whilst having reasonably steep skirts down to around −50dB, does open out a bit at the bottom so that strong CW or RTTY signals on the LF bands do hold down the RF gain by affecting the AGC line if you are trying to receive a weak station.

The general ergonomics were superb, and I particularly liked the tuning wheel, which is a great improvement over the predecessor's dreadful up/down tuning buttons.

Improvements and changes

You may be familiar with the previous model, and so it might be useful to detail some more of the improvements and changes. The ICF2001D now includes the synchronous detector, and has a fully programmable timer. This timer allows different stations to be programmed in for the four selected time periods.

Sony claim an extended battery life of 45 hours by employing circuitry which has a considerably lower current drain. The set now employs two built in microprocessors, and the ROM incorporates 4K of 8-bit memory, whilst the RAM has a memory of 244 4-bit memories.

The circuitry now includes a dual circuit loop PLL synthesizer with greatly reduced noise. The tuning can be very fast, which is another good advance.

Conclusions

Unfortunately I have only had time to test this radio subjectively, as it arrived very late for review, but I am quite satisfied that it probably respresents the best portable radio that one can get at a reasonable cost at the moment, as it is so far superior to everything that I have tried at a similar or lower cost.

The radio is rather thin, and it can be knocked over if you try to stand it upright. The built in 4 inch loudspeaker is rather small, and unfortunately LF is rather lacking on music because of this, so you may like another radio around in the house for FM. I have yet to find a modern replacement which is a good as my old Tandberg radio for this!

The ICF2001D is not in the communication receiver class, and would not really be suitable for use in a transmitting station. I have included it though as it is an ideal one to take on holiday and to use around the house. The inclusion of the FM and air bands is a most useful bonus which helps justify its cost, and bearing all this in mind it could be a very good receiver to encourage someone to take up amateur radio as a hobby. It is also a good starter for a short wave listener.

Basic manual

The instruction manual is very basic and contains only the minimum of technical information, unfortunately, but along with it comes a superb 120 page booklet called *Wave Handbook*, including the broadcasting times and frequencies of the majority of broadcasting stations around the World, and details of the languages used. An *Aviation Guide* leaflet is also included with details of some of the special language used by pilots and air traffic control. Also included in the package is a lugplug of the usual fairly poor quality, a carrying strap and a long wire antenna. The wireless costs typically around £300 including VAT.

YAESU FT757GX

An old friend revisited

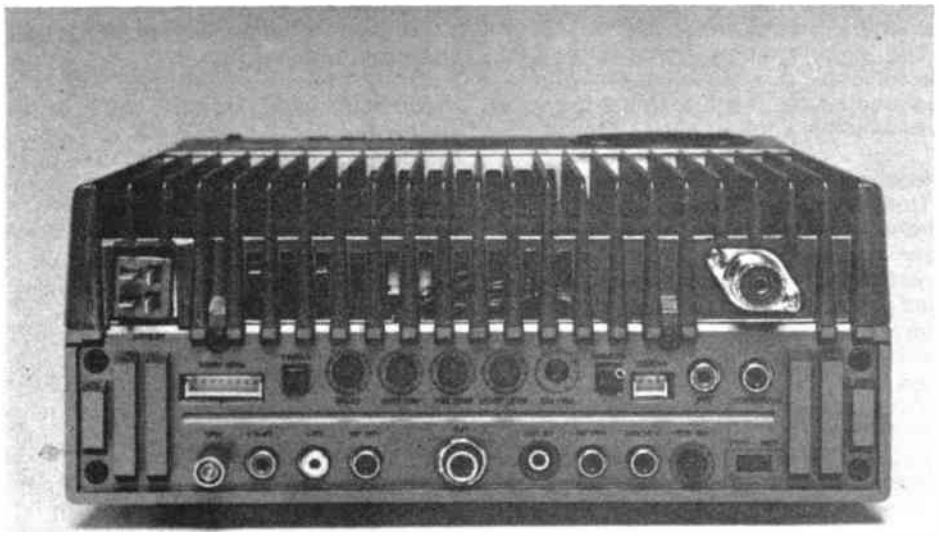
It is perhaps a little surprising that after issuing new HF rigs at the rate of at least one a year for over a decade, Yaesu have not announced any new mobile HF transceivers for two and a half years, and the FT757 has now been available for well over two years. There are rumours about a new Yaesu main station HF transceiver, but its introduction seems to be about six months late, as it was first rumoured over a year ago for release at the beginning of last winter. At the time of its original introduction, the FT757's main competition was the Trio TS430S, and the earlier Icom IC720, 730 and 740 models.

Microprocessor controlled

Unlike earlier Yaesu mobile transceivers, the FT757 is completely microprocessor operated and fully synthesized. This allows many additional functions, including general coverage on receive from 500kHz to 30MHz, eight memories (holding frequency only though), two VFOs, which could be split between Tx and Rx if required and comprehensive VFO to memory and memory to VFO facilities. Continuously tunable RIT is a useful feature, allowing you to split between Tx and Rx without using the second VFO. The rig is capable of delivering 100W peak output on CW, SSB and FM, although in the latter mode you are recommended to hold the power down to around 50W with the switched mode power supply in use. The FP757HD PSU does however allow for a higher duty cycle. The receiver includes narrow and wide CW filters and a proper AM filter, which allows a reasonable AM quality to be received. Too many older rigs used the SSB filter for AM, which was understandably almost useless!

The VFO tunes on SSB/CW in 100Hz increments at a tuning rate of 10kHz per revolution, but it has one serious snag: the single tuning rate means that you have to turn it round 25 times to QSY just 250kHz. This is extremely laborious and it would have been more useful if a 100kHz per rev tuning rate selectable alternative had been provided. In normal use the up and down band controls select the next 500kHz wide amateur band, ie, allowing you to step up the bands, with the whole of the 28MHz band covered in four sections. However, if you press the 500kHz button, the rig transfers to the general coverage mode and the up and down buttons then step the rig in 500kHz jumps, allowing you to select any frequency, including the broadcast bands etc.

The front panel is covered with buttons, switches and controls. The meter can be switched to read ALC level or power out on Tx, and is an S-meter on receive. The Rx pre-amp can be switched in or out, and there is an additional 20dB antenna attenuator which can be switched in when required, which is very necessary on the LF bands. A speech



processor can be switched in and out on Tx, while a switchable noise blanker is available for Rx.

Although there is a switch for fast or slow AGC, the AGC cannot be switched off, which is a disadvantage, although there is an RF gain control mounted concentrically with the audio gain. A MOX Tx/Rx switch which duplicates a PTT facility on the mic and Tx control on the rear sockets is useful. VOX control can be switched in and the rig includes VOX sensitivity, anti-VOX and hold time. There is a rotary mode switch which selects CW, SSB, AM or FM.

Split concentrics are provided for passband tuning combined with variable selectivity, squelch and noise blanker levels (squelch works on all modes), and Tx mic gain combined with power output drive level. There is one quirk to the microphone gain: it operates on SSB only, the gain being fixed on FM, which is a nuisance.

Programmable search

There is a programmable search facility which searches from a chosen memorised frequency to the one in the next higher numbered channel. One useful function is the rig's ability to be switched from VFO to memory, tune away from the memory frequency and then return to the main VFO setting. One often wants to use this type of function to keep a watch on a DX net on another portion of the band whilst in the middle of a QSO.

The front panel has an eight pin DIN socket for the microphone, but no mic is actually supplied with the rig. Two options were suggested to me, however: the MH1B8 hand-held includes PTT and fast and slow up/down stepping buttons, and a table stand mic type MD1B8 with similar facilities, but including Tx lock-on and a two position audio response switch. A quarter inch jack socket gives headphone interconnection.

The front panel digital display is in 100Hz increments, and several status indications are also given. On the top of the rig is a large heatsink, including air ducts and a cooling fan, which is thermostatically controlled and very quiet in operation. The internal loudspeaker is positioned at the top of the front panel, and faces upwards. By its side are additional controls for selecting full or semi-break in keying for CW, manual or auto keying and keying speed (a slider providing the adjustment).

Rear panel

The rear panel is covered with sockets and additional facilities. The main antenna connection is on an SO239 socket, and a four pin 13V dc power socket is provided with the appropriate plug. A switch on the rear panel selects normal or break-in linear operation, the latter being used with an appropriate external linear amplifier. A small push-button on the back panel brings in a 25kHz marker, which can be used for calibration purposes. It does seem a little odd, though, that this could not have been on the front panel where it would have been particularly useful for blind or partially sighted amateurs.

There are also many pre-sets providing adjustment of VOX parameters, Tx compression level and AM inserted carrier level, which allows you to reduce the carrier so that you can achieve appropriate AM modulation within the capability of the linear power amplifier stage. The latter is recessed, requiring screwdriver adjustment. The front panel meter can also be switched with a mini switch on the rear panel to read SWR, a pre-set adjusting the sensitivity of the SWR metering. Whilst the pre-set is correctly on the back, surely the switch for enabling SWR reading should have been on the front panel.

There are a number of phono jacks on the back panel which provide for the following functions: external PTT, phone patch input to Tx (this can be used for inputting RTTY/Amtor etc), external ALC input (AF output coming from before the receive gain control at an approximate peak level of 200mV for feeding a tape recorder, Amtor terminal or other data equipment), low power transverter drive (approximately 100mV which is satisfactory for driving muTek transverters, for example), and two dc sources (8V at 100mA and 12V at 500mA). A stereo jack socket is provided for interconnection with either a conventional Morse key or a paddle, which can be used with the internal auto keyer. An external loudspeaker can be plugged into a 3.5mm jack socket.

Accessory ATU

The accessory Yaesu 757AT automatic antenna tuning unit has an interconnection socket provided on the back of the transceiver which gives dc for the ATU circuits, and band data signals so that the ATU changes band automatically when bands are changed on the main transceiver. This ATU worked very well, although it was rather slower than the Icom AT500 and could take the output of a linear.

A three pin computer data socket is provided for use with an optional accessory interface, FIF232C, which allows computer operation of many of the transceiver's functions, including frequency and memory selection, for example.

There are two optional PSUs available, which are designed to work with the FT757. The FP757 is a switched mode power supply and is fairly small. It can only accommodate a 50% duty cycle and is therefore not suitable for running high power FM. RTTY or data transmissions would also require you to reduce data output power with this PSU. The FP757HD is a more conventional, larger power supply, which allows for a 100% duty cycle to be transmitted, and the rig is capable of this for up to 30 minutes, with care. This PSU also has an extension speaker and a cooling fan.

The rig is well presented, with a carrying handle on the right, and a bail stand underneath the front can lift the front up if required. The tuning knob tension can be varied by adjusting a pre-set screw underneath the tuning mechanism. Since the rig was first introduced the mechanics of the tuning assembly have been improved for better reliability, as a result of some user complaints in the early days. The rig weighs 5.5kg and measures 238 × 93 × 238mm. A mobile mount is available as an accessory.

Subjective tests

I first tested this rig in early 1984 and, although I enjoyed using it, there were a number of points that I was rather dissatisfied with. I used it on 10m FM, and also with a transverter up to 2m,and I found that the received bandwidth of the FM filter was much too wide, making weak FM signals difficult to copy. Channel separation on this band is 10kHz, but the filter is not really suitable

for separations of less than 20kHz if you want to receive a fairly weak station when there is a much stronger one on the next channel up or down.

The setting of the Tx deviation on FM was also too high and 10kHz channelling requires an absolute maximum of around 2.5kHz, with audio extending to 3kHz modulation followed by an extremely steep cut off. The first roofing filter on the receiver was also too wide, so that on the LF bands on SSB or CW very strong off-channel stations tended to cause blocking. This effect was exaggerated by what was obviously a poor reciprocal mixing performance, as the synthesizer noise extended quite a way out from the local oscillator carrier.

Reception problems

By the time I looked at the rig again in late 1985, when a friend had brought one round for me to check, I confirmed my previous opinion that many amateurs are likely to get trouble when receiving the 1.8MHz band if they are anywhere near local and BBC network medium wave transmitters. The FT757 does not seem to have a steep high-pass filter coming in below 1.8MHz, and strong medium wave signals around 1.5MHz, for example, can cause overloading of the front-end. Even switching out the RF pre-amp and switching in the antenna attenuator is insufficient to cope with the problem at my QTH, and many purchasers of the rig have had exactly the same problem. It is therefore essential for many users to make up an external high-pass filter, with its knee just below 1.8MHz, or to use an ATU, such as the SPC300, marketed by Capco, which has an extremely steep high-pass filter action inherently in the design of the circuit.

If you want to use the rig to drive a transverter, matters are just slightly awkward. The transverter drive socket is live on Tx only and gives enough level for most modern transverters, but is insufficient for some earlier models. The return from the transverter feeds into the SO239 main antenna socket, so you can imagine what happens if you inadvertently go to transmit without the PA disabled!

Terrible shame

One amateur, north of Watford, did just this to his brand new muTek transverter and blew out his entire output section, which was a terrible shame. The 4-pin dc socket requires two of the pins to be open circuit to shut down the PA. This then makes the rig safe, but it is so easy to forget this if you are frequently changing from HF to VHF. It is probably a good idea to have a coaxial relay in the antenna circuit to select HF, or a transverter connection, with the relay operated by a multi-pole switch to change over all the connections and energise the relay and the transverter from an external 13V source. Thus the PA will only be on when you have switched to HF.

You will have to remember that the switch pole which passes the current back to the PA will have to carry a very appreciable current, thus requiring a very meaty switch. The best and most suitable transverter for use with the FT757 is the new muTek 2m model which has an ALC output that can be interconnected with the ALC socket on the rig's rear panel. This makes it impossible to overdrive the transverter drive stage in the 757 by applying ALC to the IF strip in the absence of a PA ALC.

Control layout

The actual layout of the controls on the FT757 is good, and all the functions worked as they should. However, I found the absence of a higher tuning rate to be most annoying, especially on 20m where I like to QSY up and down the band quite frequently.

The transmitted and received audio quality was appreciated, and the FM quality particularly good, even if the deviation is rather too high. I did not note any particular audio problems with the mic input stage, but I do not like the sound quality of the Yaesu microphones, so I tried a Heil microphone, which was much more punchy for DX and has improved intelligibility, helping the signal to cut through the QRM in a fairly spectacular way. These microphones are available from Amcomm/ARE Ltd.

The Tx audio processor worked very well and helped intelligibility further. The transmitted audio response was ideal.

The received quality on AM was quite good throughout, although distortion at peak modulation seemed a little higher than I would have liked. The slow AGC speed was just as I like it for SSB, but if you are in a net with signals of greatly varying strength, you may need to switch AGC to 'fast' in order to hear quick break-ins by weak stations.

The fast speed was ideal for CW, and at least it is good to have the choice as well as an RF gain control, although unfortunately you can not switch the AGC off.

The received response on FM was well controlled and most certainly not muffled, a failing of some other rigs. However, some transmitters are inclined to be far too toppy on Tx and, as there is no tone control on the FT757, you may find some transmissions much too edgy. The SSB received response was excellent, being controlled primarily by the position and shape of the main SSB filter. Only one birdie might be annoying on the amateur bands, for it seemed to be fairly marked at 28.822MHz.

I hope readers will understand, however, that I baulked at tuning all the way from 500kHz to 30MHz looking for birdies on other than amateur bands, for I would have had to turn the tuning knob just under 3000 revolutions! Since the finger hole has a higher than average friction quotient, I would have ended up with a burnt finger tip!

Ergonomics were generally good, but the absence of a centre indent on the passband tuning was a little annoying. Although the programming facilities worked well, searching was painfully slow, and so it was only appropriate for SSB. The Tx power control varied the output power from below 1W up to 100W, which is extremely useful. The frequency readout in 100Hz steps with the basic status information was much appreciated. The VOX controls worked very well and I liked all the keying facilities.

Laboratory tests

The receiver sensitivity was excellent on all bands up to 21MHz, but the 28MHz band performance was only just adequate. However, it has to be said that the sensitivity on the LF bands was needlessly good, and you would certainly not need to use the RF pre-amp below 14MHz. The RF attenuator gave around 18dB attenuation at 1.9MHz and the FM sensitivity on 10m was rather poor, partly

due to the overwide FM filter. The reciprocal mixing performance was not at all good near the carrier, and because of this the measurements of the SSB selectivity were only appropriate down to around −60dB, below which reciprocal mixing effects took their toll. The CW 600Hz filter had quite a good shape, but the FM filter was far too wide and was more appropriate to 25kHz channelling than to 10kHz.

The front-end intermodulation performance measured well for carriers far out, but once one of them was anywhere near the passband of the first roofing filter, the effective input intercept point started collapsing, becoming very poor for close in separations. Since AGC is only applied by the signal passing through the final IF filter, strong off channel signals cause distortion at the second mixer, giving a blocking effect that I have previously commented on with such rigs as the IC745.

Yaesu FT757GX Laboratory Results

Transmitter results

Maximum output power: CW	
1.81MHz	114W
3.75MHz	107W
10.1MHz	110W
21.3MHz	115W
29.6MHz	110W
FM peak deviation	6.5kHz
Transmitter carrier accuracy: FM	+1kHz
SSB	within 100Hz

SSB peak signal to carrier and background noise breakthrough: better than 50dB

Worst RF harmonics: below −50dB on 10MHz band, other bands below −60dB

Worst spurii: 24MHz band ±2.5MHz at approximately −45dB

Receiver results

Sensitivity: SSB for 12dB sinad	
1.95MHz	−122.5dBm
3.65MHz	−122.5dBm
7.05MHz	−123.5dBm
14.05MHz	−122dBm
21.25MHz	−121dBm
28.4MHz	−122dBm
Sensitivity: FM (4kHz deviation)	
29.6MHz	−116dBm
Calculated intercept point: S5 method	
+5/+10kHz spacing	−32dBm
+10/+20kHz	−28dBm
+20/+40kHz	+5dBm
+100/+200kHz	+10.5dBm
Selectivity: SSB bandwidth for given level drop	
3dB	2.2kHz
6dB	2.5kHz
40dB	3.3kHz
60dB	3.6kHz
80dB	11.6kHz
Selectivity: FM off-channel blank carriers	
±12.5kHz spacing	30/62dB
±25kHz	58.5/66dB
Reciprocal mixing: SSB	
+20kHz offset	88dB
+50kHz	101dB
+100kHz	110dB

S-Meter	FM	SSB
S1	−102dBm	−101dBm
S9	−66dBm	−65dBm
S9+20	−56dBm	−55dBm
S9+40	−40dBm	−38dBm
S9+60	−22dBm	−21dBm

SSB product detector distortion	0.6%
FM audio distortion	
2kHz deviation	2.7%
4kHz deviation	5.2%
FM quieting	13.4dB at 12dB sinad point
Maximum audio output power	8 ohms 2.7W (10% THD)

Size 238 ×93 ×238mm, weight 5.5kg

Unfortunately, the incorporation of the FM facility therefore contributes to blocking problems on SSB and CW, and this does reinforce the importance of having a much narrower first IF roofing filter. Thus, the effective input intercept point is +10dBm for wide spacings, reducing to +5dBm for 20/40kHz spacing, very poor at −28dBm for 10/20kHz spacing, and just marginally poorer still at −32dBm for 5/10kHz. The closer in figures are approximate, because of the difficulty of measurement due to the poor reciprocal mixing performance, but they do seem better than those on the IC745. Unfortunately I did not measure RM closer in than 20kHz spacing on both occasions that I looked at the rig, but the noise was coming up very rapidly closer in than 20kHz.

S-meter

The S-meter worked very well, as there was 35dB difference between S1 and S9, the latter being at around 100μV, which is perhaps rather pessimistic. This makes S1 1.8μV, which is again insensitive, and AGC charts did show a slight lack of IF gain which explains the S1 reading. The S-meter gave very similar readings on FM and SSB, which is good, for too many S-meters are hopeless on FM. Another sample gave S5 at 3.5μV, and did have slightly more gain. The RF pre-amp had about 10dB gain, and since the sensitivity was 10dB worse with the pre-amp switched out, quite clearly all the noise was being produced by the mixer and IF stages.

Audio distortion of the product detector and audio amplifiers was very low on SSB and CW, and adequate audio power was available. However, FM distortion was unfortunately fairly high. The squelch range was quite wide; the lowest level that could be set to open up being 0.2μV. The received and transmitted frequency accuracies were quite good, and if you need to you can improve accuracy with an internal adjustment.

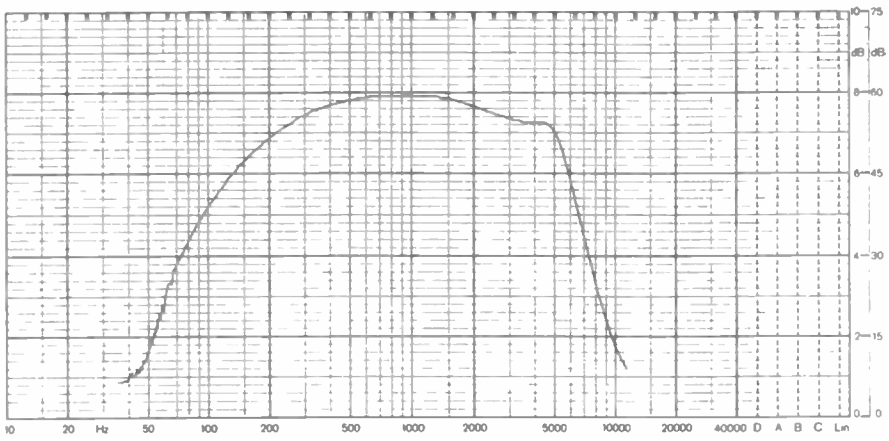
Transmitted power

The transmitted maximum powers were generally around 110W into a 50 ohm dummy load, but could be reduced down to as low as 0.3W by reducing the power control to minimum. The maximum FM deviation was 6.5kHz, which is far too high for use on 10m and should be adjusted right down internally. Residual carrier breakthrough and noise were below −50dB ref full output, and this is very good.

The transmitted SSB response showed the filter to be set at about the right distance from the carrier, but the FM TX response was clearly not appropriate for 10kHz channelling. When we checked it into the Marconi 2305 deviation meter, with 750μS de-emphasis, the response was only 5dB down at 5kHz, whereas it should have attenuated far more rapidly above 3kHz. The extended HF response clearly contributes to marked spreading, and this result ties in with typical FT757s on 10m FM that I have heard. The bass

end was just about right though, with LF rolling off below 300Hz. No frequency drift problems were noted during testing.

RF harmonics were generally below −60dB, but on 10MHz we noted the harmonics to be just below −50dB, which is good enough. On the 24MHz band we noted two sprogs at ±2.5MHz approximately, at a level of around −45dB, and I could not find any reason for this, so perhaps it was a sample fault. Brief two-tone tests showed the intermodulation performance of the PA to be quite satisfactory, and spreading tests on air showed the rig to be completely acceptable, no adverse comments about spreading being made by any stations who were asked to comment.



Transmitted FM response with 750μS de emphasis applied

Conclusions

When I initially reviewed this product, quite a time ago, I was impressed with it despite the niggles mentioned here. When it was first released it represented good value for money, its main competitor being the Trio TS430S, which at the time was more expensive, even without its various options. The situation now though, is very different, for the Trio TS430S with FM, extra filters and mic is about the same cost as the 757, now nearly £880 including VAT. Unfortunately, the Japanese Yen is now so very strong that we are all feeling the pinch!

Since these two rigs were introduced, the Icom 735 was released, which I reviewed fully in the September issue of *Amateur Radio* last year. This rig is about the same price, but its receiver performance is far superior, and I have to recommend the Icom rather than the Yaesu FT757 or TS430S. If you can obtain a secondhand Yaesu for a good price, however, you may well be quite satisfied with it, but it has to be said that it is not the rig for a DX operator who pays a lot of attention to ultimate receiver performance; he will find the Icom rig a lot better.

Just at the time of writing this review, I was informed that the new Trio TS440S is winging its way down to me from Matlock, and rather than buy any of the previous rigs mentioned, you might consider waiting until next month to see what I think of the new TS440, which I understand has a very similar Rx circuitry to the superb TS940S, whilst omitting some of the latter's facilities.

Sadly, it would seem that the Yaesu FT757GX has been overtaken by modern developments, so I don't think it is particularly good value for money now, and as there are a lot of them around and they are often seen advertised secondhand, you would be well advised to weigh up the secondhand price against a new Icom 735 or Trio TS440.

Many thanks to Amcomm/ARE Ltd for the loan of the rig for photography purposes, from whom further information on the FT757GX can be obtained.

FT757GX IMPROVED TUNING MODIFICATION

Following a visit to the workshop QTH of R Withers Communications near Birmingham, West Midlands, we are pleased to report on a development for the Yaesu FT757GX transceiver.

During a period of several months, Colin Horrabin G3SBI, the late Bill Sparks G8FBX and Ray Withers G4KZH designed an improvement for the tuning circuit of the FT757GX.

'Synthesiser glitch'

Some owners of this rig may have noticed the 'synthesizer glitch' effect when tuning, especially across CW or RTTY transmissions anywhere in the range 500kHz-30MHz.

This means that the frequency does not move smoothly in 10Hz steps, but jumps somewhat irregularly as the tuning knob is rotated.

Ray Withers and associates have produced a small printed circuit board, 56 x 16mm, carrying two integrated circuits and very few additional components, so that with no more than eight short wires to the existing transceiver circuitry and a quarter hour of labour adjacent to Tr67, the MC146805G2 microprocessor, the tuning performance characteristic can be much improved. There is also an added advantage: that of being able to tune the receiver/transmitter at the rate of approximately 50kHz per knob revolution as an alternative or addition to the 5kHz per rotation with which users are already familiar.

Mr Withers and associates are providing the modification facility on all FT757GX radios bought from them at no extra charge to the basic cost, and having been in touch with the Japanese manufacturers, are assured that this circuit improvement performed by them will not invalidate the normal guarantee on the equipment.

Handling the receiver synthesized tuning on this set thus becomes more like riding along a tar-macadam road surface instead of along a bumpy cobbled surface!

Further information on the modification can be obtained from R Withers Ltd, 584 Hagle Rd West, Quinton, Birmingham B68 0BS. Tel: (021) 421 8201.

SHORT WAVE LISTENER

TREVOR MORGAN GW4OXB

It's not really surprising that listeners are often oblivious of others with similar interests living nearby. After all, listeners, like philatelists and astronomers among others, can and do carry on their chosen hobby, content to go it alone with no other contact with fellow hobbyists save through books and magazines.

There are, however, times when a helping hand can be useful, like when you're trying to heave up a mast with one hand and fasten the guys with the other and stop the aerial feeder wrapping itself round the washing line with the other . . . well, you know what I mean.

There are also the less physical activities, and very often a newcomer can find himself in all sorts of trouble after wiring up his new receiver and length of wire only to find he has no signals coming through.

Good timing

Fortunately I was available when such an incident happened recently. A local listener had purchased a nice new receiver and wasn't sure if he had connected it up properly, as he was getting very little audio. The receiver was a Trio R2000 and a random wire had been connected to the antenna socket correctly. The trouble was, as soon as a signal appeared on the band the squelch cut it out. As it was a new receiver, we returned to the shop and explained the problem. We were told that the set would have to go for repair.

Now, I'm not going to say who the retailer was, but it took a concerted effort to get an eventual replacement. This brings up the point that, under the sale of goods acts, if a shop supplies you with equipment that is not up to standard, you are legally entitled to a replacement or a refund. If the dealer refuses (if it's a branch of a big concern, go to the head office first) contact your local Consumer Protection office.

Our local newcomer is now enjoying his listening and is pleased with his purchase. Mind you, I had to recommend a decent ATU (something the salesman should have done) and help him with his aerial, but it gave me the opportunity to have a tune round some of those frequencies I had forgotten about since being licensed.

