FOR THE RADIO ENTHUSIAST . . .

Practical Wireless

JANUARY 1983

Australia $1.35
Malaysia $4.95
IR £1.26 (inc. VAT)

85p

THE WORLD OF QRP

ALSO

AN ACTIVE A.T.U.
R.F. DUMMY LOADS

www.americanradiohistory.com

DO YOUR CHRISTMAS SHOPPING BY MAIL ORDER

TO ORDER ANY OF THE ITEMS LISTED BELOW SIMPLY WRITE ENCLOSING A CHEQUE OR PHONE AND QUOTE YOUR CREDIT CARD NO. – WE DO THE REST!

Bredhurst electronics

WELZ SP15M £29.00

WELZ		£	c&p
SP15M	SWR-PWR Meter HF/2M 200W	29.00	(1.00)
SP45M	SWR-PWR Meter 2M/70cm 100W	45.00	(1.00)
SP200	SWR-PWR Meter H.F./2M 1KW	59.00	(1.50)
SP300	SWR-PWR Meter H.F./2M/70cm	79.00	(1.50)
SP400	SWR-PWR Meter 2M/70cm 150W	59.00	(1.50)
SP10X	SWR-PWR Meter H.F./70cm compact	19.95	(0.75)
SP380	SWR-PWR Meter H.F./2M/70cm compact	49.00	(1.00)
AC38	A.T.U. 3.5 to 30 MHz 400W PEP	59.00	(1.00)
CT15A	15/50W Dummy Load (PL259)	6.95	(0.75)
CT15N	15/50W Dummy Load (N type plug)	11.95	(0.75)
CT300	300/1kW Dummy Load 250MHz (SO239)	44.00	(2.00)

SWR – POWER METERS			
Model 110	H.F/2M Calibrated Power Reading	11.50	(0.50)
YW-3	H.F/2M Twin Meter	11.50	(0.50)
UH74	2M/70	14.30	(0.50)
T435N	2M/70CM Twin Meter 120W	34.00	(0.75)
DAIWA CN620A	H.F/2M Cross Pointers	52.80	(—)
DAIWA CN630	2M/70 Cross Pointers	71.00	(—)

DUMMY LOADS			
DL30	PL259 30W MAX	5.00	(0.50)
WELZ CT 15A	50W MAX PL259	6.95	(0.75)
WELZ CT 15N	50W MAX N type	11.95	(0.75)
T100	100W MAX 450MHz	22.95	(0.75)
T200	200W MAX 450MHz	34.00	(0.75)
DL600	600W MAX 350MHz	29.95	(1.50)
WELZ CT300	1000W MAX 250MHz	44.00	(2.00)

YAESU			
FT1	Superb H.F. Transceiver	1295.00	(—)
FT902DM	160-10m 9 Band Transceiver	885.00	(—)
FC902	All Band A.T.U.	135.00	(1.50)
SP901	External Speaker	31.00	(1.50)
FT102	160-10m 9 Band Transceiver	725.00	(—)
FT707	8 Band Transceiver 200W Pep	569.00	(—)
FT707S	8 Band Transceiver 20W pep	485.00	(—)
FP707	Matching Power Supply	125.00	(5.00)
FC707	Matching A.T.U./Power Meter	85.00	(1.00)
MMB2	Mobile Mounting Bracket for FT707	16.10	(1.00)
FRG7	General Coverage Receiver	179.00	(—)
FRG7700	200KHz-30MHz Gen. Coverage Receiver	299.00	(—)
FRG7700M	As above but with Memories	409.00	(—)
FRT7700	Antenna Tuning Unit	37.00	(1.00)
FRA7700	Active Antenna Unit	36.40	(1.00)
FT208R	2M FM Synthesised Handheld	209.00	(—)
FT708R	70cm FM Synthesised Handheld	219.00	(—)
NC7	Base Trickle Charger	26.88	(1.30)
NC8	Base Fast/Trickle Charger	44.10	(1.50)
NC9C	Compact Trickle Charger	8.00	(0.75)
FBA2	Battery Sleeve for use with NC7/8	3.05	(0.50)
FNB2	Spare Battery Pack	17.25	(0.75)
PA3	12V DC Adaptor	13.40	(0.75)
FT480R	2M Synthesised Multimode	379.00	(—)
FT780R	70cm Synthesised Multimode (1.6MHz Shift)	459.00	(—)
FT290R	2M Portable Multimode	249.00	(—)
FT790R	70cm Portable Multimode	299.00	
MMB11	Mobile Mounting Bracket	22.25	(1.00)
CSC1	Soft Carrying Case	3.45	(0.75)
NC11C	240V AC Trickle Charger	8.00	(0.75)
FL2010	Matching 10W Linear	64.40	(1.20)
Nicads	2.2 AMP HR Nicads Each	2.50	(—)
FF501DX	H.F. Low Pass Filter 1kW	23.00	(1.00)
FSP1	Mobile External Speaker 8 ohm 6W	9.95	(0.75)
YH55	Headphones 8 ohm	9.90	(0.75)
YH77	*Lightweight Headphones 8 ohm*	9.90	(0.75)
QTR24D	World Clock (Quartz)	28.00	(1.00)
YM24A	Speaker/Mic 207/208/708	16.85	(0.75)
YD148	Stand Microphone Dual IMP 4 Pin Plug	21.10	(1.50)
YM38	As 34 but up/down Scan Buttons	24.90	(1.50)

FDK VHF/UHF EQUIPMENT			
Multi 700AX	2M FM Synthesised 25W Mobile	169.00	(—)
Multi 750E	2M Multimode Mobile	289.00	(—)
Expander	70cm Transverter for M750E	199.00	(—)

DRAE					
Power Supplies					
4 AMP	27.95	(1.50)	12 AMP	69.00	(2.00)
6 AMP	44.95	(2.00)	24 AMP	99.00	(3.00)
VHF Wavemeter 130-450MHz				24.95	(—)

ICOM		£	c&p
IC740	HF Mobile Transceiver 8 Band	699.00	(—)
IC720A	HF Transceiver & Gen. Cov. Receiver	883.00	(—)
PS15	Power Supply for 720A	99.00	(3.00)
IC251E	2M Multimode Base Station	499.00	(—)
IC25E	2M Compact 25W Mobile	239.00	(—)
IC290E	2M Multimode Mobile	366.00	(—)
IC-R70	General Coverage Receiver	469.00	(—)
IC2E	2M FM Synthesised Handheld	159.00	(—)
IC L1/2/3	Soft Cases	4.25	(0.50)
IC HM9	Speaker/Microphone	12.00	(1.00)
IC BC30	230V AC Base Charger and Hod	45.00	(1.50)
IC BC25	230V AC Trickle Charger	5.00	(0.75)
IC CP1	Car Charging Lead	3.71	(0.50)
IC BP2	6V Nicad Pack for IC2E	29.50	(1.00)
IC BP3	9V Nicad Pack for IC2E	20.00	(1.00)
IC BP4	Empty Case for 6×AA Nicads	6.95	(0.75)
IC BP5	11.5V Nicad Pack for IC2E	39.50	(1.00)
IC DC1	12V Adaptor Pack for IC2E	9.75	(0.75)
IC ML1	10W Booster	59.00	(1.00)

TV INTERFERENCE AIDS		
Ferrite Rings $1\frac{1}{2}$" dia. per pair	0.80	(0.20)
Toroid Filter TV Down Lead	2.50	(0.50)
Low Pass Filter LP30 100W	3.95	(0.50)
Trio Low Pass Filter LF30A 1kW	17.90	(1.00)
Yaesu Low Pass Filter FF501DX 1kW	23.00	(1.00)
HP4A High Pass Filter TV Down Lead	5.95	(—)

ANTENNA BITS		
H1-Q Balun 1:1 5kW pep (PL259 Fitting)	9.95	(0.75)
7-1MHz Traps Pair	7.95	(0.75)
T Piece Polyprop Dipole Centre	1.20	(0.30)
Ceramic Strain Insulators	0.40	(0.10)
Small Egg Insulators	0.40	(0.10)
Large Egg Insulators	0.50	(0.10)
4mm Polyester Guy Rope (strength 400kg) per metre	0.18	(0.04)
75 ohm Twin Feeder – Light Duty-Per Metre	0.16	(0.04)
300 ohm Twin Feeder – Per Metre	0.14	(0.04)
URM67 Low Loss 50 ohm Coax-Per Metre	0.60	(0.20)
UR76 50 ohm Coax-Per Metre	0.25	(0.05)

Please send total postage indicated. Any excess will be refunded.

TRIO TS 930S £1078

Amateur band transceiver/General coverage receiver

TRIO			
TS930S	New Transceiver	1078.00	(—)
TS830S	160-10m Transceiver 9 Bands	632.00	(—)
VFO230	Digital V.F.O. with Memories	215.00	(2.00)
AT230	All Band ATU/Power Meter	119.00	(2.00)
SP230	External Speaker Unit	34.96	(1.50)
DFC230	Dig. Frequency Remote Controller	179.00	(1.50)
TS430	160-10m Transceiver	TBA	(—)
TS130S	8 Band 200W Pep Transceiver	492.00	(—)
TS130V	8 Band 20W Pep Transceiver	397.00	(—)
VFO120	External V.F.O.	85.00	(1.50)
TL120	200W Pep Linear for TS120V	144.00	(1.50)
MB100	Mobile Mount for TS130/120	17.00	(1.50)
SP120	Base Station External Speaker	23.00	(1.50)
AT130	100W Antenna Tuner	79.00	(1.50)
PS20	AC Power Supply – TS130V	49.45	(2.50)
PS30	AC Power Supply – TS130S	88.50	(5.00)
MC50	Dual Impeadance Desk Microphone	25.76	(1.50)
MC35S	Fist Microphone 50K ohm IMP	13.80	(0.75)
MC30S	Fist Microphone 500 ohm IMP	13.80	(0.75)
LF30A	HF Low Pass Filter 1kW	17.90	(1.00)
TR9130	2M Synthesised Multimode	395.00	(—)
BO9A	Base Plinth for TR9130	34.90	(1.50)
TR7800	2M Synthesised FM Mobile 25W	257.00	(—)
TR7730	2M Synthesised FM Compact Mobile 25W	247.00	(—)
TR2300	2M Synthesised FM Portable	135.00	(—)
VB2300	10W Amplifier for TR2300	58.00	(1.50)
MB2	Mobile Mount for TR2300	17.71	(1.50)
TR3500	70 cm Handheld	TBA	(—)
TR2500	2M FM Synthesised Handheld	207.00	(—)
ST2	Base Stand	46.00	(1.50)
SC4	Soft Case	12.00	(0.50)
MS1	Mobile Stand	28.20	(1.00)
SMC25	Speaker Mike	14.49	(1.00)
PB25	Spare Battery Pack	22.30	(1.00)
TR8400	70cm FM Synthesised Mobile Transceiver	299.00	(—)
PS10	Base Station Power Supply for 8400	64.00	(2.00)
TR9500	70cm Synthesised Multimode	449.00	(—)
R2000	200KHz-30MHz Receiver	TBA	(—)
R600	Gen. Cov. Receiver	235.00	(—)
SP100	External Speaker Unit	26.90	(1.50)
HC10	Digital Station World Time Clock	58.80	(1.50)
HS5	Deluxe Headphones	21.85	(1.00)
HS4	Economy Headphones	10.35	(1.00)
SP40	Mobile External Speaker	12.40	(1.00)

TELEREADERS (CW & RTTY)	£	c&p
TASCO CWR 680	189.00	(–)
TONO 500	299.00	(–)
TONO 9000	650.00	(–)

MORSE EQUIPMENT			
MK704	Squeeze Paddle	10.50	(0.75)
HK707	Up/Down Key	10.50	(0.75)
—	Practise Oscillator	8.75	(0.50)
EK121	Elbug	33.00	(0.75)
EKM12A	Matching Side Tone Monitor	10.95	(0.75)
EK150	Electronic Keyer	74.00	(—)