Our first correspondent this month is not having any difficulty listening either. Goff Curtis wrote in from South Harrow to say that VQ9CI and VQ9CM had been detected on twenty metres. Goff says the transmitted signal sounded the same so it seems they were on the same team in Diego Garcia (on the Chagos Archipelago, British Oceanic Territory). QSL information was given as via W4QM (VQ9QM) or WA6SKL (VQ9CI).

Next in the postbag was Angela Sitton from Stevenage, who was having her leg pulled by someone who told her that a licence was required for listening. Well, 'twas the case some years ago Angela, but its all for free nowadays. Mind you, if you hear anything on any of those 'naughty' frequencies that sounds peculiar, don't go telling your friends or you might finish up having a visit from those nice men with bulges in their jackets!

This advice also goes to those of you who have scanners on VHF. It is quite true that, technically, you can listen anywhere on the bands but it is not the done thing to listen in on embassies or government frequencies. Just to make sure you don't, there are books on the market telling you all the forbidden frequencies so that you can avoid them.

Just when I thought that the 1985 Jamboree was behind me, I received two claims for the GB2WFF award. Silly me! The first one was from Harcerski Klub Lacznoski in Lubin, Poland. Their claim was for 56 points and included contacts with America and Africa over three bands. I wonder if the copy of *Amateur Radio* will get there.

The second claim was from Rudolf Darmadi Sewoyo in Indonesia. Rudolf sent in some very nice pictures of the scout station he is involved in and a mass of information about the set-up there, including the operators' roster and log sheets. Rudolf holds the callsign YD5NOI and it appears that two metres is used extensively in Indonesia, as most of the contacts were on 144MHz with stations in that country.

New to the scene

A hearty welcome to another newcomer to the listening scene, David Armitage of Leeds. David is presently concentrating on the broadcast bands with a Vega 204 receiver, and required a bit of advice on how to QSL etc, but he'll soon get into the swing of it.

Another new listener has joined us this month. Jean Mullany G4GIG, of Birmingham, has invested in a Philips D2935 and finds it is doing an excellent job, despite a problem with overloading the front-end when using an external aerial. This is quite a common problem with the less sophisticated receivers. An RF attenuator might do the trick by cutting back some of those strong ones. Jean is also QRV on eighty with the DSB80 with 2.5 watts.

Mike Baker of Carlisle wrote to ask if there were any of you folks interested in starting a national HRO user group. Mike uses one of these old-timers and thinks they are remarkable sets considering their age. If you are interested in forming such a group, please drop Mike a line at 13 Chertsey Mount, Carlisle, Cumbria.

I have received a nice letter from Don Robertson of Wick stating that the DX has been around on eighty and quotes JA, LU, PY, CX, PJ2 and contacts with six ZLs in a row. Forty has also been fruitful around 1330 with BV0, HL1 and KL7. Don is collecting dollar bills from JAs who want QSL cards (I'm collecting pound notes Don!).

Sten Stenstrom wrote from Algeria (one of his /A locations) after picking up his *Amateur Radio* at Heathrow Airport on his way out. Sten is on the look out for an Icom IC720A or similar to use on his beautiful new sailing boat, *Westerly Conway*. Anyone who is able to help can have a trip on the boat when he picks her up in the Solent. Contact Sten through H Attrill & Sons, The Duver, St Helens, Isle of Wight.

Eric Franks of Paignton has written regarding his newly installed Amstrad 464 computer, which he is hoping to link into his receiver for CW/RTTY reception. The Trio R600 has been giving excellent service but is now backed up by the SX200N scanner and a Slim Jim for the VHF bands. Eric would like information on radio programmes for the 464, which seem to be a bit thin on the ground at present. Eric can be contacted at 54 Berry Road, Paignton, South Devon.

There is another new computer on the scene in the shack of Stuart Trew of Barningham, who has installed the Commodore 64 with software for RTTY, CW and Amtor. Stuart is another of those 'lucky' people with breakthrough of the computer onto the FRG7700.

As well as being RS87096, Stuart is member number NL9060 of the Dutch radio society 'Veron', which is responsible for the excellent slow Morse transmissions on eighty metres. Stuart has also been busy on the antenna farm and a new 40m dipole has been added with some more copper wire buried in the garden (hope the plants don't object Stuart!).

It had to happen! Someone, in the guise of Andy Sillence G4MYS, of Coxford, has revamped the OXB mast mentioned in the February issue. Andy bolted insulators to the outriggers to give him a half-wave end-fed for Top Band

and replaced the guys to give him inverted Vs for forty, twenty and fifteen metres. The mast also acts as a support for his G5RV and 2m half-wave collinear. The whole lot, including the mast and feeders, cost him less than £100 which, when compared with the cost of a single element beam and rotator of over £150 plus the cost of a mast, sounds pretty good.

Redecorating

Did you know that in going for the Bronze and Silver prefix awards for each band and mode, you can paper the bedroom and still leave room for the Gold plaques? This seems to be the aim of Don Robertson who, not satisfied with the Gold for working the 1000 prefixes, is well on the way for the Premier award. Don says he's found the awards so much of a challenge that he was getting withdrawal symptoms until I announced the Premier award. There's no pleasing some people!

I'm pretty easily pleased, especially when I receive claims for the awards from readers. A neat computer produced list from Jane Mullany this month gets her on the roll for her Bronze. Despite her reservations regarding the Philips D2935, it has managed to pull in 3A2, AJ3, HC1, PT7, VK7, VP2, YB0 and ZB2 among a fine list.

John Upsher also managed to find them with his Yaesu FT980 and promptly put in a claim for the Silver with A71, VP9, D44, VE7, FY7, VS5, HZ1 among the crowd. Some nice comments in the last column of his log sheets too, like '5in of rain in first 8 months of the year. . .now a drought (VK2EEE)'.

The Listeners Information Bureau has got off to a flying start this year with over fifty members. Full information sheets have gone out to everyone who sent in the slip from the magazine and enquiries have been received from Belgium, South Africa, Finland and Jamaica, so it looks like we'll have an international group.

I'm in the process of getting the first newsletter made up and it should be out by the time this article is published. Mail has already started to flow between members, so if you are interested in the group please send a foolscap sized sae to 1 Jersey Street, Hafod, Swansea SA1 2HF, and I'll send you the information pack.

So to our featured listener who, this month, is Jim Marchant RS87371 from Northfleet, who became a listener in July 1985 and purchased a Trio R600 after he read good reviews of the receiver. Unfortunately Sod's Law took a hand and he had to go away on a course to Derby, so he was separated from his new toy for a while. Nevertheless, on his return home a quick lash-up of ten metres of stranded wire got him on the air, and Radio Moscow echoed round the room. After the induction, local radio stations were picked out and then 'GB0BBC you're 5/9 from GB4PB. . .', the first amateurs. A special event on the air. He was hooked!

A quick spin round what turned out to be eighty metres revealed more G stations and excitement mounted. Later, on twenty metres, UZ4FWO sent Jim frantically searching for his magazines to find where this 'exotica' was located. A Russian club station had 'appeared' in his bedroom!

These first stations were the prelude to many hours logging stations in places only previously heard of in those geography lessons Jim had never paid much attention to years ago.

After the first two weeks it was obvious that a decent aerial was required, so the Datong Active antenna was obtained. The same stations were received but were much clearer, with the occasional exotic ones being blocked by Europeans. The answer was a home-brew variable attenuator which enabled him to cut out some of the stronger signals.

It was about then that the WAB net was discovered on eighty metres. Departing with a crisp fiver, Jim received his WAB book from G4KSQ and quickly became a square hunter, achieving five awards. He finds that with WAB during the day and DX at night, his spare time is well used.

Owing to Jim's shift work he can't make RAE classes, and the twelve mile journey to the nearest club is out. Nevertheless, Jim is enjoying his hobby immensely and that is what it's all about.

Listening bug

Many listeners start in the same way as Jim, as did Dave Armitage, with a receiver that is, to him, a metal box full of electrical bits that, somehow, manages to receive signals from all parts of the world.

Quite often those without interest in the hobby ask what one sees in listening to foreign stations and writing details down in a book. Who can say? How do you explain the pleasure one gets from logging stations, or the excitement of hearing your first real DX station or getting your first award? It's a different thing when you have plodded through the RAE and gone through the terror of your first QSO.

Listeners are unique in that they are usually totally inexperienced in radio and everything that happens is new. They don't care about the technicalities of the hobby and are free to experience the fun in experimenting with aerials, add-ons and so on without the restraints of the transmitting amateur.

For those with even the simplest receiver, like the Vega 204, there is a lot of pleasure to be had from carefully and very slowly tuning round each band in turn, listening to the enormous variety of stations using the air to carry their messages around the world. Politics and religion play a large part, but there are programmes on almost any subject one can imagine, from stamp collecting to natural history and all free at the turn of the dial. You don't have to be technically minded to enjoy them.

Gradually you'll begin to recognise the call tunes of the various stations and, perhaps, begin to make up your first record of the stations you've heard and where they can be found.

Careful listening will give you an idea of the best times to listen for the different stations, and all this information can be noted down for future reference.

This is where it all starts and next month we'll look at some of the additions you can make to your station to make listening easier and more efficient. Until then, happy listening.

JUST PUBLISHED

3rd EDITION OF

U.K. LISTENERS CONFIDENTIAL FREQUENCY LIST

50% LARGER, SMARTLY BOUND with semi-stiff cover.

Completely revised:- Now includes lots more information on MILITARY, CIVIL, AIR, MARITIME, PRESS BULLETINS, RTTY etc.

£5.95 +p·p 75p

4 PUBLICATIONS YOU SHOULDN'T BE WITHOUT!

UK LISTENERS CONFIDENTIAL FREQUENCY LIST NEW EDITION

This publication has now sold well over 2500 copies since it was advertised only a few months ago. Now the recent updated version is selling even better. No self respecting listener should be without a copy. If you enjoy exploring the short wave bands then this publication will add to your enjoyment. It covers the hf spectrum from 2 to 30 mHz and gives details of transmissions outside the amateur bands. Specially designed for the UK and European listener it sets out in a very easy way a comprehensive list of hundreds of interesting transmissions that will keep you occupied for days on end! Only a fraction of the cost of other similar publications it contains details of Marine, Air, Military, Embassy, Press and News agencies. Many listings have time schedules included together with comprehensive RTTY details. It tells you the frequencies used by civil and military aircraft whilst flying the Atlantic, when and where to pick up the press bulletins, long distance marine traffic etc and much more. Send today for your copy of this worthwhile publication.

£5.95 p&p 75p

SCANNER OPERATORS GUIDE TO THE VHF-UHF SPECTRUM

Many listeners have asked for a guide to th wide VHF/UHF spectrum and to meet this request we have recently published this frequency manual. It covers the range 27 to 1300 mHz and has been specially prepared for the UK listener. Anybody who has used a scanning receiver will know that the wide frequency range involved means that it is difficult to know exactly where to listen. This guide takes all the guessing out of monitoring. It lists all the services throughout the spectrum together with both simplex and duplex frequency splits. If you've spent your hard earned money on a scanning receiver or are considering buying one you'll find that this publication contains a wealth of information that has previously remained un-published!

£3.95 p&p 40p

VHF-UHF AIRBAND FREQUENCY LIST

This frequency manual is without doubt the most comprehensive list of VHF/UHF aircraft listings available in the UK. Of vital importance to the airband enthusiast or indeed any keen VHF/UHF listener it sets out in a very easy to follow manner full details of a whole host of stations. Every known UK airfield quencies, etc. Included are Civil, RAF, USAF, MOD, Naval fields on both VHF and UHF bands. There are also air to air frequencies, the Red Arrows frequency, and much more. Send today for your copy and find out just how much you have been missing!

£3.95 p&p 40p

HF OCEANIC AIRBAND RADIO SUPPLEMENT

Prepared in response to many requests for more information about the air traffic on the hf bands this little guide sets out to explain to the beginner how the hf band works in relation to air traffic. It contains full details of the world aircraft frequency bands in the range 2 to 23 mHz together with control frequencies and those commonly used for Oceanic control. Also included are many VOLMET frequencies, the Search and Rescue frequencies used by RAF helicopters and Nimrods, the Hf RT network, London Company frequencis, European control centres etc. An ideal companion for the hf airband listener. Send today for your copy.

£1.95 p&p 35p

WATERS & STANTON ELECTRONICS

18-20 MAIN ROAD, HOCKLEY, ESSEX – 12 NORTH STREET, HORNCHURCH, ESSEX.
MAIL ORDER TO: 18-20 MAIN ROAD, HOCKLEY, ESSEX TEL: (0702) 206835

SIMPLIFIED RECEPTION

A BEGINNERS' CIRCUIT

by Old Ham G3SYX

Supposing someone gave you the circuit diagram shown in *Figure 1*, and after a few words of encouragement left you to build it. Even the most recent novice would have his doubts about the success of the project, for no amount of practice would make it function as it is. Now look at the block diagram in *Figure 2*! At first sight this may convey little, but after a few seconds the majority will have rumbled the writer's ruse. But forgive the alliteration and take *Figure 2*, fitting it into the spaces marked A, B and C. The puzzle is now complete and the reader will quickly realise that the diagram is, in effect, that of a simple TRF receiver; the diagram shown in *Figure 2* being a linear integrated circuit. This IC is the ZN414, manufactured by Ferranti and incorporated into the TO-18 package, normally used for transistors.

Three features

This small but useful product of CDI technology offers the constructor a complete RF amplifier in three stages: a detector, an AGC circuit, and a high impedance input stage. The main advantage is obvious to all: few external components are required. Indeed, it can be constructed with as few as half a dozen small components, if one wishes to leave out the switch and two ferrite rod aerials.

Shown in *Figure 3* is the underside view of the ZN414. Three simple connections complete the circuit and one has an effective radio receiver which can be used with a crystal earpiece or fed to an existing amplifier, care being taken *not* to use an obsolete ac/dc, otherwise known as the universal type.

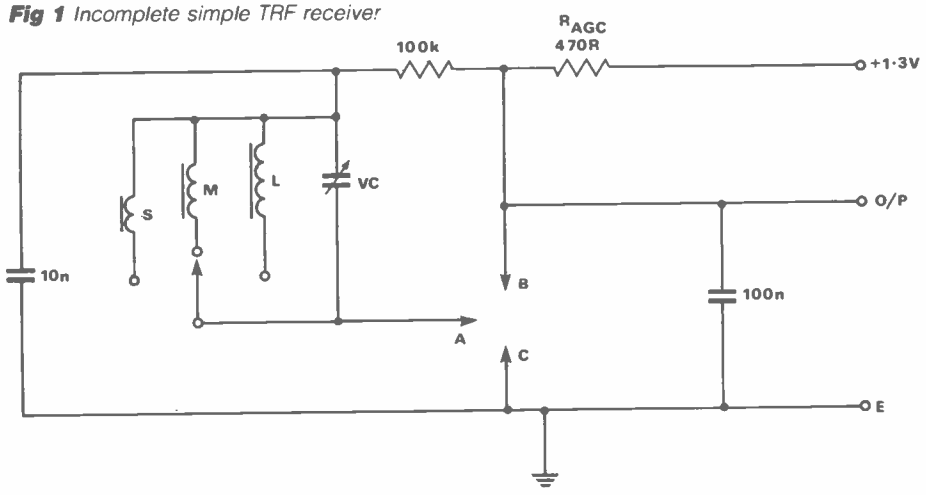
Action of the AGC system is really effective, adjustment being facilitated by the correct choice of resistance, which is in the order of 470 to 500 ohms. The writer's experiment with a 1k potentiometer determined that 475 ohms proved to be a good value, but not being endowed with excessive patience the nearest fixed preferred value of 470 ohms was quickly substituted to considerable effect.

Quality is not difficult to achieve, as the audio current consumption is very low, being in the order of a mere 0.3mA typical to 0.5mA when receiving strong signals.

For the more knowledgeable and ambitious constructor, the following information on the ZN414 will be of interest.

Supply voltage range is from 1.2 to 1.6 volts, 1.3 being recommended. Operating temperature is wide, being of the order of 0 to 70 degrees centigrade. As stated, the supply current is low (0.3 to 0.5mA), the lower figure being consistent with quality reproduction. Useful frequency range is from 150kHz to 3MHz, but it was found that frequencies above and below this range were tunable, this being due to careful construction and adjustment *vis-à-vis* short leads etc. No alignment is required, this being an additional bonus to experimenters who possess little equipment.

Fig 1 *Incomplete simple TRF receiver*



Operating conditions

In correct operating circumstances, output is set at ≥ 30mV whilst power gain is typically 72dB. Total harmonic distortion is claimed to be < 2.0 per cent under correct operating conditions, that is with R_{AGC} set to 470 ohms, thus allowing a 20dB AGC range.

Manufacturers claim that a 4kHz bandwidth can be achieved, with a threshold sensitivity of 50μV, but it must be stressed that good quality inductances with the correct

$$Q\left(\frac{WL}{R}\right)$$

must be used, this being commensurate with the correct supply voltage. Input resistance is high, being in the order of 4Mohms.

Layout is important, particularly when one considers the practical application of the higher end of the frequency spectrum. Leads must be kept short, and the output decoupling capacitor should be soldered as close as possible to the output and earth leads of the IC, care being taken to use a heat shunt during such operations. Once more, for the afficianado. The value of the output decoupling capacitor in conjunction with the AGC resistor should be calculated for a break point at ~4kHz. This equation will be of use:

$$C\ (\text{Farads}) = \frac{1}{2\pi \cdot R_{AGC} \cdot 4 \cdot 10^3}$$

During layout of the tuning assembly, care should be taken to ensure that components are placed at some distance from the voltage supplies and output circuits. The moving plates of the tuning capacitor should ideally be connected to the junction of the 100k resistor and the 0.01μF capacitor.

In both TRF and superhet receivers, good quality is an all important factor. Essential then is the use of high Q inductors, in conjunction with a tuning capacitor of good quality and a low loss wavechange switch. Once again, the noteworthy aspect of minimal lead-length is stressed, and in these circumstances the simple little TRF receiver will compare favourably (from aspects of selectivity and sensitivity) with many a superhet, some of which can be indifferent in operation. One disadvantage is that, despite an excellent AGC system, very strong signals are apt to cause swamping. This was one reason for the experiment with the AGC resistor.

There is no reason why a ferrite rod assembly, or individual ferrite rods, should be used. In fact, the writer has tried the circuit with normal coils and an aerial, but if the more convenient components *are* utilised the set should be rotated for a 'null-out' or strong signal. Better control of tuning was accomplished by the use of a reduction drive. From an aspect of gain, the ZN414 is said to be voltage sensitive, and it follows that less operating voltage will be required in areas of high signal levels. In such circumstances, AGC setting may differ slightly from the preferred value. If an excessive signal does swamp the receiver, resulting in the occupation of a

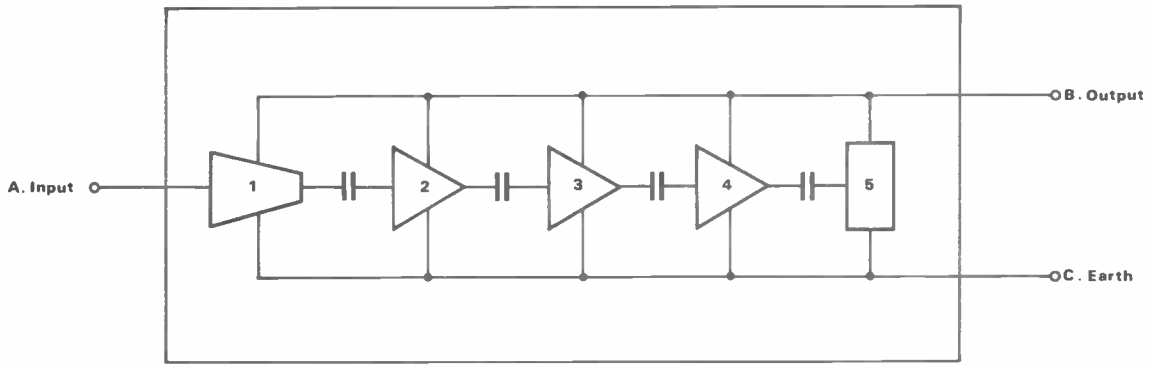


Fig 2 A linear integrated circuit

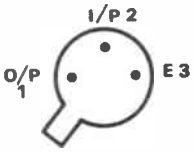


Fig 3 Underside view of ZN414

wide bandwidth, it *may* be necessary to try another AGC resistor value. Extreme cases of this often result in the saturation of the RF stages of the IC, prior to limitation. Bad swamping will reduce the audio.

Ferrite rods

When considering these, the ratio of diameter to length should be considered. This should be large in order to ensure preservation of better directional properties. Measurements from 1½ to 8 inches may be tried with varying results. A combined long and medium wave assembly can also be used if required.

The writer has used the ZN414 to great advantage in other circuits. Those interested in further experiments can obtain information from the manufacturers. There can be no doubt of the adaptability of this tiny, yet monolithic 'chip'. It is suggested that the enthusiast can try his own layout, having been guided by the foregoing information. The author used a piece of 8 × 5 inch wood for the first experiments, but a small piece of Veroboard is far superior.

An add-on amplifier

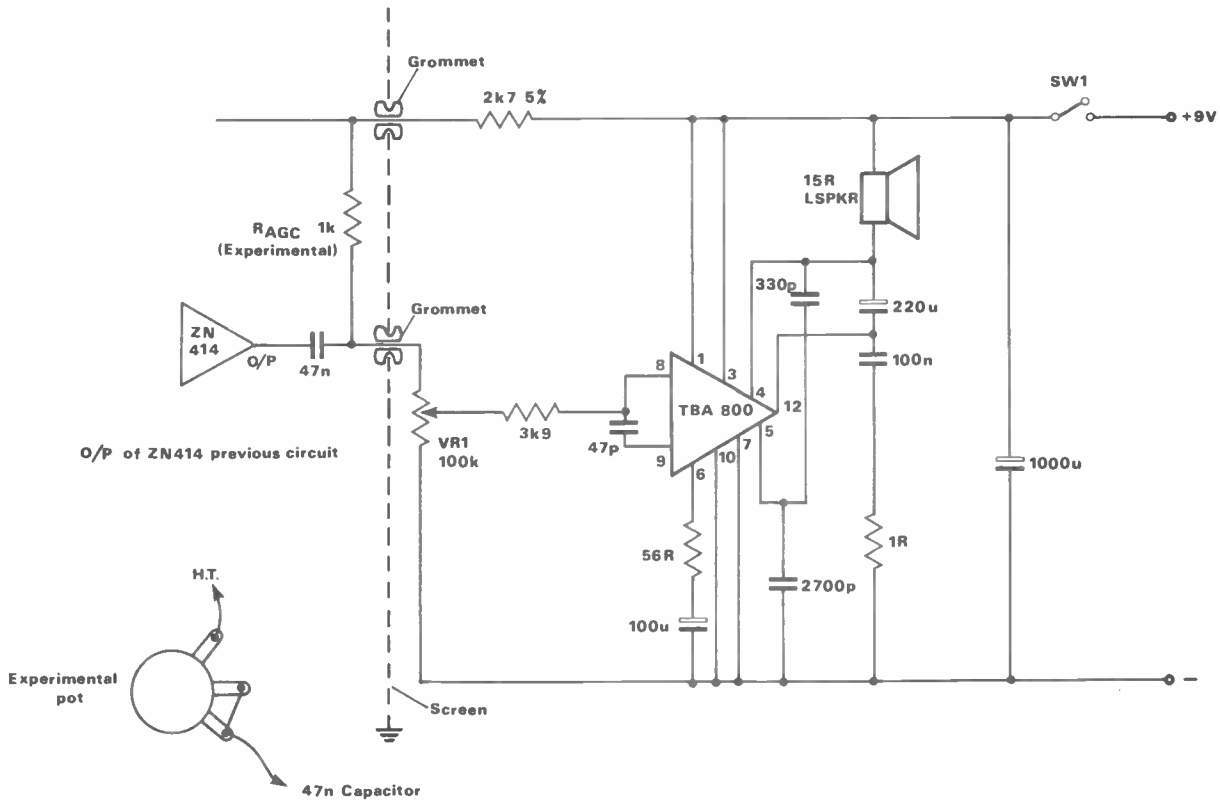
Following the author's ideas on simplified reception, it was thought that an amplifier of a similar nature might be a useful exercise in audio unit construction. The unit shown in *Figure 4* is easy to construct on a piece of Veroboard, although the author quickly completed the circuit on a wood base.

It will be noticed in the circuitry on the left hand side of the screen that the 1k resistor (R_{AGC}) has been increased in value from 470 ohms, which was used in the previous article. This is approximately twice as high as the manufacturer's recommended value, but it is suggested that a 1k linear potentiometer be used and adjusted for optimum results, after which it may be removed, measured and replaced with a fixed resistor of the measured value.

As stated previously, the ZN414 is a voltage sensitive device, and in areas of strong signals less supply voltage will be required to ensure correct AGC action. Therefore, any station which occupies an unusually wide bandwidth may be the result of an incorrect AGC adjustment. Extreme cases will cause a high degree of saturation in the RF stages in the ZN414. When amplified this will sound unpleasant and distorted, effective audio being lost.

Once the correct adjustment has been obtained, the rest is plain sailing. One will have to search diligently to find such a fine little amplifier with such a low battery drain. Good reception was obtained at all levels of volume setting, except when a mere 6mA was being consumed when a loud signal was evident. One watt can easily be obtained, this being conditional upon some 16 to 25mA being consumed. It is important that heatsink tabs should be used with the TBA800 IC.

Fig 4 A one chip amplifier for the beginner's ZN414 Rx



INTROD SATEI COMMUNI

In this two-part series explains how satellite co understood and enjo

Do you want to access a new amateur band that is always open when it is supposed to be, a band that does not fade away without warning, a band that makes DX contacts sound like locals and has no skip zones? No this article is not about to describe one of the new WARC bands, this article deals with the satellite communications bands.

Listening to or working through amateur communications spacecraft is not difficult in itself. However, most beginners don't know how to go about it properly. Not knowing what they are doing, they usually achieve indifferent results and because they put in so much effort without achieving any significant results they give up and go back to their regular haunts, where they can usually at least find someone to talk to.

This is a shame because satellites have come of age. Commercial equipment is readily available for the satellite bands just as for the regular HF or VHF bands. You can thus buy or roll your own. In either case, just like on 20 metres or the other HF bands, you have to have some knowledge of what is going on in order to get the maximum enjoyment out of the equipment.

Basic satellite jargon

A communications satellite is a repeater in the sky. It receives signals transmitted up from the ground on one amateur band, and re-transmits the same signals down to Earth on a second amateur band. It is part of a communications link between two radio amateur stations on the ground, as shown in *Figure 1*. Signals on their way up to the satellite are being 'uplinked' by stations on the ground, while the corresponding signals coming down from the satellite are being 'downlinked'.

Communications satellites travel around the earth in fixed paths. These paths are called 'orbits', because the spacecraft is in orbit around the Earth. As the satellite travels around the globe it passes over different places. The point on the surface of the Earth immediately beneath the satellite at any time is called the 'sub-satellite point'.