ROTATORS			
Hirschman	RO250 VHF Rotor	39.95	(2.00)
9502B	Colorotor (Med. VHF)	55.00	(2.00)
KR400RC	Kenpro – inc lower clamps	99.95	(2.50)
KR600RC	Kenpro – inc lower clamps	139.95	(3.00)

DESK MICROPHONES		
SHURE 444D Dual Impeadance	39.00	(1.50)
SHURE 526T Mk II Power Microphone	53.00	(1.50)
ADONIS AM 303 Preamp Mic. Wide Imp.	29.00	(—)
ADONIS AM503 Compression Mic 1	39.00	(—)
ADONIS AM 802 Compression Mic+Meter 3 O/P	59.00	(—)

MOBILE SAFETY MICROPHONES		
ADONIS AM 202S Clip-on	21.00	(—)
ADONIS AM 202F Swan Neck + Up/Down Buttons	33.00	(—)
ADONIS AM 202H Head Band + Up/Down Buttons	31.00	(—)

TEST EQUIPMENT		
Drae VHF Wavemeter 130-450MHz	24.95	(—)
DM81 Trio Dip Meter	60.00	(0.75)
MMD50/500 Dig. Frequency meter (500MHz)	75.00	(—)

Co-AXIAL SWITCH		
2 Way Diecast (V.H.F.) SA450	10.00	(0.75)
2 Way Diecast with N sockets	12.95	(0.75)
2 Way Toggle (V.H.F.)	6.50	(0.50)
LAR 3 Way 1KW Switch	16.95	(1.00)

HELIAL ANTENNAS		
2M BNC or PL259 (state which required)	4.50	(0.50)
2M Thread for TR2300 or FT290R (state whic'i)	4.50	(0.50)
70cm BNC or Thread	4.50	(0.50)

MICROWAVE MODULES			
MMT144/28	2M Transverter for HF Rig	109.95	(—)
MMT432/28S	70cm Transverter for HF Rig	159.95	(—)
MMT432/144R	70cm Transverter for 2M Rig	184.00	(—)
MMT70/28	4M Transverter for HF Rig	119.95	(—)
MMT70/144	4M Transverter for 2M Rig	119.95	(—)
MMT1296/144	23cm Transverter for 2M Rig	184.00	(—)
MML144/30	2M 30W Linear Amp	69.95	(—)
MML144/100S	2M 100W Linear Amp (10W I/P)	139.00	(—)
MML144/100LS	2M 100W Linear Amp (3W I/P)	159.00	(—)
MML432/20	70cm 20W Linear Amp (3W I/P)	77.00	(—)
MML432/50	70cm/50W Linear Amp	109.95	(—)
MML432/100	70cm 10/100W Linear Amp	228.64	(—)
MM2001	RTTY to TV Converter	189.00	(—)
MM4000	RTTY Transceiver	269.00	(—)
MMC50/28	6M Converter to HF Rig	29.90	(—)
MMC70/28	4M Converter to HF Rig	29.90	(—)
MMC144/28	2M Converter to HF Rig	29.90	(—)
MMC432/28S	70cm Converter to HF Rig	37.90	(—)
MMC432/144S	70cm Converter to 2M Rig	37.90	(—)
MMC435/600	70cm ATV Converter	27.90	(—)
MMK1296/144	23cm Converter to 2M Rig	69.95	(—)
MMD050/500	500MHz Dig. Frequency Meter	75.00	(—)
MMD600P	600MHz Prescaler	29.90	(—)
MMDP1	Frequency Counter Probe	14.90	(—)
MMA28	10M Preamp	16.95	(—)
MMA144V	2M RF Switched Preamp	34.90	(—)
MMF144	2M Band Pass Filter	11.90	(—)
MMF432	70cm Band Pass Filter	11.90	(—)
MMS1	The Morse Talker	115.00	(—)

D70 MORSE TUTOR £56.35

DATONG PRODUCTS			
PC1	Gen. Coverage Converter HF on 2M Rig	137.42	(—)
VLF	Very Low Frequency Converter	29.90	(—)
FL1	Frequency Agile Audio Filter	79.35	(—)
FL2	Multi-mode Audio Filter	89.70	(—)
FL3	Audio Filter	129.00	(—)
ASP/B	Auto RF Speech Clipper (Trio Plug)	82.8	(—)
ASP/A	Auto RF Speech Clippers (Yaesu Plug)	82.80	(—)
D75	Manually controlled RF Speech Clipper	56.35	(—)
RFC/M	RF Speech Clipper Module	29.90	(—)
D70	Morse Tutor	56.35	(—)
AD270	Indoor Active Dipole Antenna	47.15	(—)
AD370	Outdoor Active Dipole Antenna	64.40	(—)
MPU1	Mains Power Unit	6.90	(—)
MK	Keyboard Morse Sender	137.42	(—)
RFA	Broadband Preamplifier	33.92	(—)
Codecall	Selective Calling Device (link prog)	32.20	(—)
	(switch prog)	33.92	(—)

MAIL ORDER Mon-Sat. 9-12.30/1.30-5.30

All prices correct at time of going to press.

BREDHURST ELECTRONICS

RETAIL Mon-Sat. 9-12.30/1.30-5.30

BARCLAYCARD VISA

Buy it with Access

HIGH STREET, HANDCROSS, WEST SUSSEX. TEL. 0444 400786 E.&O.E.

Goods normally despatched within 24 hrs.

EDITORIAL OFFICES
Practical Wireless
Westover House
West Quay Road
Poole, Dorset BH15 1JG
Poole 671191

Geoff Arnold T.Eng(CEI) G3GSR
Editor

Dick Ganderton C.Eng., MIERE, G8VFH
Assistant Editor

Art Editor

John Fell G8MCP
Technical Editor

Alan Martin G8ZPW
News & Production Editor

Elaine Howard G4LFM
Technical Sub-Editor

Rob Mackie
Technical Artist

Keith Woodruff
Assistant Art Editor

Sylvia Barrett
Secretarial

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

Dennis Brough
Advertisement Manager
01-261 6636
01-261 6872

Roger Hall G8TNT (Sam)
Ad. Sales Executive
01-261 6807

Claire Gerrish
Secretary
01-261 6636

Barbara Blake
Classified Supervisor
01-261 5897

Dave Kerindi
Make-up & Copy
01-261 6570

COPYRIGHT
© IPC Magazines Limited 1983. Copyright in all drawings, photographs and articles published in *Practical Wireless* is fully protected and reproduction or imitation in whole or in part is expressly forbidden. All reasonable precautions are taken by *Practical Wireless* to ensure that the advice and data given to our readers are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it. Prices are those current as we go to press.

Practical Wireless

JANUARY 1983 VOL. 59 NO. 1 ISSUE 910

contents

www.americanradiohistory.com

COMPACT SIZE AND LIGHT WEIGHT
Measures only 66 W × 168 H × 40 D mm with a weight of 540 grams including Ni-Cd battery pack.

LCD DIGITAL FREQUENCY READOUT
Easy to read in direct sunlight, or in the dark. Virtually no current drain (much less than LED's). Displays transmit and receive frequencies and memory channels. Display includes four "Arrow" indicators: "F LOCK" (Frequency Lock), "REV" (Repeater Reverse), "PROG. S" (Programmed Scan), "MS" (Memory Scan).

TEN-CHANNEL MEMORY
Nine memories may be operated in simplex mode, or with transmit frequency offset permitting access to repeaters.

LITHIUM BATTERY MEMORY BACK-UP
No loss of memory in case of complete discharge (or removal) of the Ni-Cd batteries. Current (approximately 1 microampere) to maintain memory supplied by built-in separate lithium battery, with estimated life of more than 5 years.

MEMORY SCAN
Scans only those channels (maximum 10) in which frequency data is stored. Stops on "Busy" channel, resumes scan automatically approximately 2 seconds after signal goes off, or when "MS" key is pressed. The "STOP" key or the PTT switch may be used to cancel the scan function. LCD displays memory channel number and "MS" arrow while memory scan is in use.

PROGRAMMABLE BAND SCAN
Scan bandwidth (lower and upper frequency limits) and scan steps of 5 kHz and larger (5, 10, 15, 20, 25 kHz, etc.) may be programmed. Scan automatically locks on busy channel and resumes approximately 2 seconds after signal goes off or when "PROG. S" key is pressed. "STOP" key or PTT switch cancels the scan function.

UP/DOWN MANUAL SCAN
UP/DOWN manual scan in 5 kHz steps.

FREQUENCY COVERAGE
Covers 430.00 – 439.995 MHz in 5 kHz steps.

TONE BURST SWITCH
The TONE BURST switch activates the 1,750 Hz repeater access tone oscillator.

TX OFFSET SWITCH
Selects simplex or repeater operation (operator pre-programmes repeater OFFSET MAX ±9.995 MHz).

HI/LOW POWER SELECTION
HI/LOW power output switch allows operation at 1.5 W or, for extended battery life, 300 mW.

REVERSE OPERATION
"REV" switch shifts the receiver to the transmit frequency, and the transmitter to the receive frequency. Useful for checking signals on the input of a repeater, to determine if you are within simplex range.

AUTO/MANUAL SQUELCH
Selector switch on threshold control allows selection of automatic or manual squelch operation.

BATTERY INDICATOR
LED battery condition indicator flashes when battery charge level approaches nominal discharged battery potential.

TWO "LOCK" SWITCHES
"F. LOCK" switch prevents accidential loss of chosen frequency when in "LOCK" position. "TX. STOP" switch prevents accidental transmission if PTT switch is accidentally pressed in handling.

BNC ANTENNA TERMINAL
Allows antenna changeover to be quick and easy.

ACCESSORIES INCLUDED
- Flexible rubberized antenna with BNC connector.
- 400 mAH Ni-Cd battery pack.
- AC charger.
- Plug for external microphone and speaker.
- Hand strap.

"compatible"

the two metre & seventy centimetre handhelds from Trio.

TR2500 **£207.00** inc VAT carr. £5.00
TR3500 **£220.00** inc VAT carr. £5.00

PRICES AND SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE

LOWE IN LONDON, Open monday to saturday, six days a week
lower sales floor, Hepworths, Pentonville Rd, London. telephone 01.837.6702
LOWE IN GLASGOW, Open tuesday to saturday
4,5 Queen Margarets Rd, Glasgow. telephone 041.945.2626

Now from Trio, the R2000 general coverage receiver. By taking all the superb features of the R1000 and combining them with the latest in microprocessor control Trio have, in one step, completely revised the standard by which short wave receivers are judged. Among the many features provided for the discerning listener are programmable scan, memory scan, memory retention of the mode set for a particular frequency and last, but not least, Trio have included an FM mode – why FM after all this time and our repeated comment that for a shortwave broadcast receiver FM is not really necessary. Take a look at the rear panel of the R2000: a socket marked VHF converter. Wouldn't it be superb if Trio produced a VHF converter covering from 118 to 174 MHz – then you would require FM, you would also require AM. Study the features and I am sure you will agree the Trio R2000 is the receiver for you.

Continuous Coverage from 150 KHz to 30 MHz
Use of an innovative up conversion digitally controlled PLL circuit provides maximum ease of operation and superb receiver performance. Front panel up/down band switches allow easy selection within the full coverage of the receiver. The VFO is continually tunable throughout the full 150 KHz-30 MHz range.

All Modes SSB, CW AM and FM
To give full listening potential USB LSB CW AM and FM are provided for easy selection by push buttons having adjacent led indicators.

Adjustable Tuning Rate
Tuning speed switches enable the tuning rate to be in either 50 Hz, 500 Hz or 5 KHz steps. A frequency lock switch is included to guard against accidental shift.

Ten Memories Store Frequency, Band and Mode Data
Each of the ten memories can be tuned by the VFO, thus operating as ten built in digital VFO's. The original memory frequency can be recalled by simply pressing the appropriate memory channel key. All information on frequency, band, and *mode* is stored in the selected memory. The "auto M" switch allows two types of memory storage: when the "audo M" switch is off, data is memorized by pressing the "M in" switch; when the "auto M" switch is on the frequency being used at that time is automatically memorized.

Memory Scan
Scans all memory channels or may be user programmed to scan specific channels. Frequency, band and mode are automatically selected in accordance with the memory channel being scanned.

Programmable Band Scan
Scans automatically within the programmed bandwidth. Memory channels 9 and 0 establish the scan limit frequencies. The hold switch interrupts the scanning process. However, the frequency may be adjusted using the tuning knob whilst in the scan hold position.

Lithium Battery Memory Back Up
Memory and VFO information is maintained by an internal lithium battery (estimated life, five years), a most important feature when moving the receiver from location to location.

Clock Display with Integral Timer
Two 24-hour quartz clocks are built-in to allow for programming two different time zones. An integral timer is provided for on and off switching of the receiver.

Three Built In Filters with Narrow/Wide Selector
In the AM mode 6 KHz wide or 2.7 KHz narrow may be selected. In the SSB mode 2.7 KHz is automatically selected. In the CW mode 2.7 KHz is again chosen and if the optional YG455C filter is installed then 500 Hz in the narrow position. In the FM mode 15 KHz bandwidth is automatically selected.

Other important features are: squelch on all modes, noise blanker, a large 4 inch front mounted speaker, tone control, RF attenuator, AGC switch, high and low impedance antenna terminals, optional 13.8 V DC operation, record jack and, of course, provision for a VHF converter.

All in all, a truly remarkable receiver.

£370.00 inc VAT carr. £5.00

"memorable"
the new receiver from Trio

LOWE ELECTRONICS
Chesterfield Road, Matlock, Derbyshire. DE4 5LE.
Telephone 0629 2817, 2430, 4057, 4995. Telex 377482.

www.americanradiohistory.com

QRV? FER ICOM

The World's most popular portables IC-2E £159. IC4E £199.inc.
and now the marine version IC-M12 £199+VAT.

Nearly everybody has an IC-2E, the most popular amateur transceiver in the world, now there is the 70cm version which is every bit as good and takes the same accessories.

Fully synthesized – Covering 144-145.995 in 400 5KHz steps. (430-439.99 4E). **Power output** – 1.5W. **BNC antenna** output socket. **Send/Battery indicator. Frequency selection** – by thumbwheel switches, indicating the frequency. 5KHz switch-adds 5KHz to the indicated frequency. **Duplex Simplex switch** – gives simplex or plus 600KHz or minus 600KHz transmit (1.6MHz and listen input on 4E). **Hi-Low switch** – 1.5W or 150mW. **External microphone jack. External speaker jack.**

The IC-4E is revolutionising 70cm!

Multimode Mobiles IC-290E £366. IC-490E £445.inc.

290E-144-146 MHz/490E-430-440 MHz. 10 W RF output on SSB, CW and FM. Standard and non-standard repeater shifts. 5 memories and priority channel.

Memory scan and band scan, controlled at front panel or microphone. Two VFO's. LED S-meter. 25KHz and 1KHz on FM – 1KHz and 100KHz tuning steps on SSB. Instant listen for repeaters.

IC-720A Possibly the best choice in HF. £883.inc.

One way of keeping up with rapidly advancing technology is to look at what the IC-720A offers in it's BASIC form. How many of it's competitors have two VFO's as standard, or a memory which can be recalled, even when on a different band to the one in use, and result in instant retuning AND BANDCHANGING of the transceiver? How many include really excellent general coverage receiver covering all the way from 100KHz to 30MHz? How many need no tuning or loading whatsoever? and take care of your PA, should you have a rotten antenna. How many have an automatic RIT which cancels itself when the main tuning dial is moved? How many will run full power out for long periods without overheating? How many have band data output to automatically change bands on a solid state linear AND an automatic antenna tuner unit?

The IC-720A may be just a little more expensive than some, but it's better than most! Make your choice an IC-720A.

IC-PS15 Mains PSU £99.

Tono RTTY and CW computers 7000E £500. 9000E £650.inc.

The TONO range of communication computers take a lot of beating when it comes to trying to read RTTY and CW in the noise. Others don't always quite make it!

Check the many facilities offered before you buy – especially look at the 9000E which also throws in a Word Processor. Previous ads have told you quite a lot about these products – but why not call us for further information and a brochure?

IC-730 The best for mobile or economy base station £586.inc.

iCOM's answer to your HF mobile problems – the IC-730. This new 80m–10m, 8 band transceiver offers 100W output on SSB, AM and CW. Outstanding receiver performance is achieved by an up-conversion system using a high IF of 39MHz offering excellent image and IF interference rejection, high sensitivity and above all, wide dynamic range. Built in Pass Band Shift allows you to continuously adjust the centre frequency of the IF pass band virtually eliminating close channel interference. Dual VFO's with 10Hz, 100Hz and 1kHz steps allows effortless tuning and what's more a memory is provided for one channel per hand. Further convenience circuits are provided such as Noise Blanker, Vox, CW Monitor APC and SWR Detector to name a few. A built in Speech Processor boosts talk power on transmit and a switchable RF Pre-Amp is a boon on today's crowded bands.

Great base stations IC-251 £499. IC-451 £599.inc.

ICOM produce a perfect trio in the UHF base station range, ranging from 6 Meters through 2 Meters to 70 cms. Unfortunately you are not able to benefit from the 6m product in this country, but you CAN own the IC-251E for your 2 Meter station and the 451E for 70 cms. Mains or 12 volt supply. SSB, CW and FM.

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM

Thanet Electronics
143 Reculver Road, Herne Bay, Kent. Tel: (02273) 63859.

BARCLAYCARD VISA · Buy it with Access

Same day despatch if possible.

www.americanradiohistory.com

QRV? FER ICOM

IC-R70, The very latest from Icom! £469.

Now that we have tried the R70, we believe that it is going to be a real winner.

The R-70 covers all modes (when the FM option is included), and uses 2 CPU-driven VFO's for split frequency working, and has 3 IF frequencies: 70MHz, 9MHz and 455KHz, with a dynamic range of 100dB.

Other R-70 features include: input switchability through a pre-amplifier, direct or via an attenuator, selectable tuning steps of 1KHz, 100Hz or 10Hz, adjustable IF bandwidth in 3 steps (455KHz). Noise limiter, switchable AGC, tunable notch filter, squelch on all modes, RIT, tone control. Tuning LED for FM (discriminator centre indicator). Recorder output, dimmer control.

The R-70 also has separate antenna sockets for LW-MW with automatic switching, and a large, front mounted loudspeaker with 5.8W output. The frequency stability for the 1st. hour is ± 50Hz, sensitivity- SSB/CW/RTTY better than 0.32 μv for 12dB (S+N)÷N, Am-0.5μv, FM better than 0.32 for 12dB Sinad. DC is optional on the R-70. It has a built-in mains supply.

The IC-R70 measures 286mm x 110mm x 276mm and weighs 7.4Kg., making it a very attractive package indeed. Are you ready for this truly excellent receiver? You must hear it, we know you will be impressed!

IC-25E, The Tiny Tiger £239.inc.

Amazingly small, yet very sensitive. Two VFO's, five memories, priority channel, full duplex and reverse, LED S-meter, 25KHz or 5KHz step tuning. Same multi-scanning functions as the 290 from mic or front panel. All in all the best 2M FM mobile ICOM have ever made.

Remember we also stock Yaesu, Jaybeam, Datong, Welz G-Whip, Western, TAL, Bearcat, RSGB Publications.

Agents (phone first – all evenings and weekends only, except Scotland).

Scotland – Jack GM8 GEC (031 665 2420)
Midlands – Tony G8AVH (021 329-2305)
North West – Gordon G3LEQ (0565 4040 Ansafone available)

Introducing the NEW IC-740. £699.

This latest transceiver contains all the most asked-for features, in the most advanced solidstate HF base station on the amateur market...performing to the delight of the most discerning operator.

Study the front panel controls of the ICOM IC-740. You will see that it has all of the functions to give maximum versatility to tailor the receiver and transmitter performance to each individual operator's requirements.

Features of the IC-740 receiver include a very effective variable width and continuously adjustable noise blanker, continuously adjustable speed AGC, adjustable IF shift and variable passband tuning built in. In addition, an adjustable notch filter for maximum receiver performance, along with switchable receiver preamp, and a selection of SSB and CW filters. Squelch on SSB Receive and all mode capability, including optional FM mode. Split frequency operation with two built-in VFO's for the serious DX'er.

The IC-740 allows maximum transmit flexibility with front panel adjustment of VOX gain and VOX delay along with ICOM's unique synthesized three speed tuning system and rock solid stability with electronic frequency lock. Maximum versatility with 2 VFO's built in as standard, plus 9 memories of frequency selection, one per band, including the new WARC bands.

With 10 independent receiver and 6 transmitter front panel adjustments, the IC-740 operator has full control of his station's operating requirements.

See and operate the versatile and full featured IC-740 at your authorized ICOM dealer.

Options include:
- FM Module
- Marker Module
- Electronic Keyer
- 2 - 9MHz IF Filters for CW
- 3 - 455MHz Filters for CW
- Internal AC Power Supply

Accessories.
- SM5 Desk Microphone
- UP/DWN Microphone
- Linear Amplifer
- Autobandswitching Mobile Antenna
- Headphones
- External Speaker
- Memory Backup Supply
- Automatic Antenna Tuner

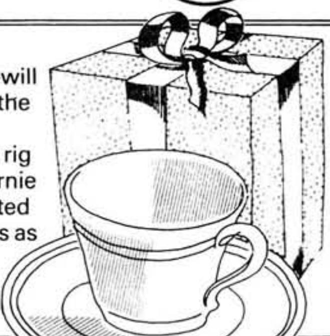
Ask about the new range of CUE DEE antennas, the winners in recent tests!

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM

www.americanradiohistory.com

COMMISSION SALES AVAILABLE ONCE AGAIN...
Call for details and have a cup of Brenda's coffee when you do the deal...

AMATEUR RADIO-EXCHANGE



SOMETHING VERY SPECIAL FOR CHRISTMAS FROM BRENDA AND BERNIE

Christmas, we are always told, is the season of good-will to all men. But now Brenda has decreed that it should be the season of good-will to the ladies as well.

So, if you have the nerve to spend £500 or more on a rig at either Acton or St Helens in the month of December, Bernie has agreed that the woman in your life should be presented with a beautiful 12-piece bone china coffee service from us as some sort of compensation.

That way **you** can have the rig you want as your Christmas present... the peace will be kept at home... and you can even have a Brenda's cup of coffee any time you want!

TWO -AMAZING NEW RECEIVERS -BREAKTHROUGHS IN TECHNOLOGY AND PRICE

As sole UK importers we are proud to present two superb new scanning receivers – the AR – 3000 for Air Band listening and the MK – 4000 for Amateur and Public Service Band coverage – both with absolutely tremendous specifications and both priced at only £99.

AR-3000

Fully synthesized AM coverage of 110 – 139.995MHz in 10kc steps with 5kc option.
Manual control or auto-scan.
Integral speaker, all within super-compact dimensions of 120mm x 222mm x 44mm.
12v operation – ideal for mobile, portable or base station use.

MK-4000

FM coverage of 70 – 87.9875MHz and 140 – 175.9875MHz in 12.5kc steps on both bands.
8 memories with manual selection.
Auto-scan of full frequency range or memories only.
Lock-out facility.
Built-in digital clock.
12v operation, making it suitable for base station or mobile use.

It's always been our policy to offer our customers the widest choice of amateur radio receivers and transmitters to be found under one roof anywhere in the UK **plus** the facility to try them out, one against the other, to find the one that's right for you.

Well, now we're doing the same with communication terminals for decoding RTTY, CW, ASCII and AMTOR. Where else will you find complete ranges of decoders by AEA, MICRODOT, MICROWAVE MODULES, TASCO - TELEREADER and TONO at prices starting from £175 for receive-only up to £700 for top-of-the-range receive-and-transmit equipment like the CWR-685 as illustrated?

One item you certainly won't find in many other places is the unique British-made ICS AMTOR decoder for which we have just been appointed the sole London retailers!