Fig 1 *Satellite communications path. Station A is transmitting (uplink). Signals are received and re-transmitted down to station B (downlink). Note. A spacecraft in orbit around the Earth is known as a satellite of the Earth*

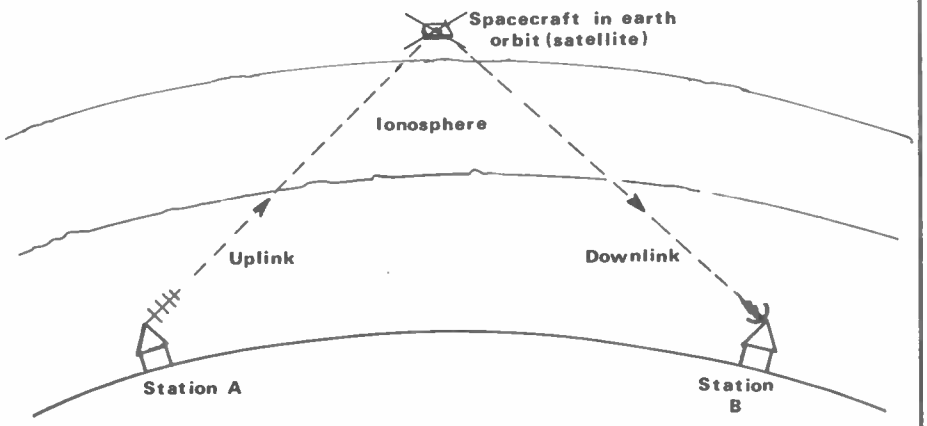
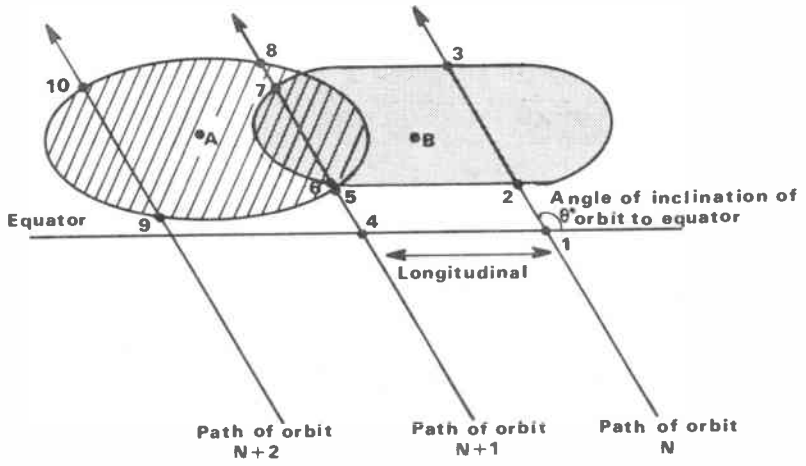


Fig 2 *Looking down on the Earth from the satellite showing track of spacecraft on surface (sub-satellite point). RANGE CIRCLES are drawn as ellipses on rectangular (map) projection. Circles overlap to give mutual access window on orbit N + 1 between points 6 and 7*

1. Satellite crosses equator (heading north) at start of orbit N
2. Satellite crosses range circle of station B and comes up over its horizon (AOS)
3. Satellite crosses range circle of station B and sets on its horizon (LOS)
4. Satellite crosses equator at start of orbit N + 1
5. Satellite crosses range circle of station A (AOS)
6. Satellite crosses range circle B (mutual access window opens)
7. Satellite crosses range circle B (mutual access window closes)
8. Satellite crosses range circle of station A (LOS)
9. Satellite crosses range circle of stations A on orbit N + 2 (AOS)
10. Satellite crosses range circle of station A on orbit N + 2 (LOS)



Altitude dependent

The area of the globe that the satellite can see will depend on its altitude. Just as when a person climbs up a tower, the higher that person is, the more of the Earth he can see. A commercial communications satellite in a high altitude over the equator can see about one third of the surface of the world. A satellite in a low altitude can see much less. Most orbits are not circular but are elliptical. The highest point above the surface of the Earth in the orbit is known as the 'apogee', and the lowest point of that same orbit is known as the 'perigee'.

Any station that can be seen by the spacecraft can also see it. When a station can see the spacecraft it is said to be 'in range' of it. Thus, any two stations who are in range of the satellite at the same time can communicate through it. These stations are said to have a 'window' into the satellite. The orbit of the satellite is fixed, but the Earth rotates beneath it.

The time taken for the satellite to travel once around its orbit, from the place where the sub-satellite point crosses the equator to the next time the sub-satellite point crosses the equator going in the same direction, is called the 'period' of the orbit. When the sub-satellite point has returned to the equator, the point on the surface of the globe that was under it before will have moved away due to the rotation of the Earth, and a new location will be beneath it. The amount of degrees of longitude that have gone by are known as the 'orbital increment' (see *Figure 2*). The first orbit of the day is known as the 'reference orbit'.

Stations on the surface of the Earth will see different parts of different orbits, as shown in *Figure 3 (Table)*. The azimuth, or horizontal bearing and elevation of the spacecraft, will change with the orbit. The spacecraft will appear to rise above the horizon when it enters

UCING LITE CATIONS

, Joe Kasser G3ZCZ

mmunications can be yed by everybody

the range of the ground station. The time that the spacecraft rises above the horizon is called AOS, or Acquisition Of Signals. The position of the satellite in the sky as seen by the ground observer will change as it passes along its orbit, rising higher in the sky, passing across the sky, getting lower, and then finally setting on the horizon.

The time that the satellite sets beneath the horizon of the ground station is known as LOS or Loss Of Signals. The path traced by the satellite in the sky as seen by that ground station will be different for different types of orbits. The path traced by satellites in circular orbits will usually approximate a section or 'chord' of a circle. The path traced by satellites in elliptical orbits will depend on the apogee and perigee of the orbit, and how close the observer is to the sub-satellite point.

Characteristics of satellite signals

In order to copy signals from satellites, we first need to know a little about the types of signals we are trying to receive. At any particular time, an observer on the ground may see the satellite in any direction with respect to the horizon (azimuth), and at any altitude between the horizon and directly overhead (elevation). This means that signals from various satellites arrive at a receiving station from any angle in any direction.

Radio waves are generated in a polarised manner. Conventional amateur radio station aerials may generate vertically or horizontally polarised signals, depending on the position of the aerial with respect to the ground. If the radiating elements are horizontal, the aerial is said to be generating horizontally polarised signals, and conversely if the elements are vertical, the aerial is vertically polarised. The same polarisation also holds for reception. Thus vertical aerials receive vertically polarised signals best and horizontal aerials receive horizontally polarised signals best. True vertically polarised aerials will copy few or no horizontally polarised signals.

Two metre and other VHF/UHF FM aerials are vertically polarised, while base stations working SSB/CW use horizontal aerials. This is because car aerials are vertically polarised, and the mobile stations put weak signals into horizontal aerials. In the early days of mobile radio communications, amateurs fitted 'halo' aerials on their cars to send and receive horizontally polarised signals so as to be compatible with the base stations.

Verticals rule

When the mobiles using FM began to outnumber the fixed stations, there was no need for them to use horizontal polarisation and verticals became the rule. Nowadays, any base station who wants to use FM has to use vertical polarisation.

On the high frequencies, both types of aerials are used interchangeably and everyone manages to work everybody. This is because the polarisation of the radio waves changes as the signals pass through the ionosphere. A process known as 'Faraday Rotation' rotates the polarisation of the signals. The signal as received on the ground is not entirely vertically or horizontally polarised, and as such may be copied at somewhat lower signal strength on any aerial. Perhaps the good performance of quad aerials is due to their having both vertical and horizontal elements. When conditions in the ionosphere are changing, the received signals may appear to fade, ie, get weaker and stronger as the plane of polarisation is rotated by the ionosphere.

Satellite orbits are outside the ionosphere, which means that the signals from the spacecraft are affected by the ionosphere in a similar manner to conventional terrestrial signals, ie, the polarisation of their signals will be changed.

The ionosphere is not a constant layer

ASSORTED SATELLITE PASSES FOR 1 DECEMBER 1985

RS5

UTC HHMM:SS	Azimuth Degrees	Elevation Degrees
1748:00	4	3
1750:00	8	9
1752:00	15	17
1754:00	24	25
1756:00	39	34
1758:00	62	41
1800:00	91	42
1802:00	115	35
1804:00	131	26
1806:00	140	17
1808:00	147	10
1810:00	151	3

RS7

UTC HHMM:SS	Azimuth Degrees	Elevation Degrees
1856:00	347	5
1858:00	344	12
1900:00	340	21
1902:00	333	32
1904:00	318	45
1906:00	286	56
1908:00	242	54
1910:00	217	41
1912:00	205	28
1914:00	199	18
1916:00	195	10
1918:00	192	3

Space shuttle Challenger

UTC HHMM:SS	Azimuth Degrees	Elevation Degrees
0625:00	328	0
0626:00	330	5
0627:00	334	10
0628:00	343	20
0629:00	7	37
0630:00	77	43
0631:00	113	24
0632:00	124	13
0633:00	129	6

Oscar 9

UTC HHMM:SS	Azimuth Degrees	Elevation Degrees
1330:00	102	10
1332:00	68	14
1334:00	35	9
1336:00	16	2
1500:00	194	1
1502:00	207	10

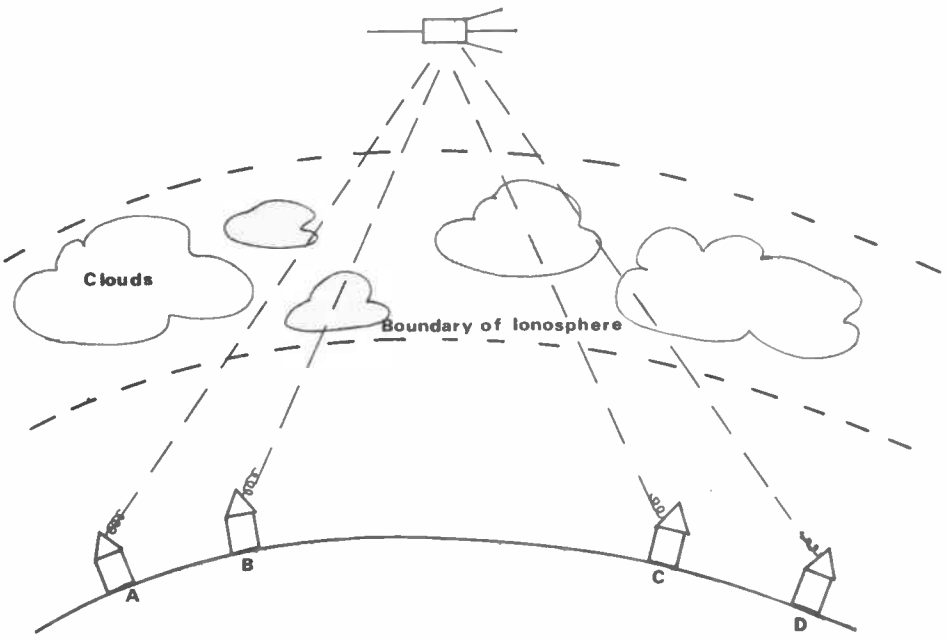
Oscar 10

UTC HHMM:SS	Azimuth Degrees	Elevation Degrees
1600:00	256	7
1700:00	240	12
1800:00	236	10
1900:00	235	6
2000:00	236	1

Oscar 11

UTC HHMM:SS	Azimuth Degrees	Elevation Degrees
0824:00	359	5
0826:00	350	15
0828:00	327	31
0830:00	269	38
0832:00	231	21
0834:00	218	9

Shown are azimuth and elevation angles from the ground station to the different spacecraft at different times of the day. It can be seen that in order to adequately copy signals from the spacecraft, the ground station must be able to receive signals coming from any azimuth or elevation. This figure only lists data for one of the daily passes for each satellite. As a rule they will be audible at other times of the day with signals coming from other directions.



1. 'Clouds' move around and change shape
2. Effects are different at different frequencies
3. The satellite itself may shield on-board antenna from one or more ground stations. Such shielding was first noted on Oscar 6
4. Clouds attenuate or rotate signals

Fig 4 *Some factors affecting satellite communications*

above the Earth but is made up of patches or clouds. Since the satellite is moving, the uplink and downlink signals will pass through different parts of the ionosphere at different times, and the effect of the ionosphere on the signals will be different as time passes, as shown in *Figure 4.*

Low power

Now, not only does the ionosphere refract radio waves and change their polarisation, it may also attenuate the signals, or even absorb them. As the spacecraft travels along its orbit, it may be spinning and tumbling, or the satellite itself may shield the on-board aerial from the receiving station. It is also probable that due to the constraints of the on-board equipment, the transmitter on board the space vehicle is transmitting at a power of less than 10 watts.

The bottom line is that signals from satellites may arrive at the ground from any direction in azimuth or elevation, with any polarisation and at any signal strength (usually very weak), all of which may (and usually do) vary as a function of time.

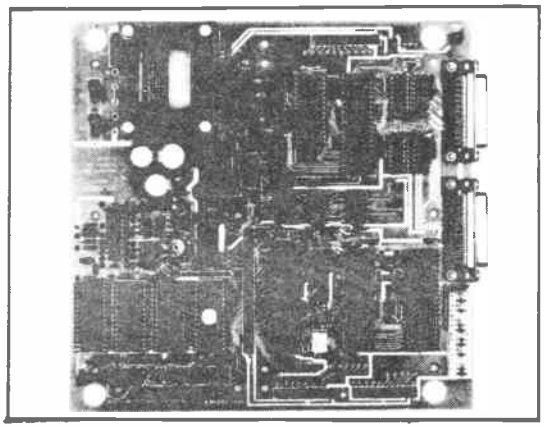
Next Month

Aerials, those in common use and their characteristics. Receiving signals and locating the satellite. Joe Kasser will explain all of this and more.

The Archer Z80 SBC

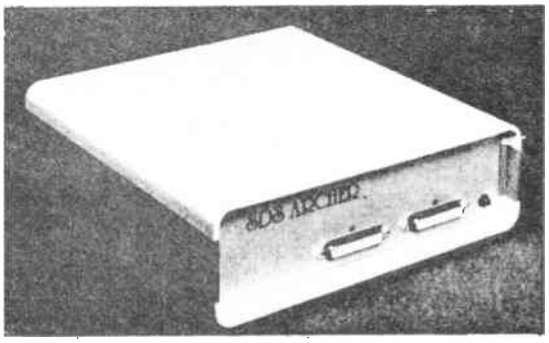
The **SDS ARCHER** — The Z80 based single board computer chosen by professionals and OEM users.

★ High quality double sided plated through PCB
★ 4 Bytewide memory sockets — upto 64k
★ Power-fail and watchdog timer circuits
★ 2 Serial ports with full flow control
★ 4 Parallel ports with handshaking
★ Bus expansion connector
★ CMOS battery back-up
★ Counter-timer chip
★ 4 MHz. Z80A



OPTIONS:

★ SDS BASIC with ROMable autostarting user code
★ The powerful 8k byte SDS DEBUG MONITOR
★ On board 120 / 240 volt MAINS POWER SUPPLY
★ Attractive INSTRUMENT CASE — see photo.
★ 64k / 128k byte DYNAMIC RAM card
★ 4 socket RAM — ROM EXPANSION card
★ DISC INTERFACE card



Sherwood Data Systems Ltd

Sherwood House, The Avenue, Farnham Common. Slough SL2 3JX.Tel. 02814-5067

SELECTRONIC

ANOTHER FIRST FROM THE UK's LEADING SUPPLIER OF 934 MHz PERSONAL RADIO EQUIPMENT MT 370-934 MHz HAND HELD TRANSCEIVER

* FEATURES *

* 20 CHANNELS * 10 MEMORY CHANNELS * FULL SCAN FACILITY *
* HIGH PERFORMANCE RF OUTPUT * 5w + 2w SWITCHABLE *
* VERY SENSITIVE RECEIVER * OUTSTANDING AUDIO QUALITY *
* HIGH CAPACITY BATTERY PACK * HALF WAVE WHIP ANTENNA *

MOBILE ADAPTOR WD-3
Use this adaptor for a more permanent installation. The handset plugs into the adaptor without the battery pack.

NICAD CHARGER. PF-34A
Mains battery charger for 7.2v nicad pack.

NICAD PACK
7.2v 1500mah replacement nicad battery pack.

203 HIGH STREET, CANVEY ISLAND, ESSEX.
Telephone: Canvey Island 691481

AN INVERTED BOW-TIE BEAM FOR 15 AND 20 METRES

A compromise between the chequebook and the DX bands

by DV Pritchard **G4GVO**

In these days of uncertain prices the new class A licensee often faces problems when considering the purchase of a commercial beam. Of course, the problem is not only confined to him but to others whose resources may be similarly slender, and very often a compromise has to be reached between the cheque book and the DX bands. This usually results in a dipole or a vertical or, in some cases, a long-wire if space permits. The construction of a high-gain beam is therefore not only a solution to these problems, but an attractive proposition for most amateurs who enjoy making antennas and look for encouraging results.

VK2ABQ/G3ONC

Among the antennas designed by Fred Caton VK2ABQ/G3ONC, one in particular deserves more prominence than it seems to have received in recent years. His 'Bow-tie' beam, although originally designed as a monobander for 20 metres, works extremely well when elements for 15 metres are incorporated: 10 metres being difficult to achieve owing to the proximity of the elements.

Original design

The original design requires a boom length of 24 feet, crossed 6 feet from each end by 12 foot spacers, and while this size may suit some locations it may be too large for others. However, the author discovered that it works quite well when erected in an inverted vee configuration, when it not only has the advantage of a reduced boom length of 20 feet, but the feed-point being close to the masthead gives a high current distribution point, which is an even greater advantage.

Undoubtedly however, its most desirable features are its 6dB forward gain (reference dipole) and its front-to-back ratio of between 20 and 24dB; figures which, for today's crowded bands, speak for themselves.

The principle of the beam

Figure 1 shows the layout of the beam when viewed from above, where it can be seen that 2 sets of elements are employed. Each element is a half-wave dipole resonant at the LF end of each band and corresponds approximately to the formula:

$$\text{Length (feet)} = \frac{492}{f(\text{MHz})}$$

which is used to provide sufficient wire lengths for trimming later on.

If complete loops of wire were employed, the antenna would provide bi-directional radiation, but by inserting insulators where indicated it results in a

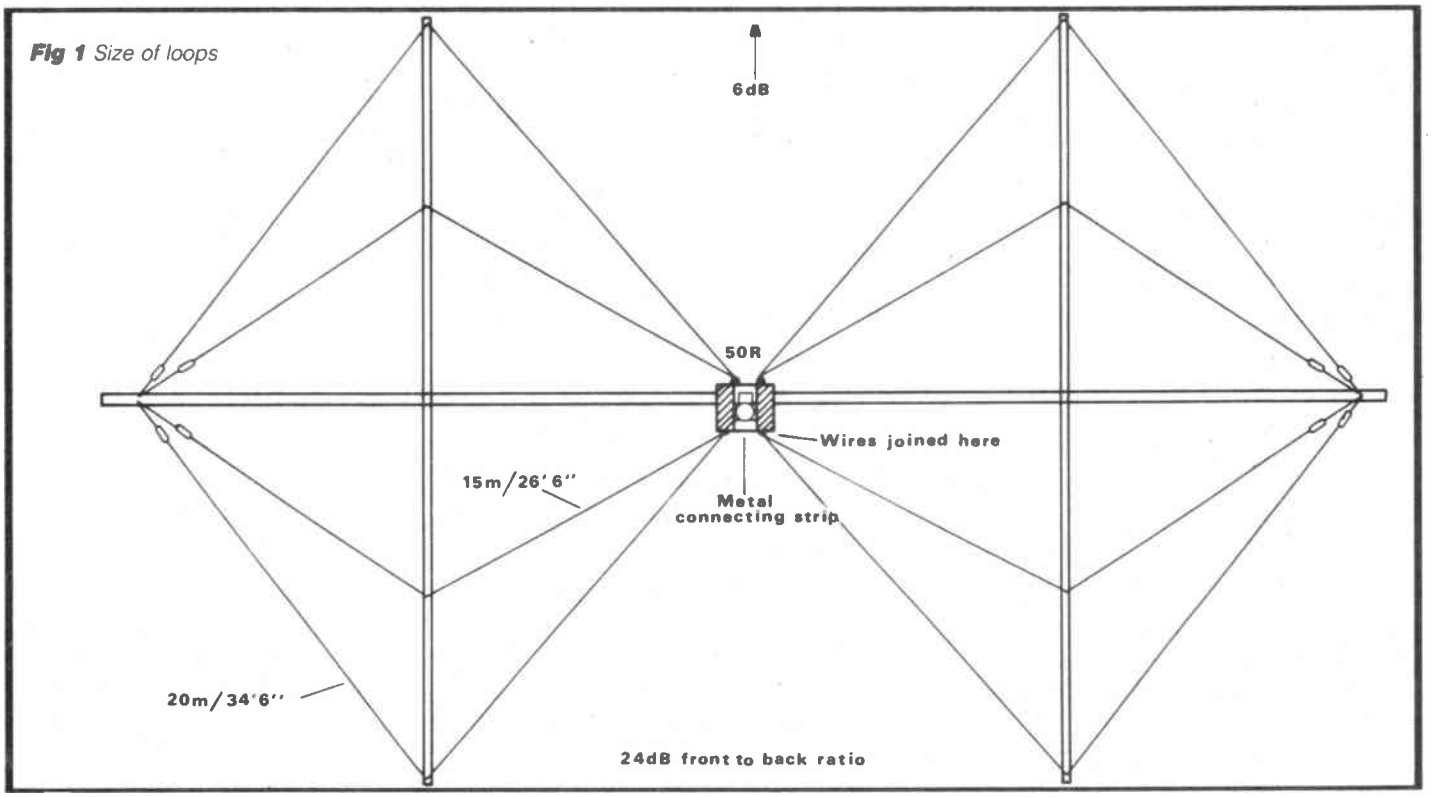


Fig 1 *Size of loops*

pair of closely-coupled high-Q circuits, the rear elements acting as voltage-driven reflectors with a 90° phase shift. The physical angle of the elements, however, tends to reduce an otherwise double-humped response and provides a very useful forward lobe for DX working.

Construction

Figure 2 shows the appearance of the beam when erected, and although its construction may seem formidable, in reality it is quite simple. The array is suspended with 'Polyprop' plastic clothes-line (no metal inside) from a small wooden gantry attached to the halliard of the mast.

In *Figure 3* details are given for the construction of this item, 2 × 2in prepared timber is used and rings, or saddles, mounted as mast guides, although U-bolts would serve just as well if wider timber was used.

The feedpoint on the front may be made from any suitable material and a cover made to fit snugly over it, weatherproofing being effected with an appropriate sealant. A similar size block is required for the back but it should be fitted with a brass or copper strip to provide continuity for the reflector elements.

Beam constructions

Figure 4 shows details of the front or rear view of the assembly. The 20 foot boom is 2 × 1in prepared timber, although two 12 foot lengths overlapped and joined together will serve just as well.

A hole is drilled 2 inches from each end to admit the plastic line, and two more 9 inches from the ends for a pair of threaded hooks and nuts. A 2 foot length of 2 × 1in timber is bolted in position at the centre as shown, and fitted with mast guides as in the gantry.

The element spacers are made from 12 foot lengths of bamboo, which may be obtainable from nurserymen, but an 8 foot and two 4 foot lengths overlapped and securely taped together will serve quite well. At this point it should be remembered that bamboo is a poor insulator when wet and that undesirable electrostatic fields may be set up as a result.

Les Moxon G6XN draws attention to this in his excellent *HF Antennas for All Locations* (Radio Society of Great Britain). Bamboo also develops splits and cracks unless it is well protected. For a first-class job, wrapping it with fibre-glass matting and dressing it with the appropriate resin is recommended, but this is a costly procedure and a winding of insulating tape well applied will do very well. It is also suggested that the elements should not be attached directly to the bamboo but supported by fine nylon line, which makes an excellent insulator.

Lightweight plastic stranded wire is recommended for the elements, and the suggested method of assembly is as follows.

Fig 2 *General layout of beam*

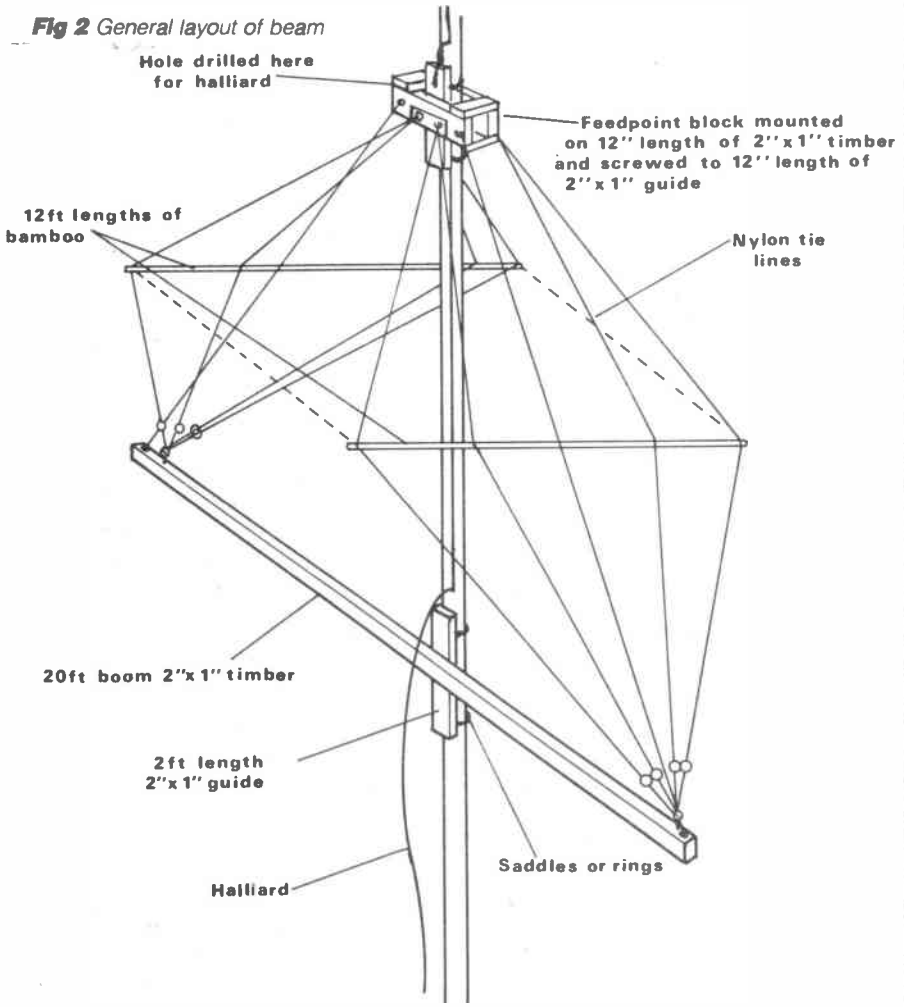
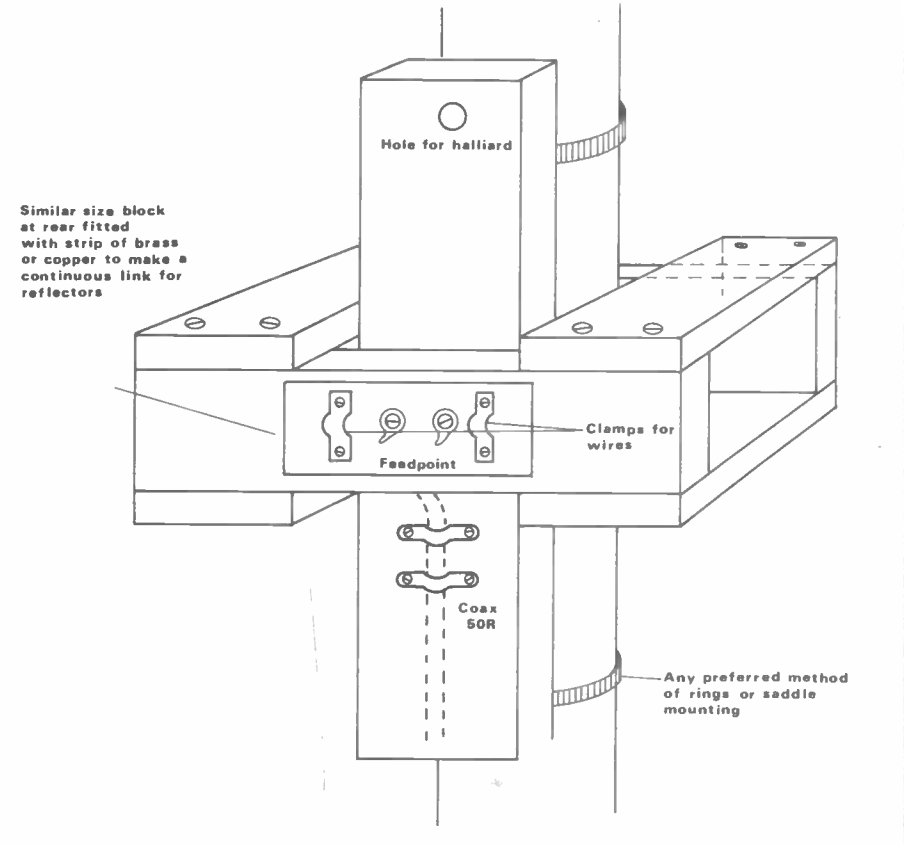