LICENSED CREDIT BROKERS ❊ Ask for written quotation on HP terms. Also interest-free terms with 50% deposit.

BARCLAYCARD VISA — Access — We welcome Access

CREDIT CARD SALES BY TELEPHONE.

All prices include VAT and are correct as we go to press. However, we reserve the right to vary them if forced to do so by the time this advertisement appears.

www.americanradiohistory.com

Rapid mail order dispatch, with FREE carriage by insured Post or Securicor within the UK mainland.

YAESU

FT 102	160-10M 9-Band Trans. **NEW**	699.00
FC 102	Atu inc PEP Meter	189.00
FT-ONE	Gen. Coverage Trans. **NEW**	1295.00
FT 790R	70cm all-mode portable **NEW**	295.00
FT 101ZFM	160-10m 9-Band Transceiver	590.00
FT 101ZDFM	160-10m 9-Band Transceiver	665.00
DIGT 101Z	Digital unit	90.00
DCT 101Z	DC Adaptor	42.50
FV 101Z	Remote vfo	112.00
FT 902DM	9-Band AM/FM Transceiver	885.00
FC 902	9-Band atu, swr/pwr etc.	135.00
FTV 901R	Transverter fitted 2m module	285.00
430TV	70cm module for above	185.00
144TV	2m module for Transverter	100.00
70TV	4m module for Transverter	80.00
FV 901DM	Remote vfo for 901	260.00
SP 901	External speaker	31.00
FL 2100Z	9-Band 1200W linear	425.00
FT 107	9-Band 100W solid state	699.00
FT 107DMS	As above with memory	779.00
DMST 107	Memory unit	92.75
FV 107G	Remote VFO for above	98.50
SP 107G	External speaker	29.90
FC 107G	Aerial tuning unit	112.70
FP 107	230V AC power module	101.95
FP 107E	Cased PSU with speaker	113.00
FT 707	8-Band solid state 100W	545.00
FP 707	230 volts AC power supply	125.00
FC 707	Aerial tuner (unbalanced only)	85.00
MR 7	Metal rack for above	15.70
MMB 2	Mobile mounting bracket	16.00
FRG 7	0.5-30MHz receiver	199.00
FRG 7700	SSB/AM/FM recvr. dig. readout	299.00
MEM 7700	Memory unit for above	90.00

CONVERTERS FOR ABOVE

FRV 7700A	118-150MHz	69.75
FRV 7700B	50-60MHz & 118-150MHz	75.50
FRV 7700C	140-170MHz	65.95
FRV 7700D	70-80MHz & 118-150MHz	72.45
FRT 7700	Receiver aerial tuner	37.85
FF 5	LF filter for above	9.95
FT 480R	2m all-mode transceiver	365.00
FP 80A	230V AC power supply	63.00
FT 780R	70cm all-mode transceiver	449.00
FT 290RM	**SPECIAL** 2m all-mode portable with ARE mods	249.00
NC 11C	AC charger	8.00
CSI-1	Carrying Case	3.45
MMB-11	Mobile mounting bracket	22.25
FT 208R	2m synthesized portable FM	199.00
NC 9C	AC charger	8.00
FT 708R	70cm hand-held	209.00

TRIO-KENWOOD

TS 930	Gen. coverage trans. **NEW**	999.00
TS 830S	160-10m transceiver 9 bands	650.00
AT 230	All-band ATU power meter	110.00
YK 88C	500Hz CW filter	29.60
YK 88CN	270 Hz CW filter	32.60
TS 530S	160-10m trans. 200W pep digital	489.00
TS 130S	8-band 200W pep	499.00
TS 130V	8-band 20W pep	445.00
AT 130	100W antenna tuner	79.00
TR 2300	2m FM synthesised portable	166.75
TR 2500	2m FM synthesised handheld	207.00
HC 10	Digital desk World	58.75
DM 801	Dip meter	60.00
TR 7730	New 25W FM transceiver	247.00
R 600	Gen. Coverage Receiver	199.00

ICOM

IC 740	Multimode H.F. trans. **NEW**	649.00
ICR 70	New multimode receiver	469.00
IC 730	HF mobile transceiver 8-band	586.00
IC 720A	HF trans. and gen. cov. receiver	795.00
PS 15	Power suply for 720A	99.00
IC 251E	2m multimode base station	499.00
IC 25E	2m synth. compact 25W mobile	259.00
IC 290E	2m multimode mobile	366.00
IC 24G	2m FM mobile 10W	169.00
IC 2E	2m FM synthesised handheld	159.00
IC 4E	70cm handheld	199.00
IC L1/2/3	Soft cases	3.50
IC HM9	Speaker/microphone	12.00
IC CP1	Car charging lead	3.20
IC BP2	6V Nicad p-ack for IC 2E	22.00
IC BP3	9V Nicad pack for IC 2E	17.70
IC BP4	Empty case for 6 X AA Nicads	5.80
IC BP5	11.5V Nicad pack for IC 2E	30.50
IC DC1	12V adaptor pack for IC 2E	8.40

MICROWAVE MODULES

MMT 144/28	2m Transverter for HF Rig	109.95
MMT 432/28S	70cm Transverter for HF Rig	159.95
MMT 432/144R	70cm Transverter for 2m Rig	184.00
MMT 70/28	4m Transverter for HF Rig	115.00
MMT 1296/144	23cm Transverter for 2m Rig	184.00
MML 144/30LS	2m 30W lin. Amp (3W1/P)	69.95
MML 144/50S	2m 50W lin. Amp (10W1/P)	85.00
MML 144/100S	2m 100W lin. Amp (10W1/P)	139.95
MML 144/100LS	2m 100W linears (1/3W1/P)	159.95
MML 432/20	70cm 20W linear Amp (3W1/P)	85.00
MML 432/50	70cm 50W linear Amp	109.95
MML 432/100	70cm 10/100W linear Amp	228.65
MM 2001	RTTY to TV converter	189.00
MM 4000	RTTY transceiver	269.00
MM 4000KB	Ditto with Keyboard	299.00
MMC 50/28	6m converter to HF Rig	29.90
MMC 70/28	4m converter to HF Rig	29.90
MMC 114/28	2m converter to HF Rig	29.90
MMC 432/28S	7cm converter to HF Rig	37.90
MMC 432/144S	70cm converter to 2m Rig	37.90
MMC 435/600	70cm ATV converter	27.90
MMK 1296/144	23cm converter to 2m Rig	69.95
MMD 050 500	500MHz dig. frequency meter	75.00
MMD 600P	600MHz prescaler	29.90
MMDP 1	Frequency counter probe	14.90
MMA 28	10 meter pre amp	16.95
MMA 144V	2m RF switched pre amp	34.90
MMF 144	2m band pass filter	11.90
MMF 432	70cm band pass filter	11.90
MMS 1	The morse talker	115.00
MMS 2	Bldrs. Adv. morse trainer	169.00

DATONG

PC 1	Gen. Cov. Converter HF on 2m	137.42
VLF	Ver Low Frequency Converter	29.90
FL 1	Frequency Agile Converter	79.35
FL 2	Multi-mode Audio Filter	89.70
FL 3	FL 2 with Auto Notch	129.37
ASP	Auto R.F. Speech Clipper (Trio or Yaesu plug)	82.80-89.70
D 75	Manually controlled R.F. Speech clipper	56.35
RFC/M	R.F. Speech Clipper Module	29.90
D 70	Morse Tutor	56.35
AD 2700	Indoor Active Filter (inc. PSU)	54.05
AD 370	Outdoor Active Filter (inc. PSU)	71.30
MK	Keyboard morse sender	137.42

PS 1	Programmable Tone Squelch System (2 units)	45.99
RFA	Wideband preamplifier	33.92
MPU	Mains Power Unit	6.90

MORSE EQUIPMENT

MK 704	Squeeze paddle	10.50
HK 707	Up/Down key	10.50
EK 150	Electronic Keyer	74.00

ROTATORS

KR 250	Kenpro Lightweight 1-1½" mast	44.95
9502B	Colorotor (Med. VHF)	55.00
KR 400RC	Kenpro – inc. lower clamps	99.95
KR 600RC	Kenpro – inc. lower clamps	139.95

BENCHER

BY 1	Keyer Paddle (black base)	32.00
BY 2	Keyer Paddle (chrome base)	39.95
BY 3	Keyer Paddle (gold plated)	92.00
ZA 1A	Balun 3.5-30MHz for dipoles	12.65
ZA 2A	Balun 14-30MHz for beam antennas	13.80

TONO

THETA 9000ERTTY/CW/ASC11	650.00
THETA 550 The latest – "A Winner"	299.00

AMPLIFIERS

UC 70	430MHz 55W + preamp	149.00
2M-50W	144MHz 30-50W	65.00
2M-100W	144MHz 100W + preamp	115.00
MR 150W	144MHz 130-150W + preamp	159.00
MR 250W	144MHz 250W + preamp	259.00

TASCO

TeleReader CWR 685E RTTY/CW/ASC11	699.00
TeleReader CWR 670E As above RX only	259.00
MorseMaster CWR 600 As above basic unit	189.00

All units include U.H.F. modulators

WELZ

SP 200	1.8-160MHz 20W-200W-1KW	59.00
SP 300	1.8-500MHz 20W-200W-1KW	79.00
SP 400	130-500MHz-5W-20W-150W	59.00
SP 15M	1.8-150MHz 0-2.5-20-200W	29.00
SP 380	1.8-500MHz 20-200W	49.00
AC 38M	8-band ATU 400W	59.95
CT-15A	DC-450MHz dummy load	6.95
CT-15N	As above N-type socket	11.75
CH 20A	DC-450MHz coax switch SO239	15.95
CH 20N	As above – N-type sockets	27.95

MOBILE SAFETY MICROPHONES

ADONIS AM 202S	Clip on	20.95
ADONIS AM 202F	S/neck + up/down btns.	30.00
ADONIS AM 202H	H/Band + up/down btns.	30.95

DRAE

FULLY PROTECTED POWER SUPPLIES

4 amp	27.95	6 amp	44.95
12 amp	69.00	24 amp	99.00
VHF Wavemeter 130-450MHz			24.95
Morse Tutor			47.00

373 UXBRIDGE ROAD, ACTON, LONDON W3 9RH
Tel: 01-992 5765/6/7 *Just 500 yards east of Ealing Common station on the District and Piccadillly Lines, and 207 bus stops outside.*

136 GLADSTONE STREET, ST HELENS, MERSEYSIDE
Tel: 0744 53157 *Our North West branch run by Peter (G4KKN) just around the corner from the Rugby Ground.*

Closed Wednesday at Acton and Monday at St Helens, but use our 24-hour Ansafone service at either shop.

www.americanradiohistory.com

AMATEUR ELECTRONICS UK

Your number one source for YAESU MUSEN

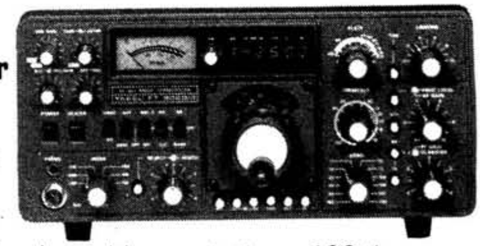
FT-ONE SUPER HF TRANSCEIVER

The ultimate in HF transceivers– –the new FT-ONE provides continuous RX coverage of 150KHz–30MHz plus all nine amateur bands (160 thru 10m). All mode operation LSB, USB, CW, FSK, AM, *FM • 10 VFO system • **FULL** break-in on CW • audio peak filter • notch filter • variable bandwidth and IF shift • keyboard scanning and entry • RX dynamic range over 95dB! and **NO** band switch!!! *OPTIONAL

FT-101ZD Mk III

YAESU's FT-101ZD **WITH FM** is the most popular HF rig on the market thanks to its very comprehensive specification and competitive price. Incorporates notch filter, audio peak filter, variable IF bandwidth plus many other features.