Fig 3 *Details of suggested top assembly (gantry)*



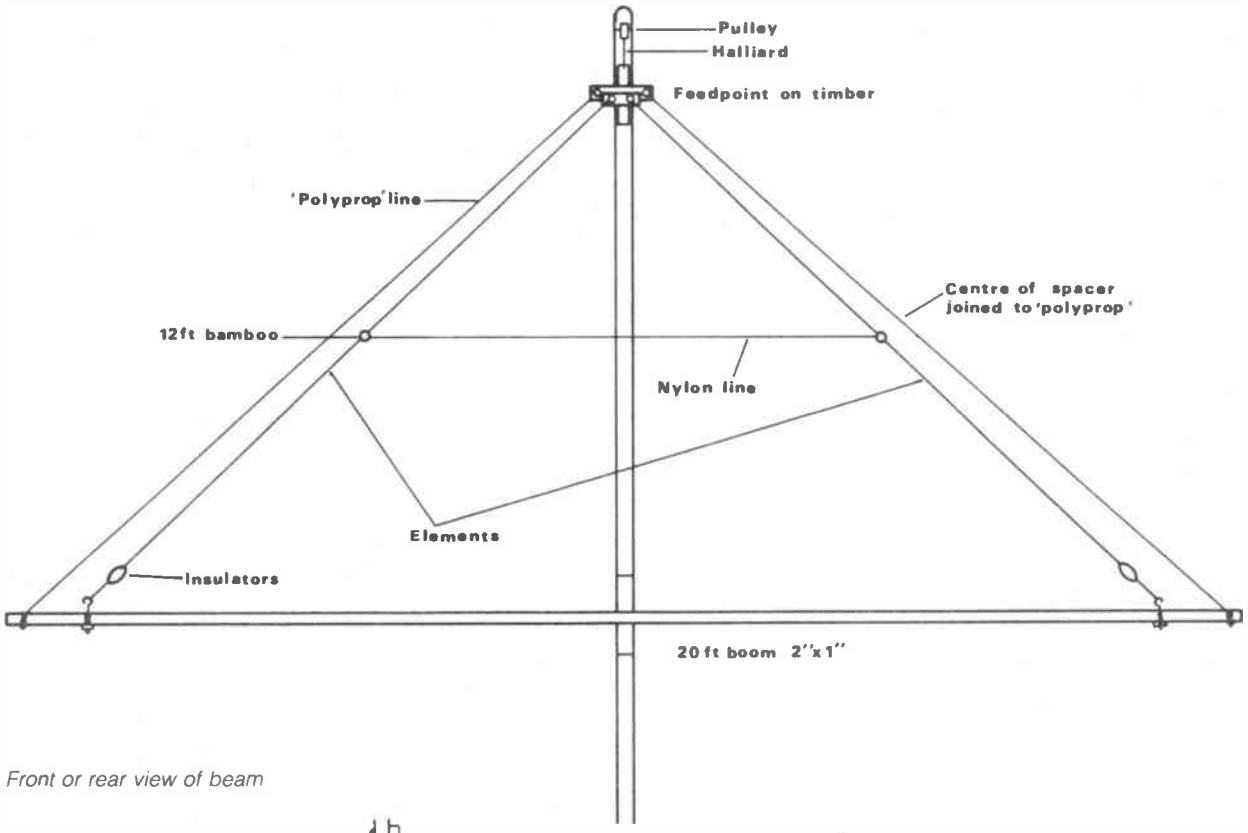


Fig 4 *Front or rear view of beam*

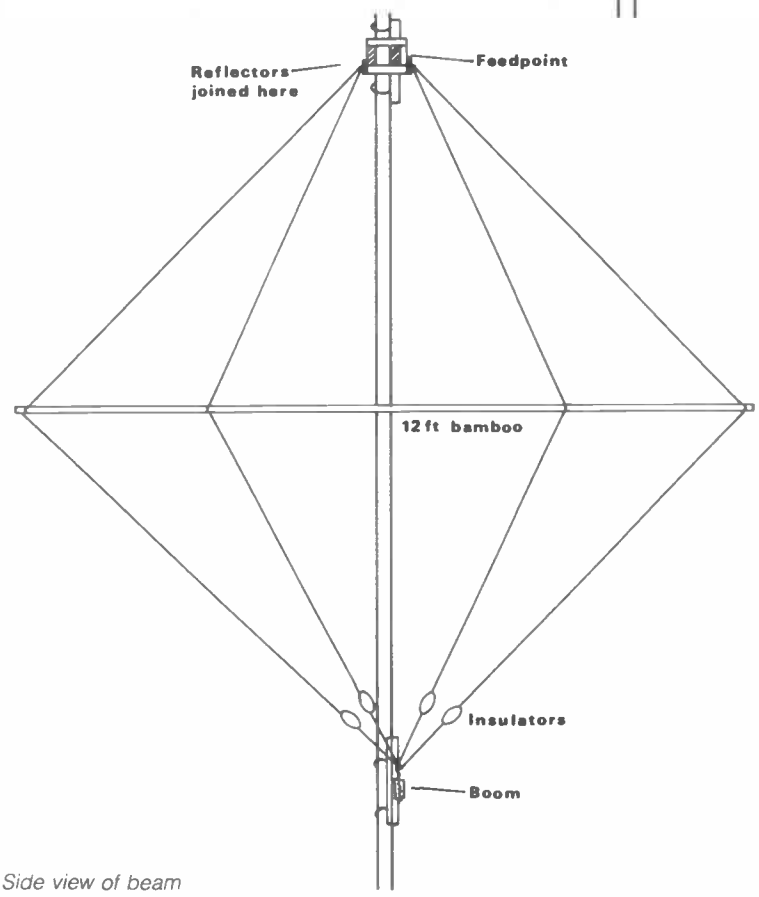


Fig 5 *Side view of beam*

Supporting gantry

The supporting gantry is assembled round the mast and pushed up two or three feet, where it is temporarily secured in position by any convenient means. The boom is then laid out at the bottom with its guides round the mast but not secured to it, to allow for vertical movement when required. The halliard is made off securely to the gantry, together with the Polyprop lines. About 18 feet of line should be used for each side, the ends being passed through the holes in the boom with loose knots tied in them to prevent them from slipping out.

The wire for the elements is cut to the required length and secured to the bamboo spacers as shown in *Figure 1*, ensuring that symmetry is maintained at all times.

Each half is assembled separately and it is useful to fix the spacer in a straight line on the ground and crossed at its centre position with a straight edge.

By this means the wires can be set out accurately. On completion, each side is connected to the feedpoint and the connecting strip at the back. The co-ax feeder is connected at the same time. *Figure 5* shows the side view of the array.

Raising the boom

Thin nylon line is loosely attached to the hooks and made off at the insulators, which may be between 2 and 12 inches from the boom. The wires are passed through them and temporarily secured with a foot or so of wire left dangling from each for trimming at a later stage.

When complete the assembly is gently raised to take up the slack, but on no account should the elements be allowed to take the whole strain. Just enough tension should be applied to ensure that the array is symmetrical, then the Polyprop should be fastened securely to the boom. The centres of the spacers may now be fastened to the Polyprop and the nylon bracing lines fixed in place.

Trimming the elements

A GDO or its transistor equivalent is required for this and the following points

should be noted. Early methods of trimming suggested that a 2 or 3 turn pick-up coil should be connected across the feedpoint and the measurements carried out there.

In the author's experience this is not good practice as the presence of a person in close proximity to the loops may lead to inaccurate measurements. A better method is to connect the pick-up coil across the ends of the co-ax and place this on a non-conducting surface, such as a table, placed a few feet away from the antenna. The co-ax may conveniently be spread around, but not directly under the beam in a heap. Although this method entails some activity, the results are worth it. If help is at hand, so much the better, but in any case it can be done quite easily by one person.

Temporary connection

The ends of the wires are stripped of their insulation and temporarily connected to make loops. Ensure that the correct wires have been connected. (The author mentions this because on one occasion, long ago, a friend was the source of much innocent merriment. He had been GDOing for about four hours and getting nowhere. Inspection revealed something we've all done at times – he had cross-connected the wires). Push the connected ends well apart from each other, raise the beam to its full height and check the reading on the GDO.

Good exercise

It may take a little while (and some useful exercise) before the midband positions are found, but when they are, the beam is lowered to a convenient position and the wire connection points noted and prominently marked. The ends are then made off to the insulators, ensuring that the marks appear at the proper place, and the remaining wire is twisted for about an inch and soldered. The surplus wire is removed and any bare wire left exposed is taped in the usual way.

Polyprop lines secured to the boom ends will not only rotate the assembly but serve as guys at the same time. A coat of primer followed by a couple of coats of paint to the woodwork will preserve it, and a light grey-blue shade was found to be very effective against the sky. It is astonishing how this appears to reduce the apparent lengths of the boom and spacers.

Conclusion

Although no mention of a balun has been made, it would probably be a useful refinement to employ one, bearing in mind that a high-gain balanced system is being fed with unbalanced line. Alternatively, 75 ohm twin feeder into an ATU would probably answer just as well, although the author has not tried it. In any event, the antenna was used for over a year at the author's QTH without a balun and the results were excellent.

Another point ought to be mentioned regarding the element lengths. While those described were found to be correct at the author's QTH, some difference may be found in other locations according to the height above ground of the boom, the effect of the earth itself and, in certain instances, the thickness of the wire. These differences are not likely to be very great, but it may mean a slight extension in the lengths of perhaps a few inches. Should this be the case it will obviously entail some extra work but, as mentioned earlier, the end result is worth it.

Easy DX

During the period that this antenna was used world-wide DX was worked with ease. Comparison tests using a VK2ABQ 'Coat-Button Quad' against the 'Bow-tie' with Stateside stations for over a month revealed the forward gain to be an average 6dB, and the front-to-back ratio between 20 and 24dB. Both antennas were mounted at 30 feet and well apart. It is hoped that these findings will encourage readers to build the beam and discover its potential for themselves.

AmRad 10GHz system

by Glen Ross G8MWR

So far in this series we have looked at the basic requirements for the system and the different types of heads that are available to save the hard work of doing our own mechanical engineering. This month we move on to the electronics that are needed to make up the transmit side of the gear.

Voltages

In an earlier article we saw that the Gunn diode, which generates the microwave energy, is susceptible to changes in voltage and that this provides an easy method of obtaining FM. It also means that unless precautions are taken to minimise drifting supply line voltages, we will also have a problem with long term stability. This is particularly important when considering portable gear that may be run from dry cells. Another important point is that the Gunn diode is actually a negative resistance device and so takes *more* current as the voltage is *reduced*.

The diode should never be operated at a supply of less than five volts (the present design making it impossible to do so). When testing a unit on the bench with a variable supply, do not start as you would with most circuits at zero volts and slowly increase them; this is a sure way of destroying the diode. In this design the supply is stabilized at not less than five volts by the use of a 7805 regulator. As the Gunn diode only requires around 100mA there is no need to provide a heatsink, and the regulator is simply mounted on the board.

Tuning

Because nearly all activity is now in the area from 10.37 to 10.4GHz, it is possible to dispense with any form of mechanical tuning. This range and more can be achieved using electrical pushing of the Gunn diode. The actual range achievable will depend on the individual diode and the cavity in which it is mounted, but with a supply adjustable from five to nine volts the tuning range of the oscillator will usually be at least 50MHz, and extreme cases of over 100MHz range have been found.

The power output, which is usually around 8 milliwatts, will vary somewhat over this tuning range, but this is not a problem in practice. The tuning control is shown in the circuit diagram as VR2 and should ideally be a ten-turn potentiometer. A ten-turn counting dial is not really required as it is not possible to calibrate the control, it simply acts as mechanical bandspread.

Alternatives

These pots are not always easy to find, and can be expensive if purchased new. It is possible to use other values however, down to around 200 ohms or up to 2kohms, and the modifications to the original circuit are shown in *Figure 2*. In the case of a higher value pot, simply use parallel resistance to reduce the effective value to that required. If using a lower value we have to resort to a little trickery!

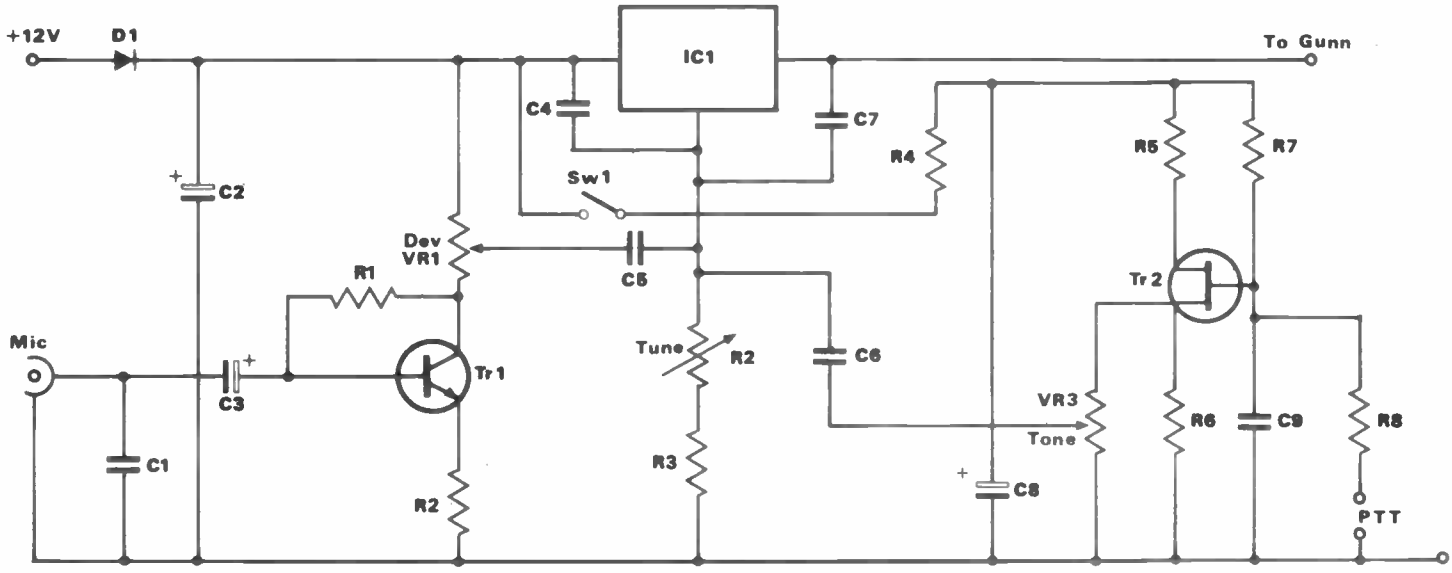
The current flowing in the earth lead of the regulator is around three milliamps, which is not sufficient to give enough 'jack-up' voltage when using a low value pot, so we use the pre-set (Rx) to shunt extra current through the tuning control from the main supply line. To set this up first set Rx at maximum resistance and the tuning control to give the highest available voltage on the Gunn supply line, then carefully adjust Rx until the Gunn voltage rises to nine volts.

Modulation

We have now got to the point where we have an oscillator tunable over the section of the band we require, giving a presentable amount of power; the next requirement is to get some audio on to it. This is easily achieved using a single BC108 audio amplifier stage. There is nothing unusual in the design, it is intended to take input from a 600 ohm dynamic microphone and the output is taken from the slider of VR1, which acts as the deviation control. The audio is then taken via a capacitor to the top of the tuning control and feeds through the regulator to appear on the Gunn supply line.

The amount of voltage swing to produce 300kHz deviation varies considerably with different Gunn diodes, but is usually somewhere in the region of 75 millivolts peak-to-peak. If a scope is

Fig 1 *Circuit diagram of transmit board*



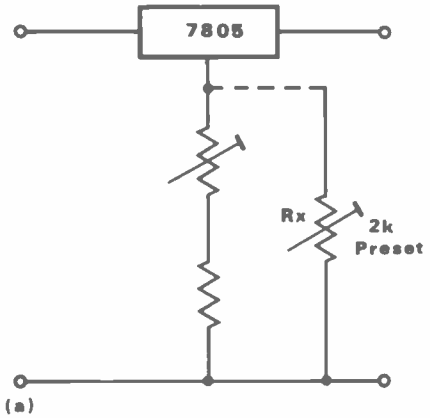


Fig 2a *High value tuning pot*

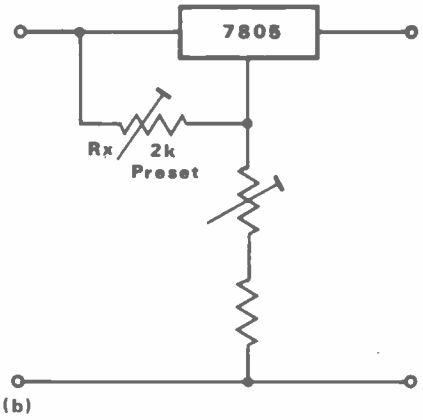
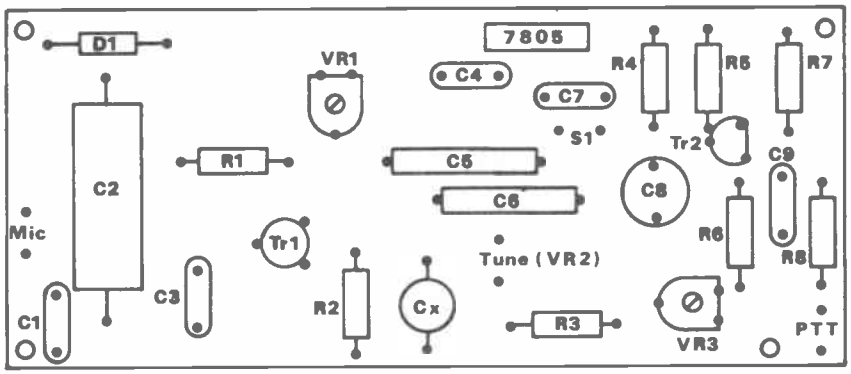


Fig 2b *Low value tuning pot*

Fig 3 *Suggested component layout for Veroboard or PCB*



available this level can be set up as a starting point, although it will need to be finally set in tests with a station at a few miles distance. It is all too easy to get misleading results using across the bench testing.

Gain

Most commonly available microphones will have more than enough output for use with this circuit, but if you have one which has very low output, the gain of the modulator can be considerably increased by decoupling the emitter of the BC108 to earth using a 10μF capacitor. The modulator will handle data, RTTY and slow-scan TV signals without difficulty.

Tone oscillator

When the station you are trying to contact is looking for your signal, the obvious way of identifying it is to keep talking.

If he is having some difficulty this can take some time, and an easier answer is to provide a small audio oscillator to keep the signal modulated. This uses a TIS43 unijunction, with the circuit constants designed to give an audio tone of around 800 Hertz.

Several other circuits were tried but it was found that the very peaky pulsed output of this circuit gave a signal that was both distinctive and, more importantly, very easy to find, even when your signal is buried deep in the noise. The output and hence tone deviation level is set using VR3. It appears from the circuit that the same result could be achieved using a 100 ohm preset, instead of the fixed resistor, but this should not be tried. The tone deviation control is normally set about one third of the way up from the earth end, and the top end of the track acts as a series resistor to stop the audio from the modulator going to earth.

Tone override

The problem with using a tone oscillator is that when the man at the other end calls you and says that he has a signal from you, you tend to get excited and start talking without turning the oscillator off. One of the peculiarities of 10GHz gear of this type is that you do not have any transmit-receive switching to worry about, in fact you can do both at the same time. Because of this the press-to-talk switch on the microphone is redundant for its normal purpose, and so can be pressed into service as an automatic tone defeat switch.

Construction

There aren't any special precautions to be taken when building the circuit, except that it is preferable to use good quality components. You do not want the gear to let you down when you are operating on a hill top 50 miles from home. The two .47μFd capacitors, connecting the audio and tone circuits to the top of the tuning control, should be checked to ensure that there isn't dc leakage through them, as this could cause a slight change in transmit frequency when going from tone to audio.

The unit could be built on a piece of Veroboard, but a special PCB for the circuit is available at a cost of £3 including post and packing from the Microwave Society, at 81 Ringwood Highway, Coventry CV2 2GT. This board is designed to fit on the side face of a standard die-cast box, and matches in size the receiver board, which will be described in next month's article. By mounting both boards on the side faces of the box, enough space is left in the centre of the enclosure to accommodate the microwave head, loudspeaker and the controls, making a very compact unit.

COMPONENTS LIST

IC1	7805
T1	BC108
T2	TIS43
D1	IN4001
C1,9	.01 disc
C2	470μF 16V elect
C3	4.7μF 16V elect
C4,7	.1 disc
C5,6	.47 polyester
C8	100μF 16V elect
R1	1MΩ ¼W
R2,4	270Ω ¼W
R3,5,6	100Ω ¼W
R7,8	100kΩ ¼W
VR1,3	10kΩ preset
VR2	1kΩ 10 turn pot
S1	SPST switch

ARE YOU A BUDDING WRITER?

We are particularly keen to receive construction articles, so if you have designed and built a project which you think could be of interest to fellow radio amateurs we would be pleased to receive your contribution.

You do not need to be an expert writer to see your name in print. Accuracy in the design of your project is far more important. If you can put your ideas down on paper, typewritten if possible, and illustrate them with clear drawings and photographs where appropriate, the *Amateur Radio* editorial team will sort out the style, grammar, spelling, etc.

If you have an idea which you wish to discuss with the Editor before submitting in article form, she will be pleased to receive your call.

We will, of course, pay for all articles which are accepted for publication.

HEATHKIT RA-1 RECEIVER

This excellent, robust, all valve amateur bands communications receiver is readily available secondhand. Richard Marris G2BZQ comments on its facilities

Valves are those funny vintage glass things which plug into sockets, can quickly be extracted and replaced, and bought at a reasonable price from advertisers in this journal. They can be over-run, abused and ill treated, and still keep on working! Drop one on the floor and it will probably still work! Give one a sharp tap when it is located in its socket, and it will invariably shatter; a fact which can probably be attributed to an unknown law by a near relation of that well known lawgiver – Mr Murphy!

If fitted with battleworthy valves, and carefully re-aligned (if necessary), the RA-1 will take a lot of beating by one of the current oriental black box receivers purchased at a high price.

At its introduction, over twenty years ago, the writer purchased a Heathkit RA-1 in kit form. It was assembled, with the aid of the more than excellent instruction manual, and used until it was sold (with subsequent regret) when the writer moved his working QTH to W0-land in the USA.

Just a few years ago, having returned from the USA, another RA-1, with matching xtal calibrator, was purchased secondhand at a reasonable price. It was re-aligned using a BC221 – this, or a very accurate signal generator, is absolutely necessary to re-align the IF stages. A new EF183 RF amplifier valve was installed and it has given yeoman's service ever since.

A surplus RA-1 (complete with 100kHz xtal calibrator) can be purchased for between £20 and £50. If it is in redeemable condition, then it is a bargain!

Would you believe that on 80 metre CW the writer's RA-1 (IFs accurately lined up) is in such a state that the variable RF/LF gain control is seldom more than 50/75% of the maximum position. The AF gain control is usually around the 50% position. Headphones are used.

'Ah yes', it will be said, 'but G2BZQ probably has a multi-element super dooper, mumbo-jumbo, fantastika, gold plated beam antenna, right on the top of the local mountain!'

This rumour is completely unfounded. Actually, an indoor antenna is used for transmitting and receiving in an apartment block, in a built up area. On 20 metres an all valve transceiver is used with an indoor antenna. On 80 metres CW an indoor antenna is also used, together with a Tx which can be 'wound up' to about 12 watts, but is usually running at 10 watts. The RA-1 Rx is used, again with an indoor antenna, on 80 metres.

Buying one?

So – buy a secondhand RA-1! Make certain that it comes complete with instruction manual, that it is physically and mechanically sound and that it is actually working, efficiently or otherwise.

The manual is superb. It includes specification, circuit description, parts list, step by step assembly, many detailed drawings and diagrams, alignment, testing and operating. If the receiver does not work, then there is a trouble-shooting section.

If you buy a surplus RA-1 complete with manual, and it is 100% all there whether working or not, starting at page 1 of the manual and checking every connection and operation – stage by stage – until you reach the last page will ensure that you will have a first class receiver.

The RA-1 receiver covers the following frequencies:
1.7 to 2.0MHz
3.5 to 4.0MHz
7.0 to 7.3MHz
14.0 to 14.45MHz
21.0 to 21.50MHz
28.0 to 30.00MHz

In other words it covers the 160, 80, 40, 20, 15 and 10 metre bands.

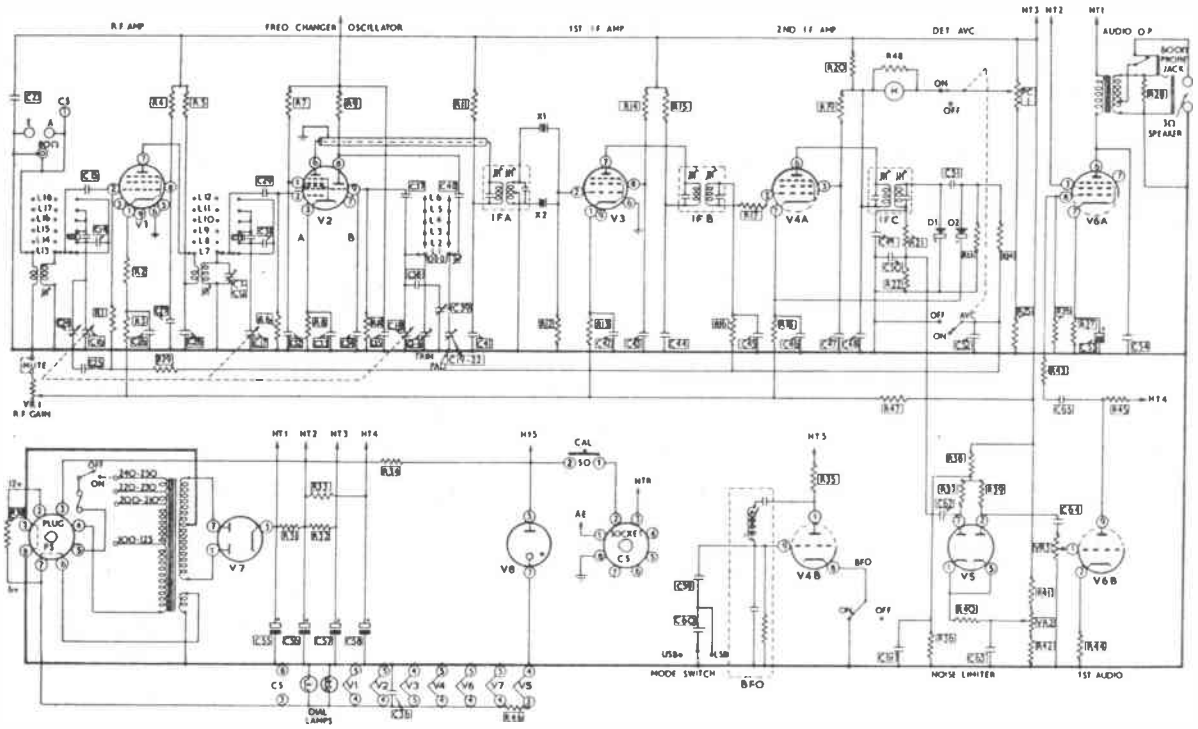
The sensitivity is quoted as 2 microvolts for 10dB S/N ratio or better (if you have the gear, and the knowhow, then it can be better).