FT-902DM Competition grade HF transceiver



The YAESU world famous pace–setter with the acknowledged unbeatable reputation. 160 thru 10 metres including the new WARC bands. All–mode capability, SSB, CW, AM, FSK **and FM** transmit and receive. Teamed with the FTV–901R transverter coverage extends to 144 & 430MHz.

FT-707 All solid-state HF mobile transceiver

The definitive HF mobile rig, digital, variable IF bandwidth, 100 watts PEP SSB. AM, CW (pictured here with 12 channel memory VFO). Latest bands

FRG-7700 High performance communications receiver

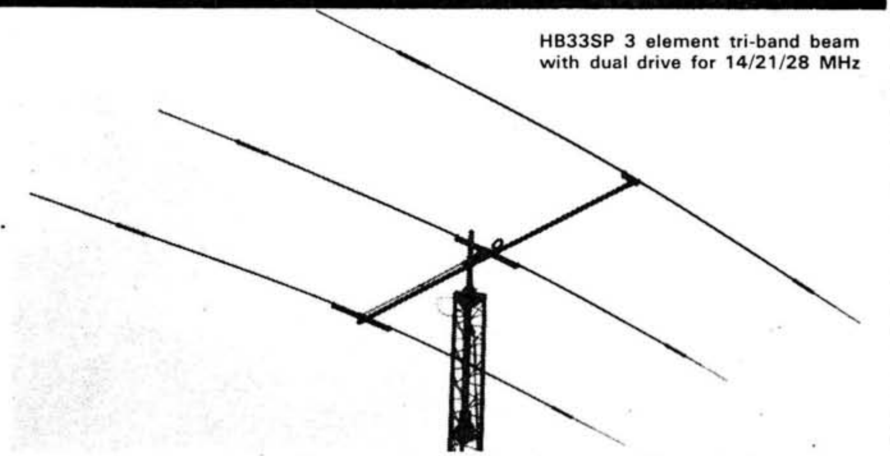
YAESU's top of the range receiver. All mode capability. USB, LSB, CW, AM *and* FM 12 memory channels with back up. Digital quartz clock feature with timer. Pictured here with matching FRT–7700 Antenna tuner and FRV–7700 VHF converter.

www.americanradiohistory.com

TET ANTENNA SYSTEMS
THE ANTENNA WITH THE DIFFERENCE

TET HF antennas are unique in that they employ dual driven elements with the following distinct advantages—

- **Improved gain over conventional arrays.**
- **Broader bandwidth with lower SWR.**
- **Enhanced front to back ratio.**
- **Better matching into solid state transceivers without an A.T.U.**
- **High power handling capacity.**


HB33SP 3 element tri-band beam with dual drive for 14/21/28 MHz

TET manufacture an exciting range of multi-element HF beams including superb monobanders plus HF verticals. Also there is a full range of VHF/UHF antennas most of which have multi-element drive or distinctive technical features.

Model	Description	incl. VAT	Carriage
HB10F2T	2 Ele. Mono Band Beams for 10 Meter Band	**50.75**	**2.75**
HB10F3T	3 Ele. Mono Band Beams for 10 Meter Band	**73.79**	**2.75**
HB15F2T	2 Ele. Mono Band Beams for 15 Meter Band	**57.21**	**2.75**
HB15F3T	3 Ele. Mono Band Beams for 15 Meter Band	**88.49**	**2.75**
HB34D	4 Ele. Tri Band Beams for 10/15/20 Meter Band	**202.69**	**5.87**
HB23SP	2 Ele. Tri Band Beams for 10/15/20 Meter Band	**128.80**	**2.75**
HB33SP	3 Ele. Tri Band Beams for 10/15/20 Meter Bands	**189.23**	**4.60**
MV3BH	Vertical Antenna for 10/15/20 Meter Band	**40.25**	**1.75**
MV4BH	Vertical Antenna for 10/15/20/40 Meter Band	**49.50**	**1.75**
MV5BH	Vertical Antenna for 10/15/20/40/80 Meter Band	**71.25**	**1.75**
MLA4	Loop Antenna for 10/15/40/80 Meter Band	**105.60**	**2.10**

YOUR LOCAL TET STOCKISTS

Amateur Radio Exchange,
373 Uxbridge Road,
Acton, London W3

Amcomm Services,
194A Northolt Road,
South Harrow, Middlesex

Bredhurst Electronics,
High Street, Handcross,
Haywards Heath,
West Sussex RH17 6BW

Stephens James Ltd.,
47 Warrington Road,
Leigh, Lancs. WN7 3EA

Uppington Tele Radio,
12-14 Pennywell Road,
Bristol BS5 0JT

- Full range of VHF/UHF Beams now in stock — an S.A.E. for full details please

TET **SOLE AGENTS**

Access — Buy it with Access

BARCLAYCARD VISA

Amateur Electronics UK
504-516 Alum Rock Road · Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 334312 PERLEC G
Opening hours: 9.30 to 5.30 Tues. to Sat. continuous – CLOSED all day Monday.

WHERE TO FIND US

www.americanradiohistory.com

South Midlands Communications Ltd.

MAIL ORDER; AS NEAR AS YOUR 'PHONE OR PEN

We welcome Access

S.M. HOUSE, RUMBRIDGE STREET, TOTTON, SOUTHAMPTON, SO4 4DP, ENGLAND
Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton

BARCLAYCARD VISA

SHOWROOMS: SPANNING THE UK – TO SERVE YOU

SOUTHAMPTON	LEEDS	CHESTERFIELD	BUCKLEY	STOKE	GRIMSBY
S.M.C. Ltd.,	S.M.C. (Leeds),	S.M.C. (Jack Twendy) Ltd.,	S.M.C. (T.M.P.),	S.M.C. (Stoke),	S.M.C. (Grimsby),
36-38 Rumbridge Street,	257 Otley Road,	102 High Street,	Unit 27, Pinfold Lane,	76 High Street,	247A Freeman Street,
Totton, Southampton,	Leeds 16. Yorkshire	New Whittington, Chesterfield,	Buckley, Clwyd.	Talke Pits, Stoke	Grimsby, Lincs.
Southampton (0703) 867333	Leeds (0532) 782326	Chesterfield (0245) 453340	Buckley (0244) 549563	Kidsgrove (07816) 72644	Grimsby (0472) 59388
9-5.30 Mon.-Sat.	9-5.30 Mon.-Sat.	9-5 Tues.-Sat.	9.30-5.30 Tues.-Sat.	9-5.30 Tues.-Sat.	9.30-5.30 Tues.-Sat.

SMC AGENTS

Neath	John	GW4FOI	(0639) 55114 Day, (0639) 2942 Eve
Stourbridge	Brian	G3ZUL	(03843) 5917
Bangor	John	GI3KDR	(0247) 55162
Tandragee	Mervyn	GI3WWY	(0762) 840656
Edinburgh	Jack	GM8GEC	(031657) 2430 Day, (031665) 240 Eve
Jersey	Geoff	GJ4ICD	(0534) 26788

NEW YEAR SALES – BARGAINS – KEENEST PRICES

FT ONE P.O.A.

FREE SECURICOR DELIVERY

FREE FINANCE

2 YEAR GUARANTEE

*Option

- ★ Rx: 150kHz-30MHz. Continuous general coverage.
- ★ Tx: 160-10m (9 bands) or 1.5-30MHz commercial.
- ★ All Modes: AM, CW, FM*, FSK, LSB, USB.
- ★ 10 VFO's!!! Any Tx-Rx split within coverage.
- ★ Two frequency selection ways, *no* bandswitch.
- ★ Main dial, velvet smooth, 10Hz resolution.
- ★ Inbuilt keyboard with up/down scanning.
- ★ Dedicated digital display for RIT offset.
- ★ Receiver dynamic range up to 100dB!!!
- ★ SSB: Variable bandwidth *and* IF shift.
- ★ 300* or 600Hz*, 2,400 → 300Hz, 6kHz*, 12kHz*.
- ★ Audio peak and notch filter. FM squelch.
- ★ Advanced variable threshold noise blanker.
- ★ 100W RF, key down capability, solid state.
- ★ Mains and 12VDC. Switch mode PSU built in.
- ★ RF processor. Auto mic gain control. VOX.
- ★ Last but not least *full* break-in on CW.

FT102 £699

VAT @ 15% & SECURICOR

2 YEAR GUARANTEE

"INSTANT" H.P.

PLASTIC BY 'PHONE

- ★ 1.8-3.5-7-10-14-18-21-24.5-28MHz.
- ★ All modes:- LSB, USB, CW, AM‡, FM‡, (‡Option board).
- ★ Front end: extra high level, operates on 24V DC.
- ★ RF stage bypassable boosts dynamic range over 100 dB!
- ★ Variable bandwidth 2.7KHz→500Hz *and* IF Shift.
- ★ Fixed bandwidth filters, parallel or cascade configurations.
- ★ IF notch (455KHz) *and* independent audio peak.
- ★ Noise blanker adjustable for pulse *width*.
- ★ External Rx and separate Rx antenna provisions.
- ★ *Three* 6146B in special configuration – 40 dB IMD!
- ★ Extra product detector for checking Tx IF signal.
- ★ Dual meter, peak hold ALC system.
- ★ Mic amp with tunable audio network.
- ★ **SP102**:– Speaker, Hi and Lo AF filters, 12 responses!
- ★ **FV102**:– VFO. 10Hz steps and readout, scanning, QSY.
- ★ **FC102**:– ATU,1.2KW, 20/200/1200 W FSD PEP, wire.
- ★ **FAS-1-4R**:– 4 way remote waterproof antenna selector.

FT980 P.O.A.

FREE DELIVERY

2 YEAR GUARANTEE

NEW

★ ALL MODE HF TRANSCEIVER

- ★ Rx 150KHz-830MHz
- ★ TX 160-10 met 9 bands + 3 × 500KHz Aux bands
- ★ All modes Am, CW, FM, LSB, USB, AFSK
- ★ IF shift + variable bandwidth 2.6KHz-300Hz
- ★ Inbuilt keyboard operation + Scanning
- ★ Switchable attenuator 10, 20, 30dB
- ★ Audio peak + notch filter −40dB
- ★ RF process or Auto mic gain control
- ★ 3rd order IMD −40dB at 100W PEP
- ★ AFSK shift 170, 425, 850Hz selectable
- ★ Multi channel memory + programmable scan limits
- ★ Optional computer interface available

★ SOME FACILITIES OPTIONAL

WIDE COVERAGE ALL MODE Rx; FRG7700 £299 inc.

VAT @ 15% & SECURICOR

- ★ 30MHz down to 150kHz (and below).
- ★ 12 Channel memory option with fine tune.
- ★ SSB (LSB/USB), CW, AM, FM.
- ★ 2.7kHz, 6kHz, 12kHz, 15kHz, @ – 6dB.
- ★ 3 Selectivities on Am, squelch on FM.
- ★ Up conversion, 48MHz first IF.
- ★ 1kHz digital, plus analogue, display.
- ★ Inbuilt quartz clock/timer.
- ★ No preselector, auto selected LPF's.
- ★ Advanced noise blanker fitted.
- ★ Antenna 500Ω to 1.5MHz, 50Ω to 30MHz.
- ★ 20dB pad plus continuous attenuator.
- ★ Switchable A.G.C. Variable tone.

'7700 THE ONE WITH FM!

- ★ 110 and 240V ac, 12Vdc option.
- ★ Signal meter calibrated in "S" and SIMPO.
- ★ Acc; Tuners, Converters, LPF, Memory.
- ★ **FRT7700**; 150kHz-30MHz, Switch, etc.
- ★ **FRV7700A**: 118-130, 130-140, 140-150MHz.
- ★ **FRV7700B**; 118-130, 140-150, 50-59MHz.
- ★ **FRV7700C**; 140-150, 150-160, 160-170MHz.
- ★ **FRV7700D**; 118-130, 140-150, 70-80MHz.
- ★ **FRV7700E**; 118-130, 140-150, 150-160MHz.
- ★ **FRV7700F**; 118-130, 150-160, 170-180MHz.
- ★ **FF5**; 500kHz (for improved VLF reception).
- ★ **MEMGR7700**; 12 Channels (internal fitting).
- ★ **FRA7700**; Active Antenna.

www.americanradiohistory.com

TWO AND SEVENTY SMC HAVE THE SOLUTION

NEW YEAR SALES – BARGAINS – KEENEST PRICES

- ★ Multimode USB, LSB, FM, CW.
- ★ 100Hz backlit LCD Frequency display.
- ★ 10 memory channels '5 year' backup.
- ★ Any TX/Rx split with dual VFOs.
- ★ Up/Down tuning from microphone.
- ★ AF output 1W @ 10% THD.
- ★ Bandwidth 2.4kHz and 14kHz @ – 6dB.
- ★ LED's; 'On Air', 'Busy'. m/c meter; S, PO.
- ★ 58(H) × 150(W) × 195(D) (1.3kg).

SMC2.2C	NiCad 2.2A/hr, "C"	**TOS**
SMC2.0C	NiCad 2.0A/hr "C"	**2.35**
SMC8C	Slow Charger (220mA)	**8.80**
MMB11	Mobile Mount	**22.25**
CSC1	Soft carrying case	**3.45**
FL2010	Linear Amplifier 2m 10W	**64.40**
FL7010	Linear Amplifier 70cms	**99.65**

2 or 70!

FT290R P.O.A.

FREE DELIVERY

- ★ 144-146MHz (144-148) possible.
- ★ 2.5W PEP, 2.5W RMS/300mW out.
- ★ FM: 25kHz and 12.5kHz steps.
- ★ SSB: 1kHz and 100Hz steps.
- ★ ±600kHz repeater split 1750Hz burst.
- ★ Integral telescopic antenna.
- ★ Rx, 70mA, Tx; 800mA (FM maximum).

FT790R £295 inc.

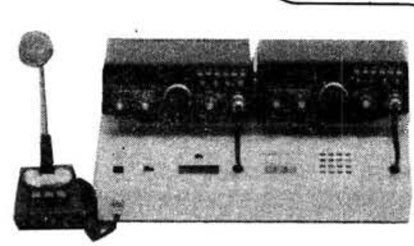
EX-STOCK

VAT @ 15% & POSTAGE

- ★ 430-330MHz (440-450 alternative).
- ★ 1W PEP, 1W/250mW FM/CW out.
- ★ FM: 100kHz and 25kHz steps.
- ★ SSB: 1kHz and 100Hz steps.
- ★ 1.6MHz shift with input monitor,
- ★ 1750Hz burst.
- ★ Rx; 100mA/200mA. Tx; 750mA max.
- ★ BNC Mounting ½λ flexi antenna.

2 or 70!

- ★ USB-LSB-CW-FM (A 3j, A1, F3).
- ★ 30W PIP A 3j, 10/1W out A1 F3.
- ★ Any Tx Rx split with dual VFO's.
- ★ Four easy write-in memory channels.
- ★ Memory scanning with slot display.
- ★ Up/down tuning/scanning from mic.
- ★ Priority channel on any memory slot.
- ★ Digital RIT. Advanced noise blanker.
- ★ Satellite mode allows tuning on Tx.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx & Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ LED's; "On Air" Clar, Hi/Low, FM mod.
- ★ Size (Case): 8.3" D, 2.3" H, 6.9" W.



Ills. c/w SCI station consol and YD 148 mic.

FT480R £365

VAT @ 15% & SECURICOR

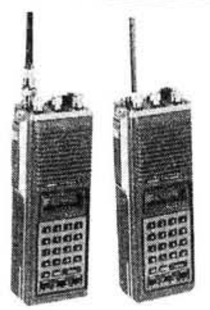
- ★ 144-146 MHz (143.5-148.5 possible).
- ★ ±600kHz standard repeater split.
- ★ Excellent dynamic range and sensitivity.
- ★ FM; 25, 12½, 1kHz steps.
- ★ SSB; 1,000, 100, 10Hz steps.

- ★ 430-434MHz (440-445 possible).
- ★ GaAs Fet RF for incredible sensitivity.
- ★ FM; 100kHz, 25kHz, 1kHz, steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ FT780R 1.6 fitted 1.6MHz Shift **£459** inc.

FT780R P.O.A.

FREE DELIVERY

- ★ Keyboard entry of frequencies/splits.
- ★ LCD digital display with backlight.
- ★ Any split + or – programmable.
- ★ Ten memory channels '5 year' back up.
- ★ Up/down manual tuning. Memory scan.
- ★ Manual or auto scan for busy/clear.
- ★ Priority channel with search back.
- ★ Scan between any two frequencies.
- ★ Auto scan restart. 1.750Hz tone burst.
- ★ Built in condenser microphone.
- ★ 500mW to int/ext speaker.
- ★ External speaker/mic. available.
- ★ 168(H) × 61(W) × 39(D)mm.
- ★ C/w Quick change NiCad pack, helical.



2 or 70!

FT208R £199

VAT @ 15% & POSTAGE

- ★ 144-146MHz (144-148 possible).
- ★ 12.5/25kHz synthesizer steps.
- ★ ±600kHz repeater split.
- ★ 2.5 or 0.3W RF output.
- ★ Rx: 20mA squelch 150mA max. AF.
- ★ Tx: 800mA at 2.5W RF.
- ★ 0.25μV for 12dB SINAD.

FT708R P.O.A.

FREE DELIVERY

- ★ 430-440MHz (440-450 option).
- ★ 25kHz synthesizer steps.
- ★ ±7.6MHz EU split standard.
- ★ 1W or 100mW RF output.
- ★ Rx: 20mA squelch, 150mA (max AF).
- ★ Tx: 500mA at 1W RF.
- ★ 0.4μV for 12dB SINAD.

2 and/or 70!

- ★ Four easy write-in memory channels.
- ★ Rx priority channel (auto check).
- ★ Scanning band/memory empty/busy.
- ★ Up/down tuning/scanning from mic.
- ★ Optically coupled tuning control.
- ★ Manual and automatic tone burst.
- ★ String LED's for 'S' and PO, 7 status LEDs.
- ★ 1½W of audio to internal/external speaker.

FT720 Control Head.

- ★ 3.3(4.3)" D × 6" W × 2 (2.2)" H.

S72 Switching box.

- ★ Pushbutton band change Auto steps/spits.

E72S	Extension cable, 2m long.
E72L	Extension cable, 4m long.
MMB3	Mobile Mounting bracket for deck.

Ills. c/w S72 and two E72S cables.

FT720RV £245 inc.

VAT @ 15% & SECURICOR

- ★ 144-146MHz (144-148MHz possible).
- ★ 12½kHz synthesizer, 600kHz shift.
- ★ 0.3μV for 20dB quieting.
- ★ Rx 0.5 Tx RV 3.5A, RVH 6.5A.
- ★ 5.8(6.5)" D × 6" W × 2 (2.2)" D.

- ★ 430-434MHz.
- ★ 25kHz synthesizer steps, 1.6MHz shift.
- ★ 0.5μV for 20dB quieting.
- ★ Rx 0.5A, Tx 4.5A.
- ★ 5.8(6.5)" D × 6" W × 2 (2.2)" D.

FT720RU £265 inc.

VAT @ 15% & SECURICOR

- ★ 150(W) × 50(H) × 176(D)mm.
- ★ Up/down, memory/band scanning.
- ★ Easy "write-in" memory channels.
- ★ Memory backup "5 year" lithium cell.
- ★ Ten memories with priority functions.
- ★ Supplied with scanning microphone.
- ★ Large illuminated "any angle" LCD display.
- ★ Display to 100's of Hz and special functions.
- ★ Two completely independent VFO's.
- ★ Operation between memory and "other" VFO.
- ★ Full reverse repeater function.
- ★ Manual and automatic tone burst.
- ★ Large "full sound" internal speaker.
- ★ Concentric volume and squelch controls.

2 or 70!

FT230R P.O.A.

FREE DELIVERY

- ★ 144-146MHz (extensions possible).
- ★ 25W RF output, 3W on low.
- ★ 25 and 12½kHz steps provided.
- ★ ±600kHz repeater split, 1750Hz burst.
- ★ Tx; 5A. Rx 300mA (standby).
- ★ UHF socket. IF's; 10.7 and 0.455MHz.

FT730R P.O.A.

FREE DELIVERY

- ★ 430-434MHz (440-445MHz possible).
- ★ 10W RF output, 1W on low.
- ★ 25 and 100kHz steps provided.
- ★ ±1.6 MHz repeater split, 1750Hz burst.
- ★ Tx 3A, Rx 300mA (standby).
- ★ 'N' socket. IF's 46.255 and 0.455MHz.

www.americanradiohistory.com

THE CQ CENTRE

10 MERTON PARK PARADE,
KINGSTON ROAD, LONDON SW19
(JUNCT. MERTON HALL RD)
TEL. 01-543 5150

A MERRY XMAS TO ALL FRIENDS AND CUSTOMERS

LARGE STOCK OF NEW AND S/HAND EQUIPMENT
ICOM – YAESU – TRIO – STANDARD – FDK – AZDEN ETC.

FULL RANGE LASHING KIT, POLES, CABLE, ROTATORS JAYBEAM – SMC ANTENNAS SWR POWER METERS ETC.

HB9-CV
2 EL. BEAM
2 METRE + 70CMS
4.5 DB FORWARD GAIN
18DB FRONT TO BACK
£8.50 WITH CLAMP
WE CANNOT POST THE 2 METRE VERSION OF THIS ANTENNA

SLIM JIM
FOR 2 METRES AND 70CMS
COMPLETE WITH 4 METRES CO-AX
£7
OR £8.50 INC. POST + PACKING

STOP PRESS: Now available – a brand new Morse Tuition Tape from GLHXZ. Based on tried and tested subliminal techniques. Includes:– Alphabet – Numerals – Punctuation – Plain Language-simulated Post Office Amateur Morse Test at 12 w.p.m. Full instructions and check sheet included. **£6.50** inc. p&p.

INSTANT CREDIT NOW AVAILABLE THROUGH LOMBARD TRICITY — PLEASE PHONE OR WRITE FOR QUOTATION

PCB's FOR PW PROJECTS

WAD784	Active antenna	£1.15	WR153	28meg preamp	£3.50
WAD834	Stour	£2.70	WR150	3v Audio amp	£2.00
WAD804	Helford	£1.00	WR152	Morse show	£8.00
WAD788	Audio amp	££1.35	WR075	Nimbus	£0.95
WAD853	Power supply	£1.90	WR074	Nimbus	£1.10
WR123	Stour	£4.40	WR073	Nimbus main board	£5.50
WR124	Stour	£4.40	WR078	Photo timer	£2.78
WR125	Stour	£5.50	WAD509	N.B.F.M. Demodulator	£2.20
WAD830	Stour	£2.75	WK706	Audio limiter	£2.30
WR126	EXE	£3.90	WK076	Audio limiter	£1.45
WR131	Field strength meter	£2.50	WR079	Audio limiter RF board	£2.25
WR122	Sleep timer	£2.60	WR080	Repeater timer	£2.20
WR127	Stour	£3.80	WR083	Nimbus	£2.90
WR128	Stour	£4.40	WK084	Flash trigger	£1.65
WR129	Stour	£4.50	WR085	Railway controller	£2.47
WR130	Stour	£4.50	WR095	Transceiver power unit	£1.00
WR136	Winton	£4.50	WR096	Nimbus	£2.15
WR134	Winton	£5.95	WAD634	2m convertor	£1.38
WR135	Crystal calibrator	£1.70	WR086	Tamar	£1.20
WR140	Short wave convertor	£2.40	WR087	Tamar	£1.90
WR141	Short wave convertor	£1.60	WR088	Tamar	£2.00
WR142	Short wave convertor	£1.40	WR089	Tamar	£2.00
WR136	Short wave convertor	£5.50	WR090	Tamar	£4.00
WK103	70cm/2m convertor	£3.70	WR091	Tamar	£4.00
WR104	HF convertor	£2.40	WR097	Nimbus	£1.10
WR132	Stour	£1.70	WAD641	Resistance meter	£1.25
WAD927	SWR warning	£1.40	WR082	Direct conversion Receiver	£1.70
WR143	TV up convertor	£4.00	WK100	Field tester	£1.25
WR144	Iambic keyer	£2.70	WK101	Field tester	£1.25
WR145	Frequency synthesisor	£2.90	G4CLF	Helford	£2.59
WR146	Frequency synthesisor	£2.50	Sherbourne 1/2		£9.20
WR147	Frequency synthesisor	£2.50	WR0104	Helford	£0.85
WR148	Frequency synthesisor	£1.75	WR0101	Bird scarer	£1.29
WR149	Frequency synthesisor	£4.50	WR0102	Bird scarer	£1.40
WK104	Frequency synthesisor	£1.50	WR0103	Buffer amp	£1.25

C. Bowes Electronics Ltd.
28 Stockport Road,
Cheadle,
SK8 2EA
Tel. 061-428 4497 Extension 5

BARCLAYCARD VISA
CASH WITH ORDER

Get the Most from your VHF equipment with a

PACKER COMMUNICATIONS
VHF/UHF ANTENNA TUNING UNITS

IMPROVE YOUR V S W R !