The antenna input impedance is quoted as 75 ohms coaxial. The writer uses a 50 ohm antenna system with the front panel Ant Trim adjustment, and this is quite satisfactory.

The audio output is 2 watts via a 3 ohm loudspeaker (not included), or 600 ohm impedance headphones. The writer has tried both 1000 ohm and 400 ohm headphones and, frankly, in practice it is impossible to detect any difference.

The image rejection is quoted as 40dB or better, and this can be achieved with careful alignment. The RA-1 employs 7 valves, 2 semiconductor diodes and a

Heathkit RA-1 circuit diagram (courtesy Heathkit)



Front panel controls

AF gain (and on/off switch)
Tuning control/dial
On/off BFO switch
Upper and lower sideband switch
S-meter
Antenna trimmer
RF gain control
Band change switch
AVC on/off switch
Crystal calibrator on/off push button switch (every 100kHz markers)
Noise limiter variable control

voltage stabiliser. The front panel controls are shown in the table.

It will be noted that the question of IF frequency and selectivity has been carefully avoided so far. This is because it has to be explained in some detail.

There are two IF stages using EF183 and ECF82 valves and the IF frequency is 1621kHz. The anode of the frequency changer is coupled to the grid of the first IF amplifier valve via a half lattice crystal filter in the secondary winding of the IF transformer. The half lattice crystal filter provides a narrow bandpass for suppression of adjacent unwanted signals, which gives the RA-1 excellent selectivity. The crystals are 1.6214 and 1.6197MHz respectively. Here lies the biggest pitfall!

Your secondhand RA-1 should come with the IFs already accurately aligned. Resist the temptation to just give the dust cores of the IFs a little 'twiddle' – that is fatal! If you have reason to suspect that the IFs are incorrectly aligned, then get a highly accurate signal source on 1621kHz and carefully make a check. Spend some time studying the circuit specification and the handbook. If you are absolutely convinced that the IFs have been twiddled by a previous owner, and are 'off tune', then proceed to re-align with care and do not hurry. Make a pencil mark on the IF can and on the chassis, so that if you move one of the dust cores you can get back to the original point. If need be, do just that. Messing about with the IFs can be a bit dodgy!

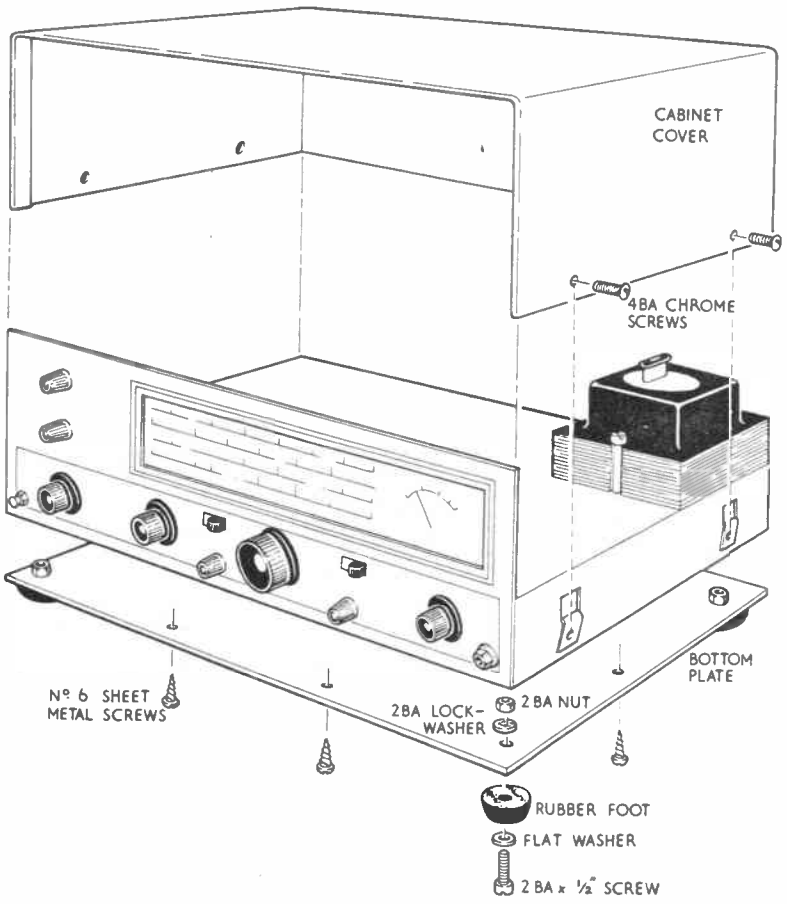
Testing and trouble-shooting

Apart from the above remarks, it will be found that the manual adequately covers testing and trouble-shooting.

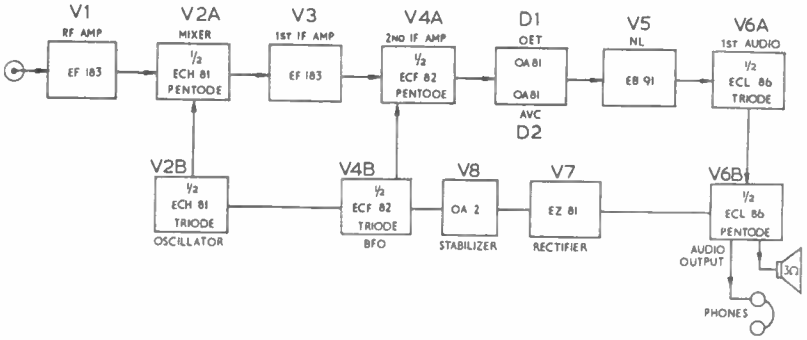
If your RA-1 has had plenty of hours in service over its life, then it is a must to replace the RF amplifier valve, type EF183 (V1 on the circuit diagram). Copies of the circuit diagram and the block diagram are shown below.

The illustration shows the general panel and chassis layout, with the cover and baseplate removed. The cabinet size is 13¼ × 11½ × 6½ins high, and its weight is 8lbs.

An optional extra is a 100kHz crystal calibrator, which plugs into an octal socket on the chassis. This gives a frequency coverage of up to 30MHz in 100kHz harmonic steps. It is activated by



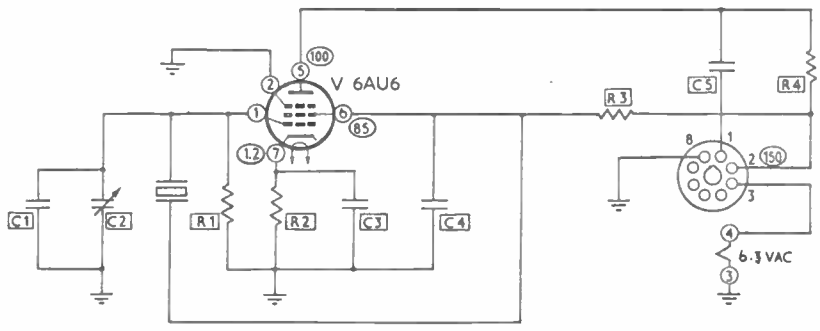
General panel and chassis layout (courtesy Heathkit)



Block diagram (courtesy Heathkit)

CL-1 crystal calibrator circuit diagram

Component values
C1-22pF C3-5000pF C5-10pF R1-470kΩ R3-100kΩ
C2- 8-50pF C4-100pF R2-1000Ω R4-100kΩ



a small red push-button on the front panel, and is a must for calibration purposes. The Heathkit type number for the crystal calibrator is model CL-1, and hopefully it will be fitted to the RA-1 already.

Make your own

If you cannot get one, then the circuit diagram and component values are given below, and it would not be difficult to make up your own crystal calibrator. The crystal is 100kHz with .005% tolerance. The valve is shown as a 6AU6, but an EF94 can be used. Trimmer C2 is to adjust the frequency to exactly 100kHz, providing you can find an instrument accurate enough to measure closer than a .005% tolerance!

In conclusion it can be confirmed that the Heathkit RA-1 receiver is an attractively styled, well built and robust instrument. Remember that originally they were sold as kits for home assembly, so the one you buy will depend a lot on the standard of soldering by the original constructor. It is a good idea to have a good look at all soldered joints, and carefully re-solder if and when required.

The performance of the RA-1 more than favourably compares with many present day, expensive black box receivers. What is more, everything is nice and cleanly spaced out and can be located on the chassis, which is more than can be said for most of the electronic jungles in the aforesaid black box Rxs.

SWL interest

A point of interest to the SWL in particular, is that Heathkit also made a general coverage cousin to the RA-1. This is the RG-1 general coverage communication receiver, and is an excellent job which can often be bought at a reasonable price. Once again, if you buy one, make certain you get the handbook/manual!

ATTENTION ALL RTTY OPERATORS!!

DID YOU KNOW that 'Software-only approaches may demonstrate some elegent programming, but for reliability youcan't beat a terminal unit' REW March '86.

WELL SCARAB SYSTEMS ARE PLEASED TO ANNOUNCE THE NEXT BEST THING.

SCARAB SYSTEMS are pleased to announce the NITE-2 RTTY filter unit. This is a new concept in RTTY filters as it not only improves filtering on conventional terminal units but also provides the computer operator who is operating a software only package with substantial signal enhancement. The NITE-2 features a pre-amplifier, limiter, tuneable bandpass filter and output amplifier. The output from the unit is variable so allowing maximum drive for users of non interfaced programs. An audio isolating transformer is included, this has been found to reduce the noise fed back into the transceiver from the computer. The NITE-2 is a must for all RTTY operators and especially for those computer users still running programs requiring no terminal unit.

The NITE-2 is supplied either ready boxed (matching the MPTU-1) or as a ready assembled PCB excluding switches, LEDs and case.

The fully cased NITE-2 is available at £34.95 + £1.00 P&P.

The unboxed fully assembled NITE-2 is available at £24.95 + 50p P&P.

PLEASE NOTE. Software is not provided.

SCARAB SYSTEMS produce many other high quality software programs for other computers – please write for further details.

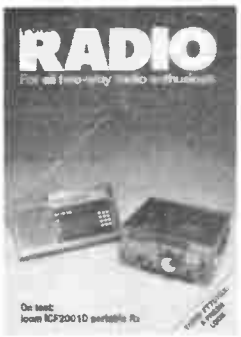
Distributors
UK Ward Electronics, D W Electronics, S P Electronics.
Scandinavia. Chara Electronics, Hofors – Sweden.
Australasia. Essex Mellor Pty Adelaide.

Or available directly from:-

SCARAB SYSTEMS
39 STAFFORD ST, GILLINGHAM, KENT ME7 5EN
TEL: MEDWAY (0634) 570441

VISA

Amateur Radio – the monthly magazine for all two-way radio enthusiasts



Don't take a chance on being able to get your copy

AVOID DISAPPOINTMENT

Place a regular order with your newsagent

Should you have any difficulties obtaining a copy, phone (0277) 219876 or write to Circulation Department, ***Amateur Radio,*** Sovereign House, Brentwood, Essex, CM14 4SE.

NEWSAGENT ORDER FORM

To (name of newsagent) .....

Please order a copy of ***Amateur Radio*** for me every month

NAME .....

ADDRESS .....

.....

..... POSTCODE .....

Newstrade distributors: Argus Press Sales & Distribution Ltd, 12-18 Paul Street, London EC2A 4JS. (Tel: 01-247 8233)

ECW FOR KITS

Audio Amplifiers

* 2.5W Ultra–Miniature Amplifier kit
Pre + power stages – 4 to 15V d.c. supply
measures just 42x32x27mm
K2637 **£8.59**

* 20W Power Amplifier kit
High quality, fully protected, easy–build
K2592 **£12.90**

Power Supplies

* 1A general purpose supply kit
1.2 to 35V output, IC–controlled,
good line + load regulation
suits many equipment applications
K1823 **£9.38**

* High quality 3A adjustable supply
0 to 24V output
Ideal for bench–top applications
K2623 **£33.73**

ECW FOR KITS

Prices include VAT & Postage,
For your order, please make cheques payable to
ELECTRONIC & COMPUTER WORKSHOP LTD
171 Broomfield Road, Chelmsford, Essex,
CM1 1RY Telephone (0245)262149

Tony Smith G4FAI takes his bimonthly look at the world of dots and dashes

Hello!

Welcome to the new column, which will appear bi-monthly. Many amateurs still use, and enjoy, Morse on the air, and I aim to provide something of interest for enthusiasts at all levels of achievement.

I hope to show beginners something of the fascination and pleasure of Morse operating, to discuss matters of current interest, to invite comment and advice from the more experienced practitioners of the art, and to look back from time to time to earlier days.

Anything about Morse will be the order of the day here, and correspondence will always be welcome. I will try to answer all letters through the column, and will occasionally reply direct on matters of special interest.

OK G-QRP tests

Over the weekend of 1-2 February, the G-QRP Club put up two teams of operators, one in England and one in Scotland, to give Czech amateurs the opportunity to test their QRP equipment over the path to the UK on a number of frequencies. Operation was entirely in CW, and a comprehensive schedule covered the 1.8, 3.5, 7, 10, 14, and 21MHz bands. Conditions were reasonable considering the low sunspot activity, and the only bands providing no contacts were 1.8 and 21MHz.

Nearly fifty contacts were made with powers ranging from one to four watts output, the major surprise being that almost half of all contacts were on 10MHz. All but six of the contacts were made by stations south of a line drawn east from Merseyside. The UK co-ordinator, G8PG, feels this adds further confirmation to previous evidence that on such east/west paths the further north one of the stations is, the more difficult it becomes to make contact.

Owing to unforeseen circumstances, the tests were not well publicised in either country, which would have given other operators a chance to take part. Nevertheless, they provided a meaningful and enjoyable CW activity. G8PG hoped to have operators of known ability prove the path thoroughly in preparation for the tests becoming an annual event. This, he considers, '. . . was fully achieved, so next time it should be much bigger and better'.

That's DX!

GM stations may not have too good a path to OK, but during the QRP Winter Sports in the week after Christmas CW optimised QRP contacts in a different direction when GM3OXX/A, with one watt, worked WB2RZU (5W) on 14MHz on three separate days, and a number of other G-QRPers also worked the American station.

On the same band, Iain Robertson GM4HBG/A, using the new G-QRP-C 'Oner' Tx (1 × 1 × 1ins × 1W) worked VU2TTC, who was using the QRP Club's famous 'OXO' 2W transmitter. By a very nice coincidence, both Txs were designed by GM3OXX.

Even more success was achieved by GM4HBG on 23 January, when he called CQ DX on 3.505MHz and was answered by VK3NC with 339 and a ten minute QSO! Almost as an anti-climax, he worked VE1BNN and K2RR/1 on the same frequency about an hour later.

For these contacts Iain used a Shimuzu Denshi 105S transceiver with 3W input, with the receiver section modified to provide very low noise levels. His transmitting antenna was a carefully tuned half-wave dipole at 48ft, and for receiving he used a shielded loop.

Who said QRP needed sunspots? What it does need, for results like these, is careful preparation, a very good antenna system, an even better operator . . . and Morse!

Morse history

I greatly enjoy researching the origins of Morse, and occasionally give a talk on the subject (next one at the Leighton-Linslade Radio Club on 7 July, if anyone is interested). I am currently trying to find details of the Berlin Conference of 1851, where International Morse as we know it today is said to have been devised.

This conference is often mentioned, but a closer look at the records shows an 1851 conference in Vienna, not in Berlin. It was agreed in Vienna that the Morse telegraph system should be adopted for use in Austria and Germany. It was also agreed that telegraph wires should henceforth cross frontiers to avoid the need for telegraph clerks to physically hand messages over the border line for onward transmission!

I already have some information about how the new code was constructed from a number of existing codes, and why it was thought necessary, but I can't get hold of the full details. If readers have more information, or any suggestions I could follow up, I should be delighted to hear from them. I will report progress in due course.

Morse tests

The RSGB's 'Year in Review', in *RadCom*, November 1985, discussed the relationship between the society and the media, saying, 'it is preferable to have little publicity than the wrong sort of publicity'. This was in reference to general press coverage, and may well be right, but is the RSGB extending this attitude to amateur radio magazines?

New arrangements

I mention this in relation to the new Morse testing arrangements, effective from 1 April. At the time of writing, just three weeks before the 'off', the booklet for prospective examiners had not appeared.

On behalf of this column, I asked the RSGB for information, such as details of the 20wpm test for examiners, what were the society's interim plans in the light of the unexpected delay, and how was the scheme to be administered?

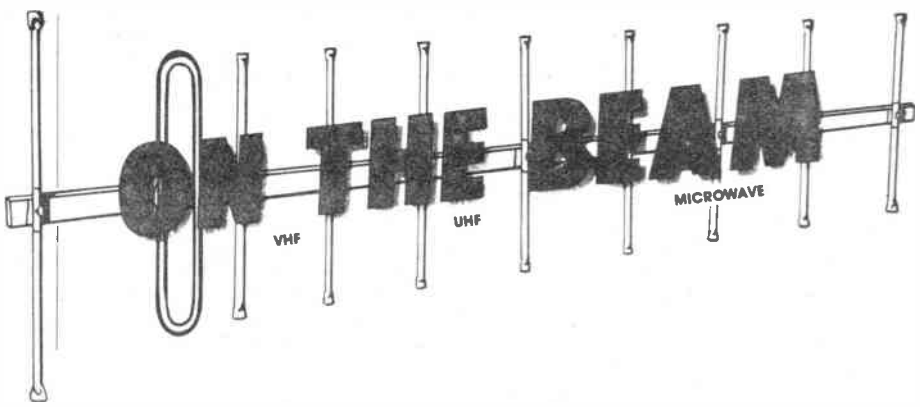
All perfectly reasonable questions from a column actually specialising in Morse and, at that late stage, information which would, presumably, be readily available. Regrettably, no one seemed to know anything, and several promises to 'ring back' were not honoured. All this over a period of four days.

I don't know if it was incompetence, indifference, or whether I simply expected too much. I had actually planned different copy for this piece, full of enthusiasm for the new scheme, which I certainly hope will be successful. The RSGB must be prepared, however, for discussion and judgement by interested parties in the light of both its performance and the image it presents.

No time!

On a previous occasion I asked if they ever issued press statements, and was told, 'Oh, we don't have time for anything like that!' Maybe not, but when anything else comes up of interest, I hope they will have learned to respond more positively to responsible enquiries, even if only to avoid further uncomplimentary comments!

By the time this appears in print, no doubt the scheme will have swung into action. In the light of its shaky start, I imagine it will be a subject for discussion for some time to come.



News and comment from Glen Ross G8MWR

Interference

The problems of TVI neither go away, nor are they always easily dealt with, but some very disturbing news is starting to circulate as to the sort of treatment amateurs are receiving from the authorities.

The normal procedure now seems to be for the RIS to assume that you are causing the interference and to send you a letter stating that a complaint has been received.

It continues by saying 'let me know within the next month if you have resolved the problem' because if you have not done so they may have to vary your licence. In practical terms this usually means putting you on to reduced power or even closing you down for a given period.

Because a copy of this correspondence also goes to your complaining neighbour, and the RIS is already threatening to close you down if the interference is not cleared, it does not encourage him to assist in sorting the problem out.

Your protestation that it is not your gear at fault but his poorly designed equipment is not going to go far in this situation.

Prolongation

Reports are already coming in of amateurs being closed down for, say, a month on the basis of one incident and then being closed down for a further period as a result of other complaints that were made at the same time as the original one. Obviously this could be continued indefinitely and is intolerable to the VHF fraternity.

Unbelievable

The RSGB represents the amateur radio hobby in this country and one has no hesitation in saying that, in general, it does an excellent job. Yet, by its own admission, it was not consulted before these new measures and letters were instituted.

It was also not consulted before the fiasco of the new licence schedule was introduced. Surely one is entitled to ask why not? The RSGB have been in existence for so long now that a really watertight working arrangement with the authorities should have been obtained many years ago.

Can one imagine a trades union not being aware of a new legislation that was to be introduced? Some two years ago the RSGB admitted that it was not aware of a British standard relating to interference immunity and that they were not on the mailing list for such information.

Refusal

The DTI have refused to accept the RSGB request to set aside the new guidelines, although they did offer to reword the offending letters. One thing is absolutely certain; the Society is now getting its teeth firmly into the problem and is in fact using it as a publicity campaign to gain new members.

There is talk of possible litigation and the expense that this would involve. It must be obvious to everyone concerned that we are going to have a real fight on our hands.

If you have any information at all and certainly if you are threatened with a variation in your licence, even if you are not a member, please inform the RSGB as soon as possible at Cranborne Road, Potters Bar EN6 3JW.

Immunity

There was a new standard being proposed to limit the problems of RFI on domestic and other equipment, but this has been delayed because a Common Market working group is putting forward its own ideas in 'a year or two'. When this is finalised the ruling will be operational throughout most of Europe.

This new CENELEC proposal defines immunity in terms of the strength of unwanted signal that the TV or other appliance should be capable of operating in without undue interference. However, try explaining to your neighbour that the bit of patterning he is suffering does not constitute undue interference.

The main problem with the levels proposed is that they are so low that most amateurs would find it very difficult to live within the regulations without running flea power to a piece of wet string, and goodbye to DX with high power and a large aerial system.

The certificates

Ian G1OZR from Rye claims a 144 Bronze award with the best DX being OZ1KFQ at 999kms. He uses an FT290 with a 30 watt linear and the aerial is a five element at 15 feet above ground, which in his case means 15ft asl. This sort of set-up seems to be extremely common and the results achieved by such an installation can be very impressive. Chris G1FUU writes to contest G1OSU's claim to being the second lady to get a Bronze award.

She admits that signing the claim form with her full name may have helped. As I do not keep records of the dates awards were issued we will have to declare the contest a draw. Do not forget that you do not need QSL cards to claim the awards and details are available from the address at the end of the feature.

Geography

A letter from Irwin GI1JUS mentions that our hobby is an excellent way to learn geography and takes me to task for saying that GW1FOF must be one of our most westerly stations. The problem is that I tend to think in terms of beam headings from my QTH in the centre of England, and whilst as he says many stations in Cornwall, Ireland and Scotland are further west of the Greenwich meridian, they are far from a westerly beam heading to me.

The real point I was trying to make is that, apart from openings, the usual beam headings in the UK are roughly north and south, and anyone living along the western coasts gets a thin time. This is a pity as a contact from, say, London into Cornwall is much better DX than one into F or ON.

Morse tests

The responsibility for Morse testing was taken over by the RSGB as of 1 April and they intend to set up test centres at some seventy locations. I have received a report from a member who tried to book a test from them and was told that it was going to take some time to get the whole thing properly organised. They informed him that they hoped it could be arranged by June or July!

The person concerned lives in the centre of England, not in some remote area, and whilst it is reasonable to concede that it may take time to set up the national network, these problems were apparent right from the start.

Matter of urgency

Surely centres in London, Bristol, Birmingham, Manchester, and a few other similar large towns with a reasonable geographical spread, should have been set up as a matter of urgency. This would still have meant people travelling some distance to take the test, but with an understanding of the problem most people would have accepted it, and at least the facilities would have been up and running.

Satellites

One of the few things that can be reported about these devices is that they are still up there. The amount of use that

they get seems to be minimal and most magazines comment on the lack of activity reports.

Even AMSAT admit that although they have a large membership only a minute fraction of those members are actually active on the things.

What a waste?

Yet we still go on putting them up there and, in the near future, we should have a couple of new Russian units and one built by the Japanese. In fact most of the constructional work has been done by the huge NEC conglomerate at a cost of over one million pounds. As well as the usual transponder arrangements, the satellite will also have a digital store which will enable you to put messages into its memory which can be heard later by the station you wish to communicate with.

Specifications

The unit is a polyhedron (26 faces), covered with solar cells and is roughly fifteen inches across, weighing in at fifty pounds.

It is due to be launched in August and will be placed in a circular orbit at a height of 1500kms, which means it will come round once every two hours. The inclination will be 50 degrees and its anticipated life is three years.

The details for the transponder system are: input between 145.9 and 146MHz, with output between 435.9 and 435.8MHz, the output having inverted sidebands to counteract doppler shift. The required uplink radiated power is estimated at 100 watts and the downlink will be running 2 watts.

The digital transponder will have four input frequencies of 145.85, .87, .89 and .91MHz, but only a single downlink on 435.91MHz. The uplink ERP is again 100 watts and the downlink will run 1 watt. The digital signal format will be 1200 baud PSK.

Beacons

There will be two beacons on the unit: the first will run 100 milliwatts of CW or PSK and will be on 435.975MHz; the telemetry beacon will be on 435.91MHz running 1 watt of PSK. The aerial system is a monopole for receiving, which will be mounted on the upper surface, while the two transmit systems will each have four monopole elements spaced around the satellite. These will be phased in such a way as to provide left-hand circular polarisation when, as the Japanese handout so neatly puts it, you are looking at the satellite 'up its bottom'.

Let's hope that all this work and expense gets a lot more use than previous units, at least you have all the details currently available to enable you to give it a try.

Things to do

For the contest operator May provides several opportunities to join the fray. For the two metre man the big contest is on the 17th and 18th of the month. For 23cms the Trophy contest is held on the 31st, whilst over the weekend of the 3rd and 4th you can have a crack at working any band between 432MHz and 24GHz. The specific microwave contests are run concurrently on the 11th, which will see the second leg of the 10GHz cumulatives and also a dedicated contest on 5.7GHz.

Looking a little ahead, 1 June is the date for the 432MHz Trophy and SWL contest. The VHF bands are a great place for the SWL and there are several contests aimed specifically at them.

Closedown

News is coming in of VHF contests being organised that will only accept old type squares; I will pass on details as I get them. There seems to be some open warfare brewing up over the operation of the MH repeater, with the possibility of a rival group putting in a take over bid for it, although it is thought that Rupert Murdoch is not involved – yet.

Don't forget that most of the information and comments in this feature come from our readers and we want to hear from you. Please contact me at 81 Ringwood Highway, Coventry, or on Prestel 203616941.

SECONDHAND EQUIPMENT GUIDE

by Hugh Allison G3XSE

A few months ago I made a comment about the frequency stability of a certain Codar receiver, which seemed to touch a raw nerve with quite a lot of readers. Although a few of the letters were specific to the Codar under discussion, most were of a more general nature. Please note that the following will only be of interest to the owners of non-stabilized valve receivers: don't go motoring in with a 'valve' stabilizer if you own an all bells and whistles synthesized Japanese wonderbox. Also remember that valve receivers can *kill*, so if you don't know what you're doing, don't do it.

Codar problems

The problem with the Codar was the extremely poor HT regulation. This makes the resolving of SSB signals difficult because the audio level rises and falls in your receiver as the transmitting station speaks. This can only come about by the audio output valve taking more (or less) current, causing the HT voltage to go up and down as the current varies. The local oscillator runs more or less directly from the HT rail, so as the voltage goes up and down the tuning appears to go for a wander. To a certain extent the BFO frequency will go walkies as well, just to make things worse.

A good guide to poor voltage regulation is to try resolving an SSB station whilst wearing headphones. The audio will be at a much lower level and thus the HT rail will not wander so much and stability should be better. Whilst wearing the headphones try gently whacking the case of the receiver. If reception is affected then microphony is your problem – maybe a dodgy valve in the local oscillator or BFO position.

Aggravating the situation

The reason microphony shows up when wearing headphones is that the receiver's internal speaker, which may be aggravating the situation, is now disconnected.

If, however, the resolution of SSB is much improved at low levels and is unaffected by a whack, then HT stabilization is probably your problem. A voltmeter across the HT supply to the local oscillator stage (and/or BFO) should stay stable to within a volt or so when the volume control is varied between silence and a moderate amount of audio coming out of the speaker. If you find a change over, say, five volts, then you have probably found the problem.

The solution is a valve stabilizer tube, more correctly called a cold cathode stabilizer. These are gas filled tubes which will maintain a constant voltage across them, whilst the supply varies. Examples of these, such as the old VR105 and VR150, can only be picked up secondhand now, at junk sales and rallies for a few pence.

Common circuit

If you refer to *Figure 1*, the 50k resistor forms the anode load of the oscillator valve. This is a fairly common type of circuit for the basic valve receivers we are talking about. To stabilize the HT you will have to disconnect the 50k resistor (or whatever you have in your receiver) from the HT and connect it up to the stabilizer, as per *Figure 2*. To calculate the resistor value R_L you have to know the voltage *across* it. This is the HT rail voltage minus the stabilizer tube voltage ie, say 350 volts HT minus the 150 of the tube equals 200 volts.

We now need to know the current drawn by the oscillator and BFO stage if we plan to stabilize this as well, which can be measured (stick an ammeter in series with the 50k resistor plus BFO) at, say, 15mA. Most of the cold cathode tubes worked with about 5mA passing through them to keep them running, so this is a fair figure to use as a starter. Add this 5mA to the oscillator current, ie 5+15 = 20mA.

Mr Ohm I presume . . .

Although a gentleman called Ohm gave us a nice little law to enable us to work out the resistor value (V=IR therefore 200=20/1000R, therefore R=10,000 or 10k), I prefer to use the 1 volt, 1mA, 1k rule, which says that 1 volt across a 1k resistor will result in 1mA flowing, so 200 volts across a 1k will give 200mA,so 10k will give the required 20mA. Connect it all up and try it. The stabilizer tube should light a moderate to gentle violet/pink/orangey colour. A really brilliant light means that you have worked your load resistor value out wrong. They should also run cool to the touch. Check that it doesn't go out on any band; if it does, come down a few kΩ to up the stabilizer current.

The problem with stabilizing like this is that the oscillator is now, of course, running on a lower voltage. Check that it starts up and runs reliably on all bands and that calibration has not been affected. If it has, try lowering the value of the oscillator load resistor – the 50k in *Figure 1* – although I wouldn't expect it to have to go lower than half of its original value.

'One band dead' receivers

In addition to a couple of letters asking about stability, there were a few from readers asking for advice on receivers that were dead on one band. The first thing to do is to establish whether the local oscillator is running. This is quite simple to do; all you need is another receiver capable of receiving on the band that the dead receiver isn't working on. Connect the aerial sockets of the two receivers together and try and find a strong, unmodulated carrier, either plus or minus the IF frequency of the 'dead' receiver, on the good one. Check that the carrier moves as you tune the dead receiver.

To get an idea of what you are looking for (and how far away to look), try and find this carrier on a known working band. Incidentally, I often use this trick when repairing dead medium wave portables. Just place the dead set tuned to about 1MHz (ie, roughly Radio 2. I know this is about 100kHz out, but it's near enough) next to a working medium wave portable tuned 'up the Luxembourg end'. Again a strong, unmodulated carrier indicates all's well in the local oscillator department.

Let us assume that the local oscillator is *not* running. An analysis of how the receiver stopped working on the dead band may give a clue as to what's wrong.

If the receiver doesn't work on the lowest frequency band and stopped working first at the low frequency end of that range, ie, it bursts into life half way up that band, then a good guess might be that a capacitor has gone low in value: either the cathode decoupler or the anode dc blocking one would be worth a look. Check by connecting a known good one in parallel. Dying out at the top end of the range, particularly on the top frequency range, probably means there is a low valve emission.

Here yesterday, gone today

If, however, the receiver just doesn't work one day on one band, then it's probably a more mechanical fault. For the time it takes it's worth analysing the feel of the bandchange switch. If it feels graunchy when selecting the dead band, a good look at the appropriate switch wafer should reveal the problem.

If it isn't that, then a quick check of the appropriate coil with an AVO is worth-

while. No results by now means real aggro, you have to start working. Check that the HT remains on the anode of the oscillator valve on the dead band, and doesn't go low. One real sod of a receiver, that drove me up the wall, had a pentode as the local oscillator and it eventually turned out that someone had changed the resistor feeding grid 2 for a wire-wound variant, which just happened to resonate with its 'decoupling' capacitor on its lowest band.

RF stage

If the receiver *does* have the local oscillator running on its dead band, then it's the RF stage that's playing up. In a simple receiver this will just be the aerial input coil. Note that this is often a ferrite aerial, especially on the medium and long wave bands, and has to be located outside the metal case as this would otherwise screen it from the incoming signal.

Very often either the coil has been damaged or the long wires to it have suffered. It is unusual for a valve in the RF stage to cause total deafness on one band – you can normally hear something. Your best bet is to examine the aerial input coil or the wafer switch.

Poor performance, especially on the HF band, or noise, can often be put down to failing valve emissions etc, but rarely dead on one band. I apologise to readers who wrote in about the above and didn't receive a personal reply; there were so many letters that it wasn't practical. I hope the above answers your collective queries.

IC255

A couple of queries on this fairly reliable two metre FM work-horse. Low, intermittent or no reading on the S-meter on receive is the pot inside. It's marked 'set RF' on the board, and a good way of dealing with this one is to note its position, give it a blast of cleaning fluid, turn the pot from end to end several times, then re-set it to its previously noted position.

The other problem recently encountered in the 255 concerns the 2SB529 (marked, true to Japanese form, B529). This is in series with the output power module and is the only power transistor visible in the PA 'lump' on the rear when you've got it out. Its job in life is to deal with the power reduction circuit. If it goes open circuit (rare) you get the symptoms of a dead module, ie, no RF out on transmit.

Common shortage

If it is being shorted (common) you get no low power facility, ie, it gives 25 watts out on low and high positions. Be warned, the 2SB529 is PNP. Any 5 amp device that will fit seems OK here if you can't get the right one, but if you fit an NPN in by mistake (what fool would do that?) then the high/low switch works backwards (ie, high power in low, and low power in high). We all make mistakes occasionally!

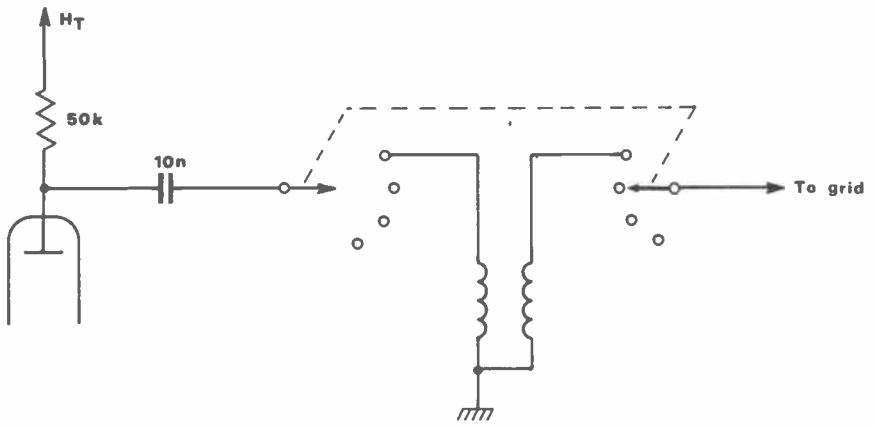


Fig 1 *Common type of circuit for basic valve receivers*

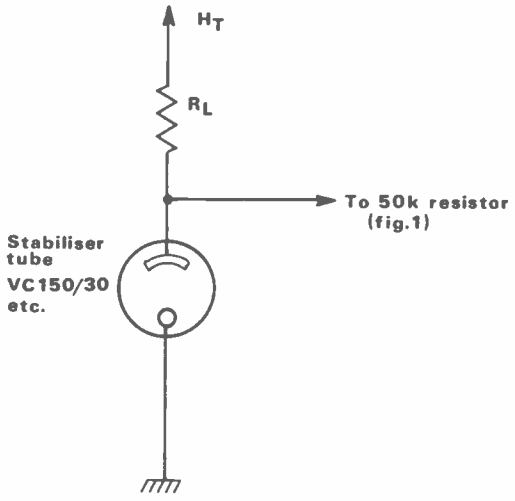


Fig 2 *The stabilizer*

Nokia SV1300

I bet you don't recognise the name of this one, but these are rather nice, all solid-state, high band FM rigs that are now appearing on the secondhand market, normally covered in Marconi labels. Most of those appearing are on about 160MHz and will come down nicely onto two metres. The receiver front-end incorporates a varicap tuning system to give extended frequency coverage between channels; not necessary on two FM but useful on Marine (naughty!). Talking of receive, the specification gives receiver sensitivity as 2μV for 20dB, which isn't exciting, but every one I have played with has comfortably exceeded this, normally only requiring about 0.75μV for 20dB quietening.

Tx is rated at 10 watts and the PA strip, built like the proverbial small brick establishment, will happily chuck out 12 watts on two.

Construction is really weird, but quite practical in a funny sort of way. As well as for mobile use, these rigs are designed for portable use, although I wouldn't like to carry one too far as their weight (quoted as 5.5kg with battery) is a little excessive.

The back bit of the case can hold U2 size cells for portable power. Another quirk of the design is the front panel, which quite neatly swings off for remote use. It is thus fairly easy to install this rig in the smallest of cars by mounting the 'head' in the cabin and the gubbins in the boot. Another nicety is the 3 watts audio output; this is even enough to overcome the racket in my noisy van.

Well equipped

Most of the examples that are poised to come onto the secondhand market are quite well equipped, coming complete with a pair of crystals fitted (useful to check its working before you go shifting its frequency), mobile mount, mike, 'head' extension lead and a handbook. Unfortunately, they will not work! This is because the selcall board will have been removed; at least it has been on all the examples I have come across. Link pin 'G' on the motherboard to pin 'V17', and another link from pin 'F' to the top of C43 and you are in business. At about £35, which is the price I am told they should be selling for at the rallies by the time this is in print, they are well worth looking out for.

dressler

191 FRANCIS ROAD
LEYTON · E10

OPEN: MON – SAT 9AM – 5.30PM
INTEREST FREE HP FACILITIES AVAILABLE ON MANY ITEMS
PROMPT MAIL ORDER

TELEX 8953609 LEXTON G

TEL. 01-558 0854 / 01-556 1415

ACCESS · BARCLAYCARD VISA

LATEST NEWS

ICOM R7000
SCANNING RECEIVER
25MHz-2GHz
Full SSB, AM, FM
& Memories

£899 inc ARA500
Active Antenna Worth £99

DATONG P.C.I.

Fit the PCI with the R7000 or FRG9600 & have 100Kc to 30 MHz general coverage H.F. USB/LSB/AM/FM for

Only £137.00

or with the FRG9600 and all power supplies

£575.00

YAESU FRG-9600 £430

60-905MHz
AM · FM · SSB

AOR 2002

25-550 MHz
+ 800MHz-1.3GHz

YAESU FT-757GX

+ FP757 HD PSU
+ FC757 ATU

TRIO-KENWOOD TS-940

INCLUDING
AUTO-ATU **£1,825**

ICOM R71

100KC-30MHz
AM FM SSB CW
GEN. COV.

YAESU £450 FRG - 8800

+ OPTIONAL
FRV8800 CONVERTOR
GEN. COV.

£260

HX 2000E
An excellent hand-held scanner
60- 80MHz
118-136MHz
136-174MHz
390-490MHz
490-525MHz
AM/FM
5-10-12½Kc steps

DRESSLER ARA 500 ACTIVE ANTENNA

50MHz to 1300MHz
Gain 17dB Typical

TECHNICAL SPECIFICATIONS FOR ARA 500

Gain	17dB Typical (14-17dB)
Frequency Range	50-1300MHz
Noise Figure	1dB at 50-180MHz 1.5dB below 300MHz 2.0dB below 350MHz 2.7dB below 400MHz 3.0dB below 500MHz 3.8dB below 650MHz

£110.00

Operation is possible up to 1300MHz with gain of 10dB
Noise 4-6dB
Intercept Point 3rd Order +18dbm at Input

TRIO KENWOOD TH-21/TH-41

YAESU FT209/709

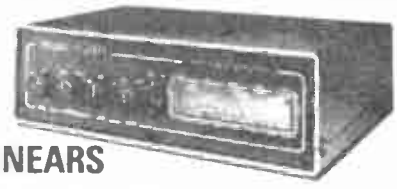
YAESU FT203/703

ICOM IC2E/IC02E

ICOM IC4E/IC04E

PRE-AMPS – NEW MODELS

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

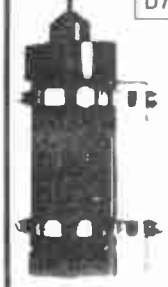


LINEARS

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

RECEIVE PRE-AMPS

MODEL	FREQUENCY	NOISE	GAIN	PRICE
EWPA 560	50-600-1GHz		16.5dB-1dB	£69
IP3 order	+18dBM			
ERPA 1296	1.25-1.30	0.8	17-18dB	£77
ERPA 435	430-440	0.5	15-18dB	£69
ERPA 144	144-146	0.7	16-18dB	£69



dressler – ara 30 – active antenna

200 kHz . . . 40 MHz

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

MUTEK SPECIALISTS

MET ANTENNAS
JAYBEAM ANTENNAS

FREE CLASSIFIED ADS

FREE CLASSIFIED ADS CAN WORK FOR YOU

We are pleased to be able to offer you the opportunity to sell your unwanted equipment advertise your 'wants'.

Simply complete the order form at the end of these ads, feel free to use an extra sheet of paper if there is not enough space. We will accept ads not on our order form.

Send to: ***Amateur Radio Classified Ads,*** Sovereign House, Brentwood, Essex CM14 4SE.

DEADLINE AND CONDITIONS

Advertisements will be published in the first available issue on a first come first served basis. We reserve the right to edit or exclude any ad. Trade advertisements are not accepted.

FOR SALE

■ Signal generator AF, five watts output, bargain, £30 ono. Tel: (021 354) 3850.

■ Redifon GR410/T HF Tx/Rx, 2-16MHz complete with audio, IF and SSB generator/demod boards, plus 24V PSU. Needs VFO but extensive info available, step by step alignment procedure, etc, £50. Buyer collects. Also Boots data recorder, suits most home micros, £25. Mr C A Crabb, 41 West Drive, Edgbaston, Birmingham B5 7RR. Tel: (021 472) 3845.

■ Yaesu 7700 general coverage receiver, 0-30MHz, with memory unit, LED readout display with AM/FM/CW/LSB/USB. Also Yaesu VHF converter FRV7700 and Yaesu antenna tuner, FRT7700 and SP520 Kenwood communication extension speaker. All brand new, still in boxes with instructions, £325. Also Sky Coupler KX-2, £10. Still in box, not been used. Mr N Barlow, Glenside Lon, St Ffraid, Trearddur Bay, Holyhead, Gwynedd LL65 2YR. Tel: (0407) 860575.

■ R1155E (mains modified), £30. US Navy CC46068 receiver, £20. Cossor 1049DB, £20. Marconi signal generator 106, £10. *Practical Wireless* copies, 1960 to 1975, £15. A H Quayle, 38 Greenways, Haywards Heath, Sussex. Tel: (0444) 451241.

■ Toshiba HX10 64K computer plus data recorder, etc. Good cond, hardly used, unwanted gift, £75.00 ono. Exchange for 2m equip, anything considered. Dave Thirsk. Tel: (0845) 567228 any time.

■ Trio model JR310 with Codar PR30 pre-selector, £60. Tel: (0939) 32714.

■ Scanner AOR2002, very little use, as new, in box, very sensitive, can demonstrate 25-550, 800-1300MHz, £340.00 ono. Tel: Bournemouth (0202) 520020, ask for Donald.

■ Drake TR7 general coverage digital processor, base mic, VFO, £1,000. Sony IC2001D, £290. Ferrograph series 6 stereo +2 AKG mics, reel of tape, £80. Commodore +4 computer, 10 games, ace, etc, £90. AOR2002 scanner, new, £370. 26in ITT colour television, remote control, £100. Panasonic VHS video, 'modern', £200. Swap Drake for R7000 Icom with HF receive converter. Miss Fordham, 31C Anerley Park, London SE20.

■ TS940S, AT940, SP940, VSI board, 500Hz CW filter, MC80 mike, all as new, 7 months old, £1,600. AMT-2 for CBM64 with all hardware and leads, £180. Doctor DX contest trainer for CW, (excellent), £50. Star Mastey key with paddle and himoud key, £30. Tonno 1200G green monitor, £25. Wellor soldering irons including PU30 PSU, four types, £20. Three PSUs 0-30V, 5 amp h/d, 0-50V, 5 amp and 13-8V, 7 amp heavy duty, £30. Large transformer, 50 amp, 17V, £15. Hansen 5S twin meter, power/SWR, £10. Magazines and books *Shortwave & Radcom* from 1960 and some earlier, £10. Large collection of components in two wall mounted drawers, £15. Sigma 4 antenna 26.0-30.0MHz, vertical 6dB gain, £25. Alpha II digital multimeter, mains and battery, £30. Terry Cooling G4XMQ, 89 Britten Road, Brighton Hill, Basingstoke, Hants. Tel: B-Stoke 22865.

■ Sony HUC4000P colour camera, mint condition, boxed, plus accessories, £275 ono. Sony tripod, £35.00. Professional Sony B/W monitor, £95.00. Richard. Tel: 01-739 0035 day, 01-958 7247 evenings.

■ FT709R handie with headset, original pkg, £200. FT209R handie with speaker mike, original pkg, £200. CWR610E, RTTY/Morse decoder, complete with 12 inch Novex brown screen monitor, £160. All above items little used and complete with manuals. Swap any one of the above items for quad FM4 stereo tuner, must be in mint condition. Tel: 01-582 7444, weekends.

■ Exchange 35mm camera, auto/man SLR Cosina CT7, lens 50mm Tamron 80/210 tele-foto, 28mm wide angle, Vivitar 2800 dedicated flash, tripod and case, lots extras, worth £275. Wanted: scanner AR2001 or others considered. Tel: (0386) 858878.

■ Icom ICR70 inc FM plus dedic' speaker. Mint cond, £395 ono. G6YKP. Tel: (07816) 2187.

■ Yaesu FRA7700 active antenna, mint, £31. Altai GDO KDM-6, GDO/wavemeter with six plug in coils, 1.5MHz-250MHz, as new, £41. CW transceive program for Spectrum 48K (Technical Software), no hardware needed, £7. VHF/UHF manual, 3rd edition, unmarked, £4.50. Kodak EK160 camera for great instant colour photos, used for only one film, includes carry case, £10. All above ono. Tel: (021 777) 6086.

■ Realistic DX200 general coverage receiver up to 30MHz, SSB, CW, AM, excellent condition, manual, £55 incl postage. Tel: Ash Bank 4587.

■ C5800E/W standard, the only rig that does not require a replacement front-end! 25W, little used, base station only. Daiwa PS120M PSU, 12 amps, 3-15V, extended H/S for maximum op. Bargain package for guaranteed inter-continental QSOs, £420 ovno. Tel: 01-886 3548 (eve), 01-242 1234 ext 2891 (day).

■ X160 receiver, general coverage, 150kHz to 30MHz, with matching communications speaker SP150, all FETs plus ICs with fitted product detector, all solid-state with manual, only £110.00 ovno. Buyer collects. Leon, 12 Stockhurst Close, London SW15. Tel: 01-785 9325.

■ TS120V tscvr 25/30 op vgc. 28/144 tnsvx new. 11 amp PSU. MC50 desk mic new. HF5 vert antenna. 8×8 2m beam. £425 the lot. Inspection invited, buyer collects. A good all round starter package. C S Knight, 130 Main St, Kinglassie, Fife.

■ Icom 211E with RM3 remote keypad with memories. Very clean and boxed, £400. Tel: Harwich (025 55) 53510.

■ Hallicrafter S-36A, 27.8-143MHz FM, AM, with technical manual. Nearest offer to £50. Suggest collection as very weighty! Ken. Tel: (0734) 860148 (Reading).

■ Yaesu FT280 (similar to FT480). Mirage 1016 linear with remote 'head' 10XY (almost new). Bearcat 220FB. IC2E with spare mic, battery pack etc. I have been out of the scene so long I don't know how much this lot's worth, so make me a sensible offer and we can haggle! Neil, ex G8WWB. Tel: (0932) 242469 (Ansafone).

■ 10GHz power measuring kit, thermistor bridge, attenuator, case etc, £25.00. Brass UHF filter, £10.00. 24V dc fluorescent 20W units, £4 each. 432MHz to 28MHz MM converter, £25.00. Land Rover trailer 15cwt, £100. Brian. Tel: 01-998 4739 evenings 9.30 to 10.

■ Ham International jumbo base station, Ham International Concorde II mobile rig, both these multimodes are perfect in every respect. Also, CTE International jumbo Aristocrat mains linear, 600 watts, AM/FM/SSB. Pre-amp, also perfect in every respect. Commodore VIC20 computer, complete with much hard/software. Ideal for amateur use. Reasonable offers accepted. Tel: (084 82) 314.

■ FRG7, mint, boxed, handbook, £110. Sony ICF7600D, boxed, mains PS, external antenna, £120. Ian. Tel: (021 472) 4275.

■ Exchange Tristar 777 for 2m receiver, or sell £100 ono. Sell ZX81 computer plus 161L RAM and printer, £60 ono. K-40 mike, £25 ono. Kevin Maxwell, 32 Queens Dr, Burnfoot, Hawick, Scotland TD9 8EH.

■ Aerials: HF5U and HF5R, £55. 2 metre 5/8 over 5/8 collinear, £15. 70 centimetre 4×½λ glass fibre collinear, £25. Two QQV0640 valves, £25 each. Also 2 metre RF switched pre-amp (Wood and Douglas), £10. All above surplus to requirements. J Carter G1BOF, 19 Hurley Brook Way, Leegomery, Nr Wellington, Shropshire. Tel: (0952) 52126.

■ Silent key sale. FR101 digital Rx, £150. FL101 Tx, £150. Two metre J-beam, eight over eight antenna, £15. Two metre J-beam, four element quad, £15. Homebrew 70cm broadside array, £15. Tektronix scope, £50. BC221, offers. Buyer collects. Contact G3NVO. Tel: Newbury 63692. Or G3VOW. Tel: Newbury 43048.

■ Pre-amp 2-30MHz, £15 including postage. Black and Decker drill, £12. Two metre base station, crystalled R1, R2, R6, R7, S-10, S-12 receiver, only £50. FRG7700 receiver .01-30MHz, £255. Metal detector, £20. C-scope make. Jane. Tel: 01-946 2967.

■ Yaesu FT101ZD Mk3 WARC complete with AM board and CW filter, £425. BNOS 12 amp 12 volt PSU, £85. Yaesu 12 amp, 12 volt PSU, type FP12 C/W speaker, £90. Datong HF converter PC1 200kHz to 31MHz, £120. Datong 2m converter DC144/28, £28. Tel: Andy, Southampton 782545.

■ ITT radio telephone, four channel, 25 watts output, easily converts to two metres, offers around £35.00, or will swap etc for 2m 70cm gear. Anything considered. Tel: (0484) 532403 Hudds, West Yorks.

■ EHT power supply, 3000 volt (approx), including rectifier valve. Used originally for 7in CRT EHT supply, but ideal for linear PSU etc, £15.00 ono or WHY? CRT tube 7in screen approx, including connecter and mu-metal screen, £15.00 ono or WHY? Amateur bands (HF), valve tuner, complete, only needs IF and AF chain to make excellent receiver, complete circuit available, £15.00 ono or WHY? (includes dial). Tel: (09073) 78792 (can return call).

■ Sommerkamp FT277ZD, matching linear FL2277Z, Zetagi transmatch, standard mike, PDL2, Skyking rotator, all complete, excellent condition, sensible offers or exchange word processor. Tony Baker, Norman Cottage, Farm Road, Great Oakley, Harwich, Essex. Tel: (0255) 880776.

■ Exchange Yaesu FT208R case, helical YM24A, speaker, mike, ¼ wave whip, PA3 adapter, charger, all boxed, FNB2 battery pack, NC1A charger. Tristar 777 11m multimode for 70cm multimode or 2m to 70cm transverter, or WHY, or sell £180, £65. Tel: Durham 701429.

■ Trio R2000 receiver, 9 months old, as new, little used, full coverage, cost £460 new, will sell for £375. Reason for sale – going bigger. Buyer collects or arranges carriage. Ken. Tel: (0290) 51491, 6-6.30pm.

■ Belcom LS2OXE 2m hand-held with car charger, and nicads. As new condition with full coverage, yet so small fits in shirt pocket, £85 ono, cash only please. Roberts, 40 Partridge Way, Newport, Gwent NP1 9WN, Wales.

■ FT730R 70cms FM mobile transceiver, new this year, tested only, boxed, £180. Realistic 5 inch DX TV, receives band 1 and 3, UHF and French systems, new condition, boxed, £59. GM4DHJ. Tel: (041 889) 9010 (Paisley).

■ Yaesu FT757GX HF transceiver, Yaesu FC757AT automatic ATU, Yaesu FP757HD PSU, Yaesu fist mic, headphones, iambic Morse key. Purchased new, November 1985, used for one month, all boxed etc, cost £1,200, sell for £975.00. G4WBT, 97 Redland Drive, Northampton NN2 8UG.

■ PRO2003 60 channel scanner, air ham marine and FM, broadcast bands, as new in box, 6 weeks old, current price £300, will sell for £190 ono. Jack Wingrove, 114 Wakehurst Rd, London SW11. Tel: 01-228 4835.

■ Racal RA17 gen cov Rx with SSB adapter and manual, £175. Also Yaesu FT708R 70cms handie, speaker mic, base charger, car charger, mobile bracket, mobile antenna, box etc, £200. FT7 HF tcvr, £225. 7.5 amp PSU, £17.50. Codar PR40 preselector, £12. MX2 SSB hand-held with speaker mic, £50. Trio 7010 SSB 2mtr tcvr, £90. KW107 ATU, £105. All ono. J B Coates, 24 Chapel Rd, Pawlett, Bridgwater, Somerset. Tel: (0278) 684042.

■ IC240 FM mobile transceiver, 10 watt complete with super-scan unit and mobile mount bracket, £110. Mike Mundy, 142 Junction Road, Burgess Hill, West Sussex. Tel: (04446) 41407.

FREE CLASSIFIED ADS

■ Hy-gain 5 (8795) boxed, complete in good condition, uses PLL02A phase lock loop on the Cybernet PTBM-125A4X board. It has 4 bands of 50 channels, covers 2MHz of the 11m band, easily converted to 10m, £120 ono. Tel: 01-471 0669 after 5pm, ask for Danny.

■ Trio 510 HF transceiver, good cond, can deliver up to 30 miles radius, £200. Creed teleprinter with reader and perif, £10. ST5 terminal unit, £20. Large computer power supply (TTL), £16. Will consider px 70cm or 2m equip for any item. Bill Ball G4RSA, 21 Redeave, Fleetwood, Lancs FY7 8DG. Tel: (0253) 41033 ext 28.

■ Pye low-band mobile radio, complete, working, ideal four or six metre project, £20. Would consider a swap? Tel: Epping 78710 after 6pm.

■ TS700G vgc, boxed, manual, Lowe CW sidetone, £250. MMT432/144R, 15dB attenuator, vgc, £110. Revco mag mount plus ⅝ wave whip and coil, £12. VHF wavemeter 65-230MHz, £10. Sandpiper 4m 3 element yagi, unused, £10. Tel: Leamington Spa (0926) 313669.

■ Maplin frequency counter, 8 digit, 10Hz-600MHz, variable time gate, mains/battery operation, fully calibrated, £140 ono. Also DSB-2 transceiver 80m, featured in *Ham Radio Today*. Direct conversion, built from kit, complete with digital readout, case, mic, speaker and service manual. Not fully working: problem in output stage. Needs attention, but in good condition, hence price, £85 ono – less than cost of components alone! D Pratt, Old Vicarage, Helme Village, Meltham, Huddersfield, West Yorkshire. Tel: (0484) 850327 after 6pm.