We are often asked, 'Why and ATU at VHF?', well for exactly the same reason that apply at HF.
(1) Antennas are rarely 50Ω.
(2) Their VSWR is never constant across the band from CW, through SSB & FM, to satellites.
(3) Many modern rigs are VSWR protected. Even a slight increase in VSWR can cause a dramatic loss in output.
(4) Roatation of a beam can cause reflections from nearby objects.
Many customers are experimenting with long wires and with our AT-145Z (built-in balun) feeding rhombics, Vees and G5RVs. For mobile our AT-145B incorporates a LW/MW splitter to allow BC reception from your 5/8s. Try loading an ordinary car aerial if you have a vandalism problem.

USE FIXED OR MOBILE MATCHES 50-10/500Ω 500W

AT-145	**£22.85**	SO-239 standard. N or BNC **£23.75**
AT-145Z	**£29.45**	SO-239 plus terminals for built-in balun.
AT-145B	**£27.35**	SO-239 plus 1m coax with car-radio plug.
AT-70	**£24.55**	Any connector to order, see you on 4m!
AT-432	**£28.80**	N standard, others to order, ideal for ATV.

YOU MUST HAVE A WAVEMETER! Over two thousand of our **WM-2 two meter wavemeters** are now in use.
They cover 130-300 MHz, well past the second harmonic demanded by the Home Office, and are VERY sensitive. **£22.45**
WM-4 for 4m, similar to WM-2 and the same price.
WM-7 for 70cm 400-900 MHz **£24.35.**
NEW . . . NB-52 Noise Bridge. Due to many requests we have just produced this versatile piece of test gear. With a general coverage receiver you can measure impedance from 1-250 MHz. Calibrated 15-120Ω SO-239, N or BNC. Makes antenna adjustments simple, and WITHOUT a VSWR meter. **£34.25.**
2-XY POLARISATION SWITCH for XY antennas. Gives Vert, Horiz, righthand and lefthand polarisation. **£34.45.** With built-in antenna tuner **£44.95**

Access – Visa – American Express Cards welcome. Order by phone.
Allow 14 days for delivery.

OLD STATION, CONISTON, CUMBRIA LA21 8HQ. 09664-678

www.americanradiohistory.com

NEW AND FREE FROM GSC.

NEW an exciting range of projects to build on the EXP300 breadboards.
NOW anybody can build electronic projects using "Electronics-by-numbers", its as "Easy as A, B, C with G.S.C!"

FREE project

MUSICAL DOORBELL OF THE 3RD KIND

You've seen the film, now haunt your visitors with the tune!
Each time the doorbell is pushed the eerie tune plays out, then switches off to conserve battery power.

HOW DO YOU MAKE IT.

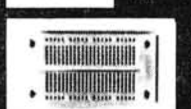
Our **FREE** project gives you clear "step-by-step" instructions. For example "take Resistor No.1 and plug it into hole numbers B45 and B47".
"Take IC No.1 and plug it into hole numbers E35 to E42 and F35 to F42, (pin 1 on the IC goes into F35)"
"Take. . ."Well! why not "clip-the-coupon" and get your FREE step-by-step instruction sheet and your FREE 12 projects with each EXP300 bought and your **FREE** catalogue and. . . . .

EXPERIMENTOR BREADBOARDS

The largest range of breadboards from GSC.
Each hole is identified by a letter/number system
EACH NICKEL SILVER CONTACT CARRIES A LIFE-TIME GUARANTEE.

All modular construction means that any Experimentor breadboard can be 'snap-locked' together to build breadboards of any size.

EXP325
The 'one-chip' breadboard
Takes 8, 14, 16 and up to 22 pin IC's
Has 130 contact points including 2 bus bars.



EXP350
The 'beginners breadboard'
For limited period you can have FREE 12 'Electronics by Numbers' PROJECTS

EXP300

The most 'widely-bought' breadboard
Don't miss out on our 'NEW AND FREE' projects
They can be built on the EXP300

EXP600
The Hobbyist microprocessor' board

EXP650
The 'one-chip microprocessor' board

EXP4B
'Snaps-on' four extra bus bars

PB6
The ultimate breadboard kit

PB100
The most

NEW AND FREE FROM G.S.C.

24 HOUR SERVICE.

Tel (0799) 21682 with your Access, American Express, Barclaycard number and your order will be put in the post immediately.

TO ORDER JUST CLIP THE COUPON.

Experimentor Breadboards	Unit Price Inc. P & P + 15% VAT	Quantity Required
Exp 325	£3·16	
Exp 350	£4·83	
Exp 300	£8·05	
Exp 600	£9·48	
Exp 650	£5·75	
Exp 4B	£3·73	
PB 6	£13·80	
PB 100	£17·53	

NAME . . . .

ADDRESS . . . .

. . . .

I enclose cheque/PO for £ . . . .

Debit my credit card No. . . . .

Expiry date . . . .

Please send free catalogue Tick ☐ Dept. 6P

GLOBAL SPECIALTIES CORPORATION

GSC Unit 1, Shire Hill Ind. Estate
Saffron Walden, Essex, CB11 3AQ.
Telephone (0799) 21682.
Telex 817477. Dept. 6P

www.americanradiohistory.com

BI-PAK BARGAINS

TRIACS — PLASTIC

4 AMP — 400v — T0202 — TAG 136G.

1 OFF	10 OFF	50 OFF	100 OFF
40p	£3.75	£17.50	£30.00

8 AMP 400v — T0220 — TAG 425

60p	£5.75	£27.50	£50.00

SLIDER POTENTIOMETERS — ALL AT 50p PER PAK

Plastic 40mm Travel Mono

SX63 5 x 470 ohms Lin — SX67 5 x 47k Lin
SX64 5 x 1k Lin — SX68 5 x 47k Log
SX65 5 x 22k Lin — SX69 5 x 100 Lin
SX66 5 x 22k Log — SX70 5 x 1 meg Lin

SX40 250 Silicon Diodes—Switching like IN4148 DO-35. All good—uncoded. Worth double our price. 45v 75mA. £1.25

SX41 250 Silicon Diodes—General Purpose, like OA200/202, BAX13/16. Uncoded. 30-100v 200mA DO-7. £1.25

SX44 10 5A SCR's T064 3 x 50v, 3 x 100v, 2 x 200v, 2 x 400v. Super value less than ½ price. £1

SX45 10 5A SCR's T066 2 x 50v, 2 x 100v, 4 x 200v, 2 x 400v. All coded. Brand new, a give away at £1

MINIATURE TOOLS FOR HOBBYISTS

Miniature round nose side cutters — insulated handles 4½inch length. Order No:Y043.

Miniature long nose pliers — insulated handles 5½inch length. Order No:Y044.

Miniature bend nose pliers — insulated handles 5½inch length. Order No:Y045.

Miniature end nippers — insulated handles 4½inch length. Order No:Y046.

Miniature snipe nose pliers with side cutter and serrated jaws — insulated handles 5inch length. Order No:Y042.

ALL AT **1.25** each

All with insulated handles

FLEXEY DRIVER

A flexible shaft screwdriver for those awkward to get at screws. Overall length 8½inch. Order No:FS-1 Flat blade 4mm FS-2 Cross point no.1 **£1.75 each.**

GRIP-DRIVER

8inch long screwdriver with spring loaded grip on end to hold screws in position while reaching into those difficult places. Order No:SD-1 Flat blade 4mm SD-2 Cross point no.0. **85p each**

INEXPENSIVE TOOLS OF IMMENSE VALUE

Combined wire stripper, cutter, crimper incl. 25 asst. terminals for crimping. Order No:WS2. Our low price **£1.20 each.**

BA NUT DRIVER SET

Set of 5 BA spanner shafts plus universal handle in roll-up wallet. Sizes 0BA 2-4-6-8BA Order no: T192
£2.75 set

NEON SCREWDRIVER

7½in blade order no:NS1 **£0.85p each**
5½in blade order no:NS2 **£0.50p each**

Guarantee

Satisfaction or your money back has always been BI-PAK's GUARANTEE and it still is. All these Sale items are in stock, in quantity and we will despatch the same day as your order is received

EXPERIMENTOR BOXES – ALUMINIUM – PLASTIC

ALUMINIUM BOXES

Made with Bright Aluminium folded construction with deep lid and screws

SIZE "L	W	H	Order No.	Price
5¼	2¼	1½	159	83p
4	2¼	1½	161	83p
4	2½	2	163	83p
3	2	1	164	67p
8	6	3	166	£1.68
6	4	2	167	£1.12

Plastic Boxes

Coloured Black. Close fitting.
Flanged Lid, fixing screws into brass bushes.

SIZE "L	W	H	Order No.	Price
4	2	1	141	£1.00
4¾	2½	1½	143	£1.30
6	3¼	2	144	£1.50

Plastic as above but with aluminium top panel

SIZE "L	W	H	Order No.	Price
4	2¾	1	146	£1.40

Plastic sloping front

SIZE "L	W	H	Order No.	Price
5½	4¼	2¼ slope to 1½	148	£2.14

All measurements for boxes are shown in inches. L = Length W = Width. H = Height

IC SOCKETS

The lowest price ever.

The more you buy the cheaper they come!

Pin	10 off	50 off	100 off
8 pin	85p	£3.50	£6.00
14 pin	90p	£3.75	£6.50
16 pin	95p	£4.00	£7.00

VOLTAGE REGULATORS T0220

Positive +	Negative +
7805 — 50p	7905 — 55p
7812 — 50p	7912 — 55p
7815 — 50p	7915 — 55p
7824 — 50p	7924 — 55p

BI-PAK'S OPTO 83 SPECIAL

A selection of Large & Small size LED's in Red Green, Yellow and Clear, plus shaped devices of different types. 7 Segment displays, photo transistors, emitters and detectors. Types like MEL11, FPT100 etc. Plus Cadmium Cell ORP12 and germ. photo transistor OCP71.

O/NO SX57A
Valued - Normal Retail £12.00
Our Price
£5.00

SEMICONDUCTORS FROM AROUND THE WORLD

100 A Collection of Transistors, Diodes, Rectifiers, Bridges, SCR's, Triacs, IC's both Logic and Linear plus Opto's all of which are current everyday usable devices.