■ Trio R2000 receiver with VC10 VHF converter, £350 Also Heathkit SW717 receiver, £60. LAR omni-match short wave listeners antenna tuning unit, £30. Tel: Wood Clochan 378.

■ Scopes Tektronix 533A 15MHz dual trace, £65. 555 30MHz dual beam, £90. 581A dual trace, £85. Marconi 801D/8 AM signal generator, 10 to 485MHz, £75. RC oscillator, TF1101, 20Hz to 200kHz, £30. Advance H1 AF generator, sine and square o/p, £35. Many other items of test gear and components. Send sae for list. Pye Olympic low-band AM, £59. AVO 7, £25. G4YVJ Beal, 115 Southdown Road, Portslade, East Sussex BN4 2HJ. Tel: Brighton 416963.

■ Yaesu FT101E new bands 350Hz CW filter, just back SMC overhaul, £350. YC601 digital readout, £65. FV101B ext VFO, £60. FC901 antenna tuner, £85. SP101BP ext spkr, phone-patch for connecting recorder, £35. 0-12V Heath 5in 5MHz lab scope, £30. All collect or carriage as housebound. G4GOF, J H Luxton, Bergheim Battery Hill, Fairlight Cove, Hastings TH35 4AP.

■ 24 complete *Radio Communication* mags, between March '84 to Feb '86. 13 *Amateur Radio* mags from March 1985 to Feb 1986. 25 *Flypast Aero* mags 1981 to 1984. 5 odd *Aeroplane Monthly's*. 97% mint condition. Will split radio and aeros, need room, fair offers to G Curtis, 45 Holyrood Ave, South Harrow, Middx HA2 8UD.

■ Drake R7A communications receiver, virtually brand new, approx 50 hours use, fitted with extra filter and aux 7. Costing £1,500, selling for £850. Tel: Cardiff (0222) 691968.

■ Yaesu FRG9600 VHF/UHF Rx, used for a few hours only, complete with box and manual. Trio R2000 Rx, mint condition. MuTek BBA500U 20-500MHz pre-amp, unused. Kempro KR400RC aerial rotator and clamps, brand new boxed. Some other items available for serious callers only. Executors sale, all items will be sold on best offer basis. Keith Johnson. Tel: (0428) 723018 after 7pm.

■ FT709R 70cm handie with headset, original pkg, hardly used, £200. CWR610E RTTY Morse reader with Novex monitor, £160. FT209R 2m handie with speaker mike, original pkg and charger, £200. All items above complete with manuals. Tom G6IDB. Tel: 01-582 7444, weekends only.

■ Trio R820 Rx CW filter, £400 ono. Swap for SM 220 monitor scope plus cash. Exchange my YG88C CW filter for a YG88A AM filter. John Wright, 12 Norn Hill, Basingstoke, Hants RG21 2EP. Tel: (0256) 468649.

■ Pye F460 station, UHF Tx, Rx, fcy 450MHz, requires tuning to 70cms, plus remote control in cabinet. Offers or swap for any 35mm camera gear or enlarger or super 8mm projector. G8BSK, 290 Priory Road, St Denys, Southampton SO2 1LS.

■ Surplus to requirements, brand new boxed QQV03-20S and 4X150S. Rohde and Schwarz watt-meter, 100-600MHz, 300W through power. Make an offer I can't refuse! Tel: (0851) 5682.

■ Trio TR7600 2m mobile transceiver, 25 watts, with mobile mount, £200. Microline 186 cpi printer, serial or parallel input, £300. RTTY terminal for computers + software for BBC, £35. 3¼in disc drive, £100. 10 ele long yagi, £10. 6 ele ZL special, £15. *Elektor* universal nicad charger, £15. Belcom liner 2 2m SSB transceiver, 10W Tx modified Rx (ECA front-end), £70. Panasonic stereo amplifier SU2600, main/remote speakers, 50W per channel, £70. Tel: (0952) 503758.

■ Ham International Concorde II and multimode II, £80 ono each. Cobra 148GTLDX transceiver, £90 ono. Also another Cobra 148GTLDX, needs repairing, £40. Also solid-state broadband linear (3.5-30MHz) variable inputs, £90. Also have Bremi BRL500 linear amp, £100. Above transceivers ideal for 10 metre conversions and linears, ideal for external amplification after converted transceivers have been completed. All above for £400 ono. Tel: (0636) 814541 evenings only.

■ Plessey Avionics PR155G high specification communications receiver. 0-30MHz continuous PLL tuning. Complete with service/operating manual. Absolutely mint condition, £500 ono. For details tel: (04868) 7088 (Godalming, Surrey).

■ R107 World War 2 Army receiver. No mods, good condition. Tel: (0272) 421965.

■ Yaesu FT77 100W tcvr, £350. Yaesu FRG7700 RX, £250. Both items as new in original Yaesu boxes, complete with manuals. Mr C J Graham, 8 Oaktree Drive, Ecclefechan, Dumfrieshire DG11 3EH. Tel: (057 63) 494.

■ Surplus to requirements, new boxed QQV03-20S, QQV06-40s, 4X150s. Rohde and Schwartz 100-600MHz, 300W through power wattmeter. Make an offer I can't refuse. Mark Smith, PO Box .14, Stornoway, Isle of Lewis, Outer Hebredes, Scotland.

■ Eddystone 770/2 VHF Rx, 150MHz-500MHz, in working order but requires front-end alignment. Complete with manual. Best offer over £80. L G Slater, 8 Bankside, Moseley, Birmingham B13 9LU. Tel: (021) 778 4445, evenings.

■ Regency digital flightscan 108-136MHz 16 channel air band scanner, £80.00. Samatron-v-vertor VHF to UHF convertor for air band, £40.00. MuTek BBBA 500V 20-500MHz pre-amp with quality BNC connectors, £25.00. Mr S Drew, 227 Southmead Road, Westbury on Trym, Bristol. Tel: (0272) 506208.

■ Trio R1000, mint condition, digital readout, 24hr timer, unused last 12mths, original, boxed, makers manual, lots of literature, first £185. Also Yaesu FRT7700 ATU, also mint cond, £30. Boxed both together, £210. Tel: John (0224) 821423.

■ Yaesu set, four extender boards, FT101 series, £20. Yaesu service manual, FT101E, series, £10. Matches pair GJS6C's, £20. Callbooks, DX listing 1984, £5. 1985, £7. 1-1 balun, £8. Amateur radio operating manual, £2. All collect or carriage extra as housebound. Yaesu FT101 postage cover, £3. Jess G4GOF, Bergheim, Battery Hill, Fairlight, Cove, Hastings, E Sussex TN55 4AP.

■ Two metre mobile rigs; Yaesu 227, £120. Icom 280E vgc, £130. MM TV Rx, £25. Handhelds by Icom: IC2E plus accs, £130. New rig, Icom 02AT, to 148MHz, tone pad, hardly used, £225. Yaesu FT707 HF rig, 100W vgc, good for other bands, £400 ono. Datong autoprocessor, £65. Mobile bracket for 707, £20. C64 progs on disk and cass. Martyn, 112 Leeds Rd, Mirfield. West Yorks WF14 0JE. Tel: (0924) 495916.

■ AVO multimeter, type 8/9, £75 ono. AVO signal generator, type TFM, £45. AVO valve tester, with manual, £20. Wee Megger vgc, £50. Two *Wireless World* teletext decoders, with data, £100. High speed 8 point tape reader, £20. Cavity wavemeter, type AM1842, £15. Mr R T Waite, 16 Lawn Ave, West Drayton. Tel: West Drayton 441031.

■ FT101ZD dc power lead, £10.00. FT101Z an-log read-out, £25.00. Heil HC-3 mic element, £12.00. Mr J Burrowes. Tel: (0952) 57670.

■ Yaesu FTV-107R 6m, 2m, 70cm transverter, 2 metre board installed, with adaptor wired for use with TS430. Supplied complete, boxed, manual. Ideal gear for new 50MHz band. Easily adaptable for use with most HF rigs, £100 ono. Carriage and insurance extra. Mr CA Crabb G4HNH, 41 West Drive, Edgbaston, Birmingham B5 7RR. Tel: (021) 472 3845.

■ New IEE wiring regulations book, cost over £20.00, for sale £10.00. Teac A-3300SX 10½in tape deck, offers or exchange for HF ATU, eg SPC300 with cash adjustment. Tel: (0694) 722131 anytime.

■ Yaesu FL50B HF Tx, with manual, no mods, vgc, £65. Mizuho MX2, 2m SSB/CW hand-held, with case and rubber duck, £65. Racal 836, 32 MHz frequency counter, gwo, £35. 19inch rack mount PSU, variable transformer, has slight earth fault, 20A output, offers. All above items ono. Collect only, disabled SWL. All enquiries answered. Peter Hunter, 2 Huxley Close, Norwich, Norfolk NR1 2JS.

■ Sharp MZ-90A desk top computer, built in VDU and tape deck, 214MHz clock. MZ-80AEU expansion unit and interface and cable for Epson printer. Basic, machine language, assembler, disassembler etc. £300 the lot, buyer collects. S Fielding, 81 Wharfedale Road, Long Eaton, Notts NG10 3HE. Tel: (0602) 723319.

■ Icom HM7 hand mic, (new), £14. Icom SP5 ext speaker (mint), £44. NEC 12 inch green screen comp video monitor, very high resolution, £65. MuTek 10GHz Gunn diode board, £44. Wood and Douglas 23cm WDV400/1200 varactor multiplier, £53. 420MHz video source oscillator, VFM01, £17. Yaesu YH55 Headphones (new), £10. Paul G4XHF. Tel: (0293) 515201.

■ Dragon 32K personal computer, excellent condition with all leads and manuals, £80.00 or WHY. Burndept solid blue batt pack, three for £15. Pye Pocketphones, five for £10, untested. All above plus postage or carriage. Is there a good working Burndept 470 or 471 UHF trncvr. No time wasters or rip off merchants please. Tel: (0302) 835 280, South Yorkshire.

■ 70cms 4CX250B linear + PSU, 180W output, £250. TR7800 2m FM mobile, 5/25W, 14 memories, keypad entry, mil/scan, £150. Yaesu FTV107R transceiver CW 2m, 4m modules easy conversion for 6m, £200. Noz G0DXC. 75 Edgehill Street, Reading, Berks R41 2PU. Tel: (0734) 596485.

WANTED

■ Any two metre ham rig in good cond for around £120. Preferably Trio or Yaesu. Also a small aerial (Slim Jim) for around £5. David Oxendale, 10 Greaves Avenue, Walsall. Tel: Walsall 32503.

■ Drake R7A Rx and TR7A tcvr. Must be excellent. Bob McHenry G3NSM. Tel: (0865) 56321 (Oxford).

■ Sony CRF320 receiver moderately priced, exchange Datong AD370 + MPU for marine or airband Rx, otherwise for Grundig 1200 SSB detector plus *Radio/TV Handbook* and International callbook DX listing (any year, 1980 onwards). F Amoroso, 60 Highfield Road, Salford, Lancs M6 5LA. Tel: (061) 743 1570.

■ Software and hardware which will allow me to receive and send RTTY via my Texas TI99/4A computer. Surely someone has cracked this one by now? Also want Shibaden or Sony reel to reel video tape recorder, must be in first class condx and working order. Also still looking for an American aircraft Tx type BC375 or BC191 in any condx. Nev Kirk G3JDK, 54 Allendale Road, Rotherham, Yorks S65 3BY. Tel: Wickersley 541606.

■ Info and circuit diagram on Admiralty rec patt 100339, a MF/HF set covering 60kHz to 31MHz in eight bands, made by Pye Marine Ltd in 1955. All exp refunded. Mr G Oddy G8BVR, 47A Dale Ave, Stratford-upon-Avon, Warwickshire. Tel: (0789) 298924.

■ Ham Master HM2010 circuit diagram required. Also, where can I obtain a VHF diode, HP5280. G1RSU. Tel: (021) 745 1000.

■ FT290R with muTek front-end fitted, also nicads, charger and mobile bracket. Also BNOS linears LPM-3-50, LPM-3-100 or similar, and Diawa CN620A P/SWR cross needle meter. Mint condition please. Neil Taylor G1OFI. Tel: (0726) 66093.

■ Wanted urgently by unemployed SWL beginner with £40 to spend. Has anyone got either an R107, R1155 with PSU, HRO with PSU and a few coils, or an AR88? Must be from fairly local area as I am allergic to carriage prices. If you have an ounce of sympathy and are prepared to accept the meagre price offered, please write to: Mr A Hawkins, 111B Parkers Sq, Southgate, Runcorn, Cheshire.

■ Yaesu FT290, IC202 and IC2E or TS7009 WHY?

FREE CLASSIFIED ADS

Would prefer two rigs SSB and FM handie. Exchange very comprehensive coarse fishing outfit, 11 metre carbon pole, carbon rod, nets, tackle, boxes, tackle reels, holdall bags, total value in excess of £375. Please help. T Jenner, 20 Goodwood Mansions, Stockwell Park Walk, London SW9. Tel: 01-733 3533 after 3.30pm.

■ Ham Jumbo in good working order. Have Canon super 8 cine camera and two projectors, also Texas T1/994A computer as new. Ian, The Dormouse, 5 Sunset Walk, Bush Estate, Eccles-on-Sea, Norfolk NR12 0SX.

■ Sony radio 6700, 6800 or Panasonic RD29, RD49 or Zenith Oceanonic or any similar radio with SSB. Please state price wanted or have Sony radio 230, cash adjustment if necessary. Tel: (0432) 271091.

■ Murphy type 618 HF Tx (AP100333) and power unit (AP100336). Marconi Elettra Rx (type 2232B) (similar to Eddystone 840). Aerial plug AM type 161 (10H/184), type 889A or 966A power units with plugs and cables. G4FUY, QTHR. Tel: Reading 733633.

■ Service manual or circuit diagram for Yaesu FRG7, plus any details on mod, buy or loan. Expenses will be met. Tel: (04893) 4960 after 5.00pm.

■ Any circuit info on a QM70 electronics 2m tvtr low power Buccaneer model. G4WJX, QTHR. Tel: (0782) 330613.

■ Yaesu FRG8800 or Yaesu FRG7700 receiver in good working condition. Tel: Wood Clochan 378.

■ I would be pleased to hear from all project Omega constructors, with a view to creating a pool of ideas and information regarding any problems which may have been encountered, with the solutions arrived at, or not, as the case may be. All correspondence will be replied to, and treated as confidential. M Jarvis, 11 Bushey House, Charles Field, Grove Park, London SE9.

■ Racal collector is interested in exchange or purchase of any tactical (green) items, especially TRA931, TRA967, PRM models, MA4222, MA968, MA934, RA929, TA944, TA970, MA985, MA986, antennas, manuals, mounting frames, incomplete units, spares, encryption units, brochures, WHY? Also required: distress/locator/survival beacon items, especially orange CRT-3 'Gibson Girl' dinghy transmitter, any Sarah/Sarbe items, documentation, homing receivers, etc, please write with full details. Racallector, 120 Birmingham Rd, Redditch, Worcs B97 6EP.

■ FT101ZD, FT200 + PSU, FT77S + PSU, Trio 520TS and PSU etc. Swap Belcom AMR217B scanner, xtalled for 150MHz – 160MHz, easily re-xtalled for 144MHz. Colour TV, Teletext, vgc. Make me an offer. Please no time wasters. N Kelly, 18 School Hill Ave, Castletown, Isle of Man.

■ Receiver, old valve set or transistor, must be cheap but in working order, small repairs not objected to, must have HF up to 30MHz and SSB (BFO), AM facility and ATU if pos. Codar CR70A, ex forces, WHY? Can collect Midlands area. Tel: Stan on Tamworth (0827) 58004.

■ Full coverage communications receiver in good working order. Up to £150. G3ACT, Exmouth, Devon. Tel: (0395) 27432.

■ Software and hardware for MSX computer, RTTY transceive, log, Morse Tx/Rx, Amtor, etc. Mr H A Cameron, Garden Cottage, Balloch, Alyth, Blairgowrie, Scotland. Tel: (08283) 2829.

■ 620 bases for 4CX250S, source of supply for PTFE sheet in order to get someone QRV 23cms in WS square! Mark GM6TKS, 42 New Valley, Stornoway, Isle of Lewis. Tel: (0851) 5682.

■ Nato 2000, good price paid for a clean set. Also FRG7700. Tel: (0283) 221870.

■ Trio 7930 2 metre rig, must be in first class condition. Also Signal Communications Co R532 airband receiver, Yaesu YK-901 keyboard to link up with YR-901 RTTY reader. Tel: Colchester 394336.

■ FT2700 dual bander or similar wanted in exchange for Rotel hi-fi stack system; tuner, amplifier & tape recorder and record storage in glass fronted cabinet. Also matching turntable plus Benkson portable B/W TV, still under warranty, mains/battery or car, or the TV plus matched set of Jean Donald golf clubs, woods, irons plus bag, and new wide wheeled trolley. Tel: (0603) 867005.

■ Wanted most urgently – Pye personal miniature portable battery receiver model M78F. Good price paid to replace damaged set. Please write or telephone Stan G3XON, 14 Dagden Road, Shalford, Guildford, Surrey GU4 8DD. Tel: (0483) 36953.

■ KW2000 series or similar tscvr with PSU. Must be in good condx. Also HF mini beam required. C S Knight, 130 Main Street, Kinglassie, Fife.

■ Yaesu FRG7700 or Trio R2000, must be in good working order, will pay for mail delivery and good money paid for good condition receiver. Les Stock, 4 Haven Court, Elmbridge Road, Gloucester GL2 0QD. Tel: (0452) 31380.

■ Trio SP230 speaker unit. Geof Barnes G3AOS. Tel: (02605) 2764.

■ Have ex USAF TS175, combined HET frequency meter, signal generator. Covers 85 to 1000MHz, 250V ac input, compact. Exchange for synth scanner Rx, with airband, Bearcat, Tandy or similar. External condition not important. Tel: (0207) 544342 evenings, weekends.

■ Exchange FT203R hand-portable in good condx with FNB-3 batts, helical aerial, soft case and home brew spkr/mike, CW handbook and FT200 or any similar HF trx. Simon G0EHU. Tel: Derby (0332) 515908.

■ Eddystone EC10 Mk2, also Eddystone panoramic display unit for EA12. All in good working order. Eric Rutter, 4 Crompton Avenue, Blackpool, Lancs FY4 3LQ.

■ 5 band trap vertical antenna, with or without radials. ATU suitable for 100W Tx. Beam rotator, any type, light, medium or heavy duty. 10m FM rig (ex-CB) or multi-mode. Oscilloscope, working, WHY? HF beam 2 or 3 band/element type, preferably with rotator and possibly tower, can dismantle myself if needed. Willing to collect. Roy G0BZT, Sedgley (West Midlands). Tel: (09073) 78792.

■ Burndept 470 in vgc, £100 paid for good rig xtalled for RB6, RB4, RB10, RB14, SU8 or calling channel. I'll pay £100+ for a rig in mint cond, or I'll buy a 471 with a charger and spare nicads if poss. Also good price paid for mint rig. Tel: (0942) 675445.

FREE CLASSIFIED AD FORM

Send to: Amateur Radio Classified Ads · Sovereign House · Brentwood · Essex CM14 4SE

Classification: (tick appropriate box) If you want to insert ads under more than one classification use separate sheets for second and subsequent ads

For Sale ..... ☐ Wanted ..... ☐

USE BLOCK CAPITALS (One word per box)

To avoid mistakes please write clearly and punctuate your ad

Name/Address Postcode/Telephone							

USE SEPARATE SHEET FOR MORE WORDS

Ensure that you have included your name and address, and/or telephone number

CONDITIONS: Ads will be published in the first available issue on a first come first served basis. We reserve the right to edit or exclude any ad. Trade advertisements are not accepted

Amateur RADIO SMALL ADS

MAXI — Q

COILS AND CHOKES
PREVIOUSLY MADE BY
DENCO SAE PRICE LIST

8 BRUNEL UNITS, BRUNEL ROAD, GORSE LANE IND ESTATE, CLACTON, ESSEX CO15 4LU.
TEL: (0255) 424152

USED AMATEUR EQUIPMENT?

I Buy, Sell & Exchange!
SELLING? I pay the BEST POSSIBLE PRICES for your Clean Used Equipment! BUYING? I have the BEST SELECTION of top Quality Used Equipment Available!
For the Deal You've been Looking for, Phone Dave, G4TNY ANYTIME ON HORNCHURCH (04024) 57722 or Send SAE

G4TNY AMATEUR RADIO
132 Albany Road, Hornchurch, Essex RM12 4AQ

THE SCIENTIFIC WIRE COMPANY

811 Forest Road, London E17. Telephone 01-531 1568

ENAMELLED COPPER WIRE

SWG	1lb	8oz	4oz	2oz
8 to 34	3.63	2.09	1.10	0.88
35 to 39	3.82	2.31	1.27	0.93
40 to 43	6.00	3.20	2.25	1.61
44 to 47	8.67	5.80	3.49	2.75
48	15.96	9.58	6.38	3.69
SILVER PLATED COPPER WIRE				
14 to 30	9.09	5.20	2.93	1.97
TINNED COPPER WIRE				
14 to 30	3.97	2.41	1.39	0.94
Fluxcore Solder	5.90	3.25	1.82	0.94

Prices include P&P VAT. Orders under £2 add 20p.
SAE for list of copper and resistance wire.
Dealer enquiries welcome.

PNP Communications Communications Interface

for RTTY — Morse — AMTOR

Our popular range of communication modules is now available, fully boxed and tested under the model number.

CTU 20

The CTU20R is RTTY only & costs **£62.50** whilst the CTU20RM is for morse as well and costs **£75.25**
For shortwave listeners the MF2-DX gives the option of 170Hz, 425Hz or 850Hz shift reception and costs **£56.95**

Send a large (A4) SAE for full Cat
Please add VAT at the current rate.
Access & Barclaycard (VISA) welcome.

62 Lawes Avenue, Newhaven
East Sussex BN9 9SB
Tel: (0273) 514465

AGRIMOTORS

MERTON CB AND RADIO CENTRE
MERTON GARAGE AND POST OFFICE, MERTON.
Nr OAKHAMPTON, DEVON EX20 3DZ

OPEN 6 DAYS 9-6 LUNCH 1-2pm
(SUNDAYS BY APPOINTMENT)
SPECIALIST IN 934 MHz
SUPPLIERS OF ALL 27MHz AND 934 MHz EQUIPMENT
AMATEUR ACCESSORIES CATERED FOR
08053 200

XXX

ADULT VIDEO CLUB
OUR GIRLS WILL GIVE YOU
THE INTIMATE DETAILS. NOW RING
0924 471811 (24 HRS)
OR WRITE: AVC, PO BOX 12,
BATLEY, W YORKSHIRE

DW ELECTRONICS G3 XCF

Amateur Radio Supplies
71 Victoria Rd, Widnes ICOM
Tel: 051-420 2559
Open Mon-Sat 9.30-6 (closed Thurs)
We supply Yaesu, Icom, Tonna, Jaybeam, Microwave Modules, Datongs etc

MORSE READER PROGRAMMES

SPECTRUM **BBC 'B'** **DRAGON**
CBM 64 **VIC 20**
ZX81 16K **ATARI 600/800XL** **AMSTRAD 464**

Sinclair computers need NO interface. others use simple one transistor (BC107 or similar) interface. Programmes self tracking 8/30 WPM. All connections to existing sockets. Cassette with full instructions and interface circuit where required £6.00 inc P&P. Interface built and tested £2.50 inc P&P

RTTY

FOR YOUR 48K SPECTRUM

Menu driven. 10 programmable memories. split screen. morse ident. four baud rates. etc etc NO TERMINAL UNIT. just a simple filter! Cassette with full instructions. circuit and filter layout £8.50 or SAE for full details. Filter unit built and tested £6.00.

JEP ELECTRONICS
NEW ROAD COMPLEX
NEW ROAD
KIDDERMINSTER DY10 1AL
TEL: 0562 753893

Amateur RADIO SMALL ADS

This method of advertising is available in multiples of a single column centimetres — (minimum 2cms). Copy can be changed every month.

RATES
per single column centimetre:
1 insertion £7.00, 3 — £6.60, 6 — £6.30, 12 — £5.60.

Ian Fisher Communications of Stanhope

CB Works, Bondisle Way, Stanhope, Bishop Auckland Co Durham DL13 QTY.

Distributors of 934 MHz equipment. We carry a full range of 934 MHz aerials, the **COMMTEL** Scanner transmitter/receiver, the **UNIACE 400,** also in stock **POPE H100** 11mm and 6mm diameter coaxial cable.
All at *very* competitive prices
Open: Mon-Sat 10.30am-6.00pm
Mail Order service recently commenced
Ring for details
(0388) 528464

SP ELECTRONICS

48 Limby Road
Ruckhall, Nottingham
Tel: (0602) 640377
Open Monday-Saturday 8.30-5.30

AMATEUR RADIO SMALL AD ORDER FORM

TO: **Amateur Radio · Sovereign House**
Brentwood · Essex CM14 4SE · England · (0277) 219876

PLEASE RESERVE .....centimetres by.....columns

FOR A PERIOD OF 1 issue.....☐ 3 issues.....☐ 6 issues.....☐ 12 issues.....☐

COPY enclosed.....☐ to follow.....☐

PAYMENT ENCLOSED: (Add 15%VAT).... £ —

Cheques should be made payable to Amateur Radio. Overseas payments by International Money Order and credit card

CHARGE TO MY ACCOUNT.....☐

COMPANY .....

ADDRESS .....

SIGNATURE ..... TELEPHONE.....

.....

	C	P	I							

NEXT ISSUE ON SALE

Amateur RADIO

Thursday 29th May

RF DEVICES AT ROCK BOTTOM PRICES!

Nobody beats us!

Over 30,000 RF devices at low prices

REPLACEMENT RF TRANSISTORS

MRF454 HF/SSB 80W	£18.20
MFR450 HF/SSB 50W	£11.60
MRF238 VHF/FM 25W	£12.80
MRF475 HF/SSB 20W	£2.99
2SC1969 HF/SSB 18W	£2.50
2SC2043/1307 HF 16W	£2.00
2SC1947 VHF 3.5W	£7.60
2SC1946A VHF 32W	£14.30

REPLACEMENT RF POWER MODULES

M57704/SAU3 UHF 15W	£36.00
M57712/SAV7 VHF/FM 25W	£39.00
M57713/SAV8 VHF/SSB 15W	£39.00
M57716/SAU4 UHF/SSB 15W	£49.00
M57719 VHF/PMR 15W	£29.00
M57727 VHF/SSB 38W	£45.00
M57749/SAU11 934/FM 7W	£29.00

Send £1.00 p&p and SAE for full list
All prices inc. VAT
Many Ic's and other types in stock

RAYCOM LTD
DEPT AR 584 HAGLEY RD WEST
QUINTON BIRMINGHAM
B68 0BS
021 421 8201-3
(24hr answer phone)

JAPANESE Ic's (PART OF OUR RANGE)

AN214Q £1.80 AN7145 £1.80 AN7146 £1.85 BA521 £1.75 BA532 £1.50 HA1306W £1.60 HA1339A £1.60 HA1342 £1.70 HA1366W £1.50 HA1366WR £1.50 HA1377 £2.20 LA1230 £1.50 LA4460 £1.75 LA4461 £1.75 LC7137 £2.75 M51515 £2.50 M51517 £2.50 MB3705 £1.60 MB3712 £1.50 MB3730 £1.75 MB3731 £2.50 MB3756 £2.60 MB8719 £3.50 TA7205AP £1.00 TA7222AP £1.20 TA7227P £1.60 UPC575 £1.00 UPC1001 £2.00 UPC1156 £1.40 UPC1181 £1.00 UPC1182 £1.00 UPC1185 £2.20. ADD 60p POST AND PACKING AND THEN ADD 15% VAT TO TOTAL

T POWELL 16 PADDINGTON GREEN LONDON W2 1LQ
OPEN MON-FRI 10AM-5PM, SAT 9AM-12 NOON.
TELEPHONE: 01 723 9246
ACCESS/VISA. TELEPHONE ORDERS ACCEPTED OVER £5.00

SCOTCOMMS

OPEN TUES-FRIDAY 10am-12.30pm, 2pm-5pm
SAT: 9am-1pm, 2pm-4pm. CLOSED MONDAY

25 Morton Street, Edinburgh 15
Tel: 031-657 2430

SERVICE MANUALS

For most Makes Models Age of electron c equipment
Amateur Radio Test equipment Audio Television Video Vintage Military etc Thousands Stocked SAE enquiries

MAURITRON TECHNICAL SERVICES
Dept AR, 8 Cherry Tree Road, Chinnor, Oxon OX9 4QY.

MORSE CODE PREPARATION

Cassette A 1-12 wpm for amateur
Cassette B 12-25 wpm for professional examination preparation
Each cassette is type C90
Price of each cassette (including booklets) **£3.95.**
Morse key with separate battery (PP3) — driven solid-state oscillator and sound transducer produces clear tone for sending practice Price of key with electronic unit **£8.95.**
Price includes postage etc Europe only
MH ELECTRONICS (Dept AR)
12 Longshore Way Milton Portsmouth PO4 8LS

AMATEUR BAND RECEIVERS. . .

Pocket-sized (7½in x 3½in x 1½in) fully self-contained with integral squelch, UFO and volume facility Provides ultra-sensitive 2 and 10 and 11 metre ham activity (in full) and tunes through 52-176MHz VHF for aircraft, public-services utilities, PMR, mobile phone and more! Special offer: £34 95 all inc while stocks last CWO/COD welcome from

Dave Taylor (Dept AR5) Emerson Street, Crook, Co Durham, UK

BEAM VIDEO

Throughout the house on Channel 36.
Price £8.90 + P&P 50p. Phone for leaflet:

Electronic Mailorder A
62 Bridge Street, Ramsbottom
Lancs BL0 9AG
Tel: 070682-3036 (24hrs)

Infra-red Sensors fitted reflector 9-12V dc, supply List £34, we sell £12. Sensor item and emitter diode only, £4.50. Transformers 24V CT, £4. ORP12, £1.60. Diodes 400V 40 amp, £1.50.
Lists:

Malden Transformer
134 London Road, Kingston-on-Thames
Tel: 01-546 7534

JAYCEE ELECTRONICS

JOHN GM30PW

20 Woodside Way, Glenrothes, Fife KY7 5DP
Tel: 0592 756962
Open: Tues-Sat 9-5

Quality secondhand equipment in stock. Full range of TRIO goodies. Jaybeam – Microwave Modules – LAR.

Electronic ATU for HF Receivers

Is your HF communications receiver plagued with interfering signals that should not be there? Is the only way to eliminate them by switching in the antenna attenuator, reducing the receivers overall sensitivity? Not any more – the compact HF3B electronic tuner eliminates this effect by giving at least 20dB rejection, and removing background hash that is so irritating on many modern receivers. The unique electronic circuitry runs for over 12 months on a PP3 battery.

Price: £28 including battery, all connectors and p&p

Evans Electronics,
11 Hill View, Bryn-y-Baal, Mold, Clwyd CH7 6SL

D.P. HOBBS (Norwich) Ltd
13 St Benedicts Street, Norwich Tel: 615786

Open Mon-Sat 9-5.30
Closed Thurs 1.00pm
Stockists of
YAESU, FDK, ICOM, JAYBEAM
& Electronic Component Specialists

Booth Holdings Bath

GOLF CLUBLANE
SALTFORD
BRISTOL
Tel: 02217 2402
Open Tues-Sat 9am-9pm
Closed Monday

CRYSTALS Made to order for any purpose and large stocks of standard frequencies for computers, modems, etc. Amateur CW (QRP) freqs *£4.00* and CB conversion crystals at *£4.50*.
PROGRAMMABLE OSCILLATORS (PXO) for baud rates, MPU, and freq markers *£12.50*.
FILTERS Crystal, monolithic, mechanical and ceramic for all standard IF's. Special 10.695MHz for big improvement to most CB rigs! at *£4.50 each*.

SAE FOR LISTS. PRICES INCLUDE VAT AND POST

PR GOLLEDGE ELECTRONICS
G3EDW, Merriott, Somerset, TA16 5NS
Tel: 0460 73718

TRF AND SUPERHETRODYNE MODULES
AM, SSB and CW.
Assembled, tested and guaranteed.
Sae for details.
R EAST
REGABY, ANDREAS, ISLE OF MAN
Tel: (0624) 88672. 24 hours

Telephone the advertising department on: 0277 219876 for details

ADVERTISERS INDEX

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

COLOUR AD RATES

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
263 x 394	double page	£1,130.00	£1,070.00	£1,010.00	£900.00

SPECIAL POSITIONS

Covers: Outside back cover 20% extra, inside covers 10% extra
Bleed: 10% extra [Bleed area = 307 x 220]
Facing Matter: 15% extra

DEADLINES

*Dates affected by public holidays

issue	colour & mono proof ad	mono no proof & small ad	mono artwork	on sale thurs
Apr 86	27 Feb 86	5 Mar 86	7 Mar 86	27 Mar 86
May 86	27 Mar 86	2 Apr 86	4 Apr 86	24 Apr 86
Jun 86	1 May 86	7 May 86	9 May 86	29 May 86
Jul 86	29 May 86	4 Jun 86	6 Jun 86	26 Jun 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.
A 'hold ad' is acceptable for maintaining your series rate contract. This will automatically be inserted if no further copy is received.
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.

COPY
Except for County Guides copy may be changed monthly.
No additional charges for typesetting or illustrations (except for colour separations).
For illustrations just send photograph or artwork.
Colour Ad rates do not include the cost of separations. Printed – webb-offset.

Above rates exclude VAT.
PAYMENT
All single insertion ads are accepted on a pre-payment basis only, unless an account is held. Accounts will be opened for series rate advertisers subject to satisfactory credit references.
Accounts are strictly net and must be settled by the publication date.
Overseas payments by International Money Order or credit card.
FOR FURTHER INFORMATION CONTACT
Amateur Radio, Sovereign House, Brentwood, Essex CM14 4SE.
(0277) 219876

Commission to approved advertising agencies is 10%.

CONDITIONS
10% discount if advertising in both Amateur Radio and Radio & Electronics World.
A voucher copy will be sent to Display and Colour advertisers only.
Ads accepted subject to our standard conditions, available on request.

MARCO TRADING

ACCESS VISA

ELECTRONIC COMPONENTS MAIL ORDER CATALOGUE

COPPER WIRE
Tinned Enamelled copper wire
2oz reels 14 to 38 swg pr reel **£1.00**

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**

ELECTRICAL
4 way ex socket (fused)	£4.10
4 way with lead	£5.75
13 amp plugs	46p each 10 for £4.50
Single ex socket nylon white	95p ea

VALVES
Type	Price (£)
DY802	0.95
DY86/87	.66
ECC81	1.00
ECC82	.90
ECC83	1.00
ECC84	.80
ECC85	.95
ECC86	2.80
ECC88	1.25
ECF80	1.20
ECH81	1.40
ECH84	1.50
ECL82	1.10
ECL86	1.75
EF80	.75
EF86	1.80
EF183	0.90
EF184	1.00
EH90	0.98
KT66(GEC)	16.00
KT88(GEC)	19.00
EL34	3.25
EL84	1.00
EL509	7.85
EM87	2.55
EY86/87	.67
EY500A	2.50
PCC84	0.60
PCC85	1.75
PCC89	0.75
PCC189	0.85
PCF80	.95
PCF86	1.25
PCF200	1.95
PCF801	1.05
PCF802	1.05
PCF806	1.20
PCL82	1.00
PCL83	2.50
PCL84	1.00
PCL86	.90
PCL805/85	1.05
PD500	2.90
PFL200	1.85
PL33	1.50
PL36	1.75
PL81	0.85
PL82	0.75
PL83	1.20
PL84	0.75
PL95	2.00
PL504	1.40
PL508	2.70
PL509/519	5.25
PY88	1.80
PY500A	2.20
U26	1.90
UCH81	2.00
UCL82	1.80
30FL12	1.60

TRANSISTORS + DIODES
Type	Price (£)	Type	Price (£)	Type	Price (£)
AC127	0.28	BC117	0.22	IC327	0.16
AC128	0.30	BC118	0.16	IC328	0.16
AC128K	0.34	BC119	0.28	IC337	0.12
AC141	0.54	BC125	0.14	IC338	0.12
AC141K	0.38	BC140	0.27	IC350A	0.24
AC142	0.56	BC141	0.26	IC440	0.36
AC142K	0.38	BC142	0.24	IC441	0.40
AC151	0.45	BC143	0.26	IC461	0.58
AC152	0.45	BC147	0.18	IC547	0.12
AC176	0.30	A or B	0.14	IC548	0.12
AC176K	0.44	BC148	0.10	IC549	0.10
AC187	0.28	A or B	0.12	IC550	0.10
AC187K	0.38	BC149	0.10	IC550C	0.10
AC188	0.28	BC157	0.12	IC557A	0.10
AC188K	0.38	BC158	0.12	IC558	0.10
ACY41	0.90	BC159	0.12	ICX34	0.29
AD142	0.80	BC160	0.30	ICY70	0.16
AD143	0.88	BC161	0.30	ICY71	0.17
AD149	0.72	BC168B	0.20	ICY72	0.16
AD161	0.42	BC169C	0.12	ICZ10	3.21
AD162	0.52	BC170	0.16	ICZ11	2.60
AD161/162	1.20	BC170B	0.16	ID124P	0.70
AF114	1.20	BC171	0.10	IC130Y	0.68
AF115	2.10	BC171	0.14	ID131	0.36
AF116	2.10	A or B	0.08	ID132	0.36
AF118	1.85	BC172	0.16	ID135	0.26
AF121	0.56	A or B	0.12	ID136	0.26
AF124	0.42	BC177	0.24	ID137	0.28
AF125	0.58	BC178A	0.30	ID138	0.30
AF126	0.58	BC182	0.10	ID139	0.30
AF127	0.36	A B or C	0.09	ID140	0.28
AF139	0.40	BC182L	0.12	ID144	1.62
AF178	2.28	A B or C	0.09	ID145	1.82
AF239	0.50	BC183	0.10	D150A	0.68
AF279S	1.40	A B or C	0.10	ID160	1.58
AL100	5.40	BC183L	0.10	ID165	0.45
AL102	4.40	A B or C	0.10	ID183	0.70
ASY80	5.20	BC184L	0.10	ID201	0.52
AU110	2.80	A B or C	0.10	ID202	0.57
AY102	4.32	BC207	0.15	ID204	0.57
BA110	0.68	BC208	0.45	ID222	0.80
BA121	0.42	BC212	0.10	ID225	0.40
BA129	0.38	A B or C	0.10	ID232	0.45
BA148	0.16	BC212L	0.09	ID234	0.30
BA154	0.12	A B or C	0.10	ID235	0.30
BA155	0.12	BC213	0.10	ID236	0.38
BA157	0.28	A or B	0.10	ID237	0.38
BA164	0.14	BC213L	0.10	ID410	0.76
BB105B	0.30	A or B	0.10	ED434	0.58
BB105G	0.48	BC237	0.11	ED438	0.58
BB110B	0.42	BC238	0.14	ED439	0.85
BC107	0.10	BC239C	0.16	ED507	1.05
A or B	0.12	BC251	0.14	ED518	0.88
BC108	0.10	A B or C	0.14	ED520	1.20
A B or C	0.12	BC301	0.30	D699	1.89
BC113	0.42	BC302	0.30	D707	0.74
BC114	0.12	BC303	0.30	DX18	1.80
BC115	0.12	BC307A	0.18	DX32	1.48
BC116	0.12	BC323	0.90	F115	0.32

THE MALTINGS
HIGH STREET, WEM
SHROPSHIRE SY4 5EN
Tel: (0939) 32763. Telex: 35565
1986

ONLY £1.00

PRE-PAID ENVELOPE – SPECIAL OFFER ORDER FORM INCLUDES 50p FREE VOUCHER

136 PAGES

MAY SPECIAL OFFER
TELEPHONE CHANGE OVER KIT –

1 x BT APPROVED MASTER SOCKET £2.85
1 x BT APPROVED SECONDARY SOCKET £1.95
1 x LINE JACK CORD WITH PLUG £1.25
= £6.05

THE WHOLE PACKET FOR £4.95 + VAT

ONE KIT AVAILABLE WITH ANY ORDER OF £10 AND OVER

12 VOLT RECHARGEABLE UNIT £5.99 each + £1.85 p&p

ALL PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Type	Price (£)	Type	Price (£)	Type	Price (£)
BF117	0.50	BFX85	0.35	BY189	6.75
BF119	0.82	BFX86	0.44	BY198	0.64
BF120	0.38	BFX87	0.44	BY199	0.72
BF125	0.42	BFY50	0.22	BY206	0.14
BF127	0.44	BFY51	0.22	BY207	0.16
BF154	0.23	BFY52	0.22	BY210/400	0.21
BF157	0.46	BFY90	0.80	BY210/600	0.24
BF158	0.30	BFY90S	1.34	BY210/800	0.28
BF160	0.23	BR100	0.25	BY227	0.22
BF167	0.32	BR101	0.40	BY228	0.46
BF177	0.42	BR103	0.50	BY238	0.65
BF178	0.26	BRY39	0.50	BYX10	0.20
BF180	0.27	BRY56	0.42	BYX36/150	0.40
BF181	0.27	BSX19	0.32	BYX36/600	0.48
BF182	0.32	BSX20	0.30	BYX48/300	0.70
BF183	0.32	BSX59	0.78	BYX55/350	0.26
BF184	0.30	BSX76	0.65	BYX55/600	0.30
BF185	0.28	BT100A/02	0.90	BYX71/600	1.18
BF194A	0.15	BT101/300	2.75	BYZ12	0.78
BF195	0.12	BT101/500	3.25	C106D	0.48
BF200	0.30	BT102/300	3.60	E1222	0.32
BF222	0.38	BT106	1.15	E5024	0.30
BF224	0.20	BT108	1.25	GET872	0.60
BF224J	0.20	BT109	1.15	ITT2002	3.34
BF240	0.30	BT116	1.20	MEU21	0.62
BF241	0.30	BT119	3.30	MJ400	1.45
BF244	0.34	BT120	3.50	MJ2955	1.00
BF244A	0.30	BT121	2.99	MJ3000	1.80
BF244B	0.28	BT138/600	1.30	MJE340	0.46
BF257	0.22	BTY79/400R	2.80	MJE371	0.85
BF258	0.26	BU100A	2.30	MJE520	0.44
BF259	0.30	BU104	1.80	MJE2955	1.60
BF262	0.34	BU105	1.20	MJE3055	1.40
BF263	0.38	BU105/02	1.55	OA47	0.10
BF270	0.30	BU108	1.75	OA90	0.07
BF271	0.28	BU124AE	0.90	OA91	0.07
BF273	0.22	BU126	1.40	OA95	0.12
BF274	0.34	BU133	1.40	OA200	0.06
BF324	0.46	BU204	1.30	OA202	0.10
BF336	0.32	BU205	1.30	OC26	2.65
BF337	0.28	BU206	1.50	OC28	3.15
BF338	0.28	BU208	1.40	OC35	4.75
BF363	0.35	BU208A	1.40	OC36	2.75
BF367	0.24	BU208/02	2.05	OC42	0.72
BF371	0.27	BU326S	1.75	OC44	0.72
BF422	0.20	BU407	1.10	OC45	0.68
BF450	0.38	BUX80	3.70	OC71	0.60
BF457	0.36	BUY20	2.75	OC72	0.70
BF458	0.37	BUY69A	2.60	OC81	0.68
BF459	0.35	BUY69B	1.98	OC200	2.46
BFR51	0.36	BY122	0.60	ORP12	0.85
BFR61	0.32	BY126	0.10	R2008B	1.20
BFR90	0.86	BY127	0.08	R2010B	1.20
BFT41	0.68	BY133	0.08	TIC44	0.38
BFT43	0.38	BY135	0.35	TIC45	0.45
BFW11	0.84	BY164	0.48	TIC46	0.48
BFW44	0.88	BY179	0.56	TIC47	0.70
BFX29	0.28	BY182	0.80	TIC106A	0.95
BFX30	0.40	BY184	0.38	TIP30A	0.35
BFX80	6.46	BY187	0.65	TIP31C	0.39
BFX84	0.28			TIP32	0.35

FUSES
QB	20mm	100mA	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

74LS
74LS00	0.24
74LS01	0.24
74LS02	0.24
74LS03	0.24
74LS04	0.24
74LS05	0.24
74LS08	0.24
74LS09	0.24
74LS10	0.24
74LS11	0.24
74LS12	0.24
74LS13	0.33
74LS14	0.48
74LS15	0.24
74LS19	0.44
74LS20	0.24
74LS21	0.24
74LS22	0.24
74LS24	0.28
74LS26	0.24
74LS27	0.24
74LS28	0.24
74LS30	0.24
74LS32	0.24
74LS33	0.24
74LS37	0.24
74LS38	0.24
74LS40	0.24
74LS42	0.50
74LS148	1.28
74LS151	0.70
74LS153	0.70
74LS155	0.55
74LS157	0.45
74LS158	0.58
74LS160	0.62
74LS161	0.68
74LS162	0.70
74LS163	0.68
74LS164	0.74
74LS165	1.10
74LS166	1.50
74LS168	1.48
74LS170	1.40
74LS173	0.98
74LS174	0.75
74LS175	0.70
74LS190	0.82
74LS192	0.98
74LS193	0.98
74LS194	0.75
74LS195	0.74
74LS 196	0.84
74LS197	0.98
74LS221	0.85
74LS240	0.80
74LS241	0.80
74LS242	0.94
74LS243	0.94

CMOS
4000	0.19
4001	0.24
4002	0.24
4006	0.68
4007	0.24
4008	0.59
4009	0.44
4010	0.39
4011	0.23
4012	0.24
4013	0.35
4014	0.58
4015	0.58
4016	0.38
4017	0.54
4018	0.59
4019	0.59
4020	0.78
4021	0.58
4022	0.68
4023	0.30
4024	0.49
4025	0.24
4026	0.89
4027	0.44
4028	0.44
4029	0.73
4030	0.33
4031	1.28
4033	1.25
4034	1.40
4035	0.68
4036	2.48
4038	0.73
4039A	2.70
4040	0.58
4042	0.48
4043	0.42
4044	0.48
4046	0.58
4049	0.38
4050	0.34
4051	0.68
4051	0.68
4052	0.58
4053	0.58
4066	0.44
4068	0.24
4069	0.24
4070	0.24
4071	0.24
4072	0.24
4073	0.24
4075	0.24
4076	0.68
4077	0.24

NEW GAS SOLDERING IRON (PORTABLE) ORYX ONLY £13.90

WE STOCK SPARE TIPS FOR THIS IRON
2.4mm-3.2mm-4.8mm **£4.50 each**

TIPS TEMP TO MAX OF 400f

CHART RECORDER SPECIAL
Brand new 3 channel pen recorders complete with charts. Full spec upon request Once only price **£40 + £10 p&p**

NI-CAD CHARGER
Universal charger to charge PP3, AA, C, D

PRICE £5=17

SERVICE AIDS
Switch Cleaner	1.18
Circuit Freezer	1.34
Foam Cleanser	1.16
Aero Klene	1.10
Plastic Seal	1.28
Excel Polish	1.12
Antistat Spray	1.18
Aero Duster	1.40
Super 40	1.82
Video Head Cleaner	1.06
Fire Extinguisher	3.06
Silicone Grease Aero	1.42
Ditto Tube	1.64
Heat Sink Compound	£1.08
Solda Mop 0.12mm	0.74
Ditto 0.06mm	0.76

NI-CADS
A Cells + **95p each**, 10 off **85p**.
C Cells = **2.14-1.98**
D Cells = **2.30-2.10**
PP3 = **3.75-3.65**

PLASTIC BOXES
3x2x1	0.85
3x2 1/2x2	0.93
4x3 1/2	1.15
6x4x2 1/2	2.50
8 1/2x5x3 1/4	2.95

Colour Black all boxes with lids and screws

SONY SPARES

ZENER DIODE PACK
400mW – 5 each value – 11 values – individually marked and packed – 55 Zener Diodes **Price £3.50 each**

TRANSFORMERS
British made transformers at very attractive prices.

Primary	Secondary	Current	1+	10+	100+
240V	6-0-6v	100mA	£0.58	£0.52	£0.43
240V	6-0-6v	500mA	£0.65	£0.60	£0.48

Carriage 45p transformer **£1.60** per 10

TRANSISTOR EQVI FROM BOOKS £9.00

ROTARY POTS
0.25W Carbon Log & Lin 1K-2M2 **40p** each
10 **30p**
Any 100 **£2.25**

EQUI BOOKS £9

ZENER DIODES
400mW Plastic	3V-75V	8p each 10/75p
1.3W Plastic	3V-200V	15p each 10/£1.40
1.5W Flange	4.7-47V	£1.26 each*
2.5W Plastic	7.5-75V	64p each*
200W Stud	7.5-75V	£1.25 each*

*Only available while stocks last

ROTARY SWITCH
1 pole 12 way 2 pole 6 way 3 pole 4 way 4 pole 3 way **50p**

CERAMIC CAPACITORS
All 50V 1p to 10 nf **4p each**, 100 for **£2.75**

RESISTORS – CARBON FILM 5%
¼W 1R0 to 10M (E12 Range)	2p each. 15p/10. 75p/100
½W 1R0 to 10M (E24 Range)	2p each. 15p/10. 75p/100
1W 10R to 10M (E12 Range)	7p each. 40p/10. 3.50/100
2W 10R to 10Mm (E6 Range)	8p each. 60p/10. 5.00/100

RESISTOR KITS – each value individually packed
¼W pack 10 each value E12 – 10R – 1M 610 pieces	5.75
¼W pack 5 each value E12 – 10R – 1M 305 pieces	3.35
½W pack 10 each value E12 – 2R2 – 2M2 730 pieces	7.95
½W pack 5 each value E12 – 2R2 – 2M2 365 pieces	4.75
1W pack 5 each value E12 – 1OR – 1OM 365 pieces	15.00
2W pack 5 each value E6 – 10R – 1OM 365 pieces	18.50

RESISTORS – WIREWOUND Generally 5%
2.5W – 0.22 to 2.2R – available in preferred values	0.15
4W – 1R0 to 10R – available in preferred values	0.18
7W – 0.47R to 20K – available in preferred values	0.15
11W – 1R0 to 22K – available in preferred values	0.18
17W – 1R0 to 22K – available in preferred values	0.24

SWITCHES
Sub-Miniature Toggle
SPST **50p** SPDT **63p**
DPDT **66p**
Miniature Toggle
SPDT **68p** SPST **65p**
DPDT **72p**
DPDT Centre off **85p**
DPDT On/Off **58p**
Plate Miniature DPDT Slide **15p**
Push-To-Make **28p**
Push-To-Break **25p**

Soldering Section
Soldering Station complete with 30W or 40W Iron (state which) **£7.95**

XS25W Iron Kit/complete with steel & plug attached **10.00**
CS 18W as above **9.90**

Antex 15W iron **5.25**
Antex 18W iron **5.50**
Antex 25W iron **5.75**
Antex elements **2.75**

Antex bits **0.90**
Antex stands **2.10**
Soldersucker **4.50**
Spare nozzles for Soldersucker **0.65**

ORDERING: All components are brand new and to full specifications. Please add 65p postage/packing (unless otherwise specified) to all orders then add 15% VAT to the total. Min order £5.00. Either send cheque/cash/postal order or send/telephone your Access or Visa number. Official orders from schools, universities, colleges etc most welcome. (Do not forget to send for our 1986 catalogue - only £1.00 per copy. All orders despatched by return of mail.
NEW RETAIL 1000 sq.ft. shop now open Mon-Fri 9.00-5.00, Sat 9-12.00.

MARCO TRADING (DEPT AR05)
The Maltings
High Street
Wem, Shropshire SY4 5EN
Tel: 0939 32763 Telex: 35565

934 MHz PERSONAL RADIO

The Nevada Range

Join the growing number of people discovering this exciting radio band.

934 MHz offers 2 way high quality communications from 10 - 250 miles (according to location/weather conditions).

THE CYBERNET DELTA 1 934 MHz TRANSCEIVER
Has been engineered specifically for the UK market using latest "state of the art" technology.

- Sensitive RX (0.25 μV for 12 db SINAD).
- 16 memories available.
- Auto/Manual scan and search facility.
- External 'S' meter socket.

£355
+£5 SPECIAL DELIVERY

POWER SPLITTER
Enables the co-phasing of any two similar 934 MHz antennas to give an additional 3 DB gain.
£24.50

HRA 934 L IN-LINE GaAs FET PRE-AMP
A super new ultra-low noise pre-amp which fits in line on any base or mobile installation. Guaranteed to give a staggering increase in received range. Extremely low noise 0.7 DB NF. 20 DB gain.
£125

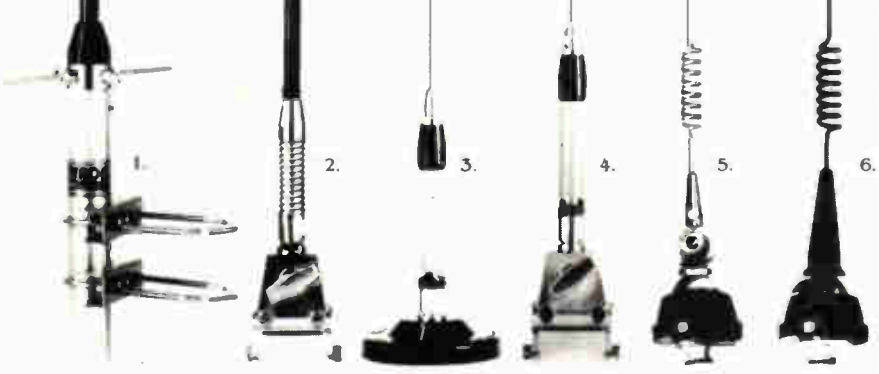
HRA 900 MASTHEAD PRE-AMPLIFIER
Super low noise GaAs FET pre-amplifier that mounts at the masthead. Low insertion loss and noise (typically 0.8 dB) coupled with 15dB gain enable this unit to double the received range of many sets.
£139.95

SWR/POWER METER
This precise and extremely accurate meter features an illuminated scale, low loss 'N' type connectors and twin meters for both power and SWR measurement. Power 0-50 watts in two ranges.
£89.95

REMOTE ANTENNA SWITCH
High quality weatherproof masthead mounting switch. For switching 2 antennas with one cable feed.
£59.95

HAS-2
Remote DC switch for mast head antenna switch
£6.95

WR 900 SWR/POWER METER
A low cost unit measuring power to 100 watts in three ranges.
£49.50



ANTENNAS
Manufactured to the highest possible specification.

1. **PA7-E BASE COLNEAR** Gain 7.14 dBi stacked ⅜ array. **£66**
2. **P714-RE** High gain gutter mount, mobile antenna. **£44**
3. **P7-ME** High gain mobile magnetic mount antenna. **£44**
4. **P7-E** High gain gutter mount mobile antenna. **£44**
5. **G900A** Low profile, bolt thru mobile antenna. **£25**
6. **G900R** Low profile bolt thru mobile antenna in black. **£25**
7. **Tc 12L MKII 12 ELEMENT BEAM** A new aluminium version of our succesful 12 element loop quad. Gain: 18dBi. **£49**

ASK YOUR DEALER FOR MORE INFORMATION OR CONTACT US DIRECT.

NEVADA 934 *Professional Series*

Telecomms, 189 London Road, Portsmouth PO2 9AE. Tel: 0705 662145 Telex: 869107 TELCOM G

Nevada 934 MHz Catalogue with full details and specifications of the complete range is available from Telecomms £1.00.