Guaranteed Value over £10 at Normal Retail Price

yours for only **£4•00**

Data etc. in every pak. Order No SX56

MW398 NI-CAD CHARGER

Universal Ni-Cad battery charger. All plastic case with lift up lid. Charge/Test switch. LED indicators at each of the five charging points

Charges — PP3 (9V), U12 (1.5V penlite), U11 (1.5V "C"), U2 (1.5V "D")
Power — 220-240V AC
Dims — 210 x 100 x 50mm
£6.95

POWER SUPPLY OUR PRICE £3.25

Power supply fits directly into 13 amp socket. Fused for safety. Polarity reversing socket. Voltage switch. Lead with multi plug. Input — 240V AC 50HZ Output -3 4.5 6 7.5 9 & 12V DC Rating — 300 ma MW88

1 Amp SILICON RECTIFIERS

Glass Type similar IN4000 SERIES IN4001-IN4004
50 — 500v — uncoded — you select for VLTS
ALL perfect devices — NO duds Min 50v
50 for **£1.00** — worth double ORDER NO SX76

Silicon General Purpose NPN Transitors TO-18 Case Lock fit leads – coded CV7644 Similar to BC147 – BC107– ZT89 ALL NEW! VCE 70v IC500mA Hfe 75-250

	50 off	100 off	500 off	1000 off
PRICE	£2.00	£3.80	£17.50	£30.00

Order as CV7644

Silicon General Purpose PNP Transistors TO-5 Case Lock fit leads coded CV9507 similar 2N2905A to BFX30 VC 60 IC 600mA Min Hfe 50 ALL NEW!

	50 off	100 off	500 off	1000 off
PRICE	£2.50	£4.00	£19.00	£35.00

Order as CV9507

Silicon NPN'L' TypeTransitors

TO-92 Plastic centre collector
Like BC182L — 183L — 184L
VCBO 45 VCEO 30 IC200mA Hfe 100-400
ALL perfect devices — uncoded ORDER AS SX183L

50 off	100 off	500 off	1000 off
£1.50	£2.50	£10.00	£17.00

PNP SILICON TRANSISTORS:

Similar ZTX500 — ZTX214 — E-Line
VCEO 40 VCBO 35 Ic 300mA Hfe 50-400
Brand New — Uncoded — Pefect Devices

50 off	100 off	500 off	1000 off
£2.00	£3.50	£15.00	£25.00

Order as ZTXPNP

DIGITAL VOLT METER MODULE

3 x 7 segment displays Basic Circuit 0-2V± instructions provided to extend voltage & current ranges. Operating voltage 9/12v.
Typ. Power Consumption 50mA
O/NO:SX99 Once only price
£9.95

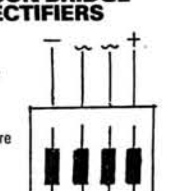
ELECTRONIC SIREN 12v DC

Red plastic case with adjustable fixing bracket. Emits high-pitched wailing note of varying pitch - 100 cycles per minute
Dims - 90mm (dia)
60mm (depth)
Power - 12 v DC
Our Price:- £5.50

SILICON BRIDGE RECTIFIERS

Comprising 4 × 1½amp rectifiers mounted on PCB

VRM – 150vlts
IFM – 1.5Amps
Size: 1 inch square
10 off £1.00
50 off £4.50
100 off £7.50
Order No. As:4RI BRect.



MULTITESTERS

1,000 opv Including test leads & Battery.
AC volts:- 0-15-150-500-1,000.
DC volts:- 0-15-150-500-1,000.
DC currents:- 0-1ma-150ma.
Resistance:- 0-2.5 K ohms 100 K ohms.
Dims:- 90 x 61 x 30mm.

O/No.1322.OUR PRICE £6.50 ONLY

30,000 opv Including test leads and case.
AC volts:- 0-2.5-10-25-100-250-500-1,000.
DC volts:- 0-0.25-1-2.5-10-25-100-250-1,000.
DC current:- 0-50ua 0-5ma-50ma 0-12amps.
Resistance:- 0-6K ohms-70K ohms-6meg ohms-60meg ohms.
Decibels:- -20db to plus 56db.
Short test:- Internal buzzer.
Dims:- 160 x 110 x 50mm

O/No. 1315. OUR PRICE ONLY £24.75

BI-PAK's COMPLETELY NEW CATALOGUE

Completely re-designed. Full of the type of components you require, plus some very interesting ones you will soon be using and of course, the largest range of semiconductors for the Amateur and Professional you could hope to find.

There are no wasted pages of useless information so often included in Catalogues published nowadays. Just solid facts i.e. price, description and individual features of what we have available. But remember, Bi-Pak's policy has always been to sell quality components at competitive prices and **THAT WE STILL DO.**

BI-PAK'S COMPLETELY **NEW** CATALOGUE is now available to you. You will be amazed how much you can save when you shop for Electronic Components with a Bi-Pak Catalogue. Have one by you all the time—it pays to buy BI-PAK

To receive your copy send **75p** plus 25p p&p

BI-PAK

Send your orders to **Dept. PW1**, BI-PAK PO BOX 6 WARE HERTS
SHOP AT 3 BALDOCK ST. WARE HERTS
TERMS: CASH WITH ORDER. SAME DAY DESPATCH. ACCESS. BARCLAYCARD ALSO ACCEPTED. TEL (0920) 3182. GIRO 388 7006
Add 15% VAT AND 75p PER ORDER POSTAGE AND PACKING

Use your credit card. Ring us on Ware 3182 NOW and get your order even faster. Goods normally sent 2nd Class Mail.
Remember you must add VAT at 15% to your order Total. Postage add 50p per Total order

www.americanradiohistory.com

BI-PAK BARGAINS

5T21 SCREWDRIVER SET
6 precision screwdrivers in hinged plastic case. Sizes – 0.8, 1.4, 2, 2.4, 2.9 and 3.8mm **£1.75**

5T31 NUT DRIVER SET
5 precision nut drivers in hinged plastic case. With turning rod. Sizes – 3, 3.5, 4, 4.5 and 5mm **£1.75**

5T41 TOOL SET
5 precision instruments in hinged plastic case. Crosspoint (Phillips) screwdrivers – H0 and H1. Hex key wrenches – 1.5, 2 and 2.5mm **£1.75**

5T51 WRENCH SET
5 precision wrenches in hinged plastic case. Sizes – 4, 4.5, 5, 5.5 and 6mm **£1.75**

BUY ALL FOUR SETS 5T21-5T51 and get HEX KEY SET **FREE**

HEX KEY SET ON RING
Sizes 1.5, 2, 2.5, 3, 4, 5, 5.5 and 6mm. Made of hardened steel. HX/1 **£1.25**

"IRRESISTABLE RESISTOR BARGAINS"

Pak No.	Qty.*	Description	Price
SX10	400	Mixed "All Type" Resistors	£1
SX11	400	Pre-formed ¼-½ watt Carbon Resistors	£1
SX12	200	⅛ watt Carbon Resistors	£1
SX13	200	¼ watt Carbon Resistors	£1
SX14	150	½ watt Resistors 22 ohm-2m2 Mixed	£1
SX15	100	1 and 2 watt Resistors 22 ohm-2m2 Mixed	£1

Paks SX12-15 contain a range of Carbon Film Resistors of assorted values from 22 ohms to 2.2 meg. Save pounds on these resistor paks and have a full range to cover your projects.
*Quantities approximate, count by weight.

"CAPABLE CAPACITOR PAKS"

Pak No.	Qty.*	Description	Price
SX16	250	Capacitors Mixed Types	£1
SX17	200	Ceramic Capacitors Miniature Mixed	£1
SX18	100	Mixed Ceramics 1pf-56pf	£1
SX19	100	Mixed Ceramics 68pf-0.5mf	£1
SX20	100	Assorted Polyester/Polystyrene Capacitors	£1
SX21	60	Mixed C280 type capacitors metal foil	£1
SX22	100	Electrolytics, all sorts	£1
SX23	50	Quality Electrolytics 50-1000mf	£1
SX24	20	Tantalum Beads, mixed	£1

*Quantities approximate, count by weight.

BRAND NEW LCD DISPLAY MULTITESTER.

RE 188m
LCD 10 MEGOHM INPUT IMPEDANCE
*3½ digit *16 ranges plus hFE test facility for PNP and NPN transistors *Auto zero, auto polarity *Single-handed, pushbutton operation *Over range indication *12.5mm (½-inch) large LCD readout *Diode check *Fuse circuit protection *Test leads, battery and instructions included

Max indication	1999 or – 1999
Polarity indication	Negative only. Positive readings appear without + sign
Input impedance	10 Megohms
Zero adjust	Automatic
Sampling time	250 milliseconds
Temperature range	– 5°C to 50°C
Power Supply	1 x PP3 or equivalent 9V battery
Consumption	20mW
Size	155 x 88 x 31mm

RANGES
DC Voltage 0-200mV, 0-2-20-200-1000V Acc. 0.8%
AC Voltage 0-200-1000V Acc. 1.2% DC Current 0-200uA, 0-2-20-200mA 0-10A Acc. 1.2%
Resistance 0-2-20-200K ohms, 0-2 Megohms Acc. 1%

BI-PAK VERY LOWEST POSS PRICE **£35.00** each

GUARANTEED TO SAVE YOU MONEY

SX27A 60 Assorted Polystyrene Bead Capacitors Type 9500 Series PPD **£1.00**
SX28A 50 Assorted Silver Mica Caps 5.6pF-150pF **£1.00**
SX29A 50 Assorted Silver Mica Caps 180pF-4700pF **£1.00**
SX30A 50 High Voltage Disc Ceramics 750V min up to 8KV. Assorted useful values **£1.00**
SX31A 50 Wirewound 9 watt (arg) Resistors. Assorted values 1 ohm-12K **£1.00**

AUTO SCREWDRIVER/DRILL

Automatic spiral ratchet. Complete with 2 screwdriver blades, 5 & 65mm. 1 screwdriver cross point No. 1 & three drills – 2, 2.8 and 3.65mm – A MUST FOR ALL HOBBY-BUILDERS & CONSTRUCTORS. Order No. ASD/1 **£3.50 each.**

BARGAINS

SX91	20 x Large .2" RED LED	£1
SX42	20 small .125 Red LED's	£1
SX43	10 Rectangular Green LED's .2	£1
SX46	30 Assorted Zener Diodes 250mw-2 watt mixed voltages, all coded. New.	£1
SX47	4 Black Instrument Knobs—winged with pointer ¼" Standard screw. Fit size 29 x 20mm.	50p
SX49	20 Assorted Slider Knobs Black/Chrome, etc.	£1
SX80	12 Neons and Filament Lamps. Low voltage and mains – various types and colours – some panel mounting	£1

MINI VICE

This small cast iron quality made vice will clamp on to any bench or table having a max thickness of 1⅛". The 2½" jaws open to max of 1⅝". Approx size 80 x 120 x 66mm. Bi-Pak's Mini Vice at a Mini Price only

£2.50

ORDER NO. SX82

The Third and Fourth Hand...

.... you always need but have never got "until now". This helpful unit with Rod mounted horizontally on Heavy Base. Crocodile clips attached to rod ends. Six ball & socket joints give infinite variation and positions through 360° also available attached to Rod a 2½ diam magnifier giving 2.5 x magnification. Helping hand unit available with or without magnifier. Our Price with magnifier as illustrated ORDER NO. T402 **£5.50**
Without magnifier ORDER NO. T400 **£4.75**

SX52 6 Black Heatsink will fit TO-3 and TO-220. Ready drilled. Half price value **£1**
SX53 1 Power finned Heatsink. This heatsink gives the greatest possible heat dissipation in the smallest space owing to its unique staggered fin design, pre drilled TO-3. Size 45mm square x 20mm high **40p**
SX54 TO-66 size 35mm x 30mm x 12mm **35p**
SX55 1 Heat Efficiency Power Finned Heatsink 90mm x 80mm x 35mm High. Drilled to take up to 4 x TO-3 devices. **£1.50 each**

SINGLE SIDED FIBREGLASS BOARD

Order No.	Pieces	Size	Sq.Ins.	Price
FB1	4	9 x 2¾"	100	£1.50
FB2	3	11 x 3"	100	£1.50
FB3	4	13 x 3"	156	£2.00

DOUBLE SIDED FIBREGLASS BOARD

Order No.	Pieces	Size	Sq.Ins.	Price
FB4	2	14 x 4"	110	£2.00

SILICON POWER TRANSISTORS – T03

NPN like 2N3055 – but not full spec
100 watts 50V min.
10 for £1.50 – Very Good Value
100s of uses – no duds
Order No. SX90

BI-PAK SOLDER–DESOLDER KIT

Kit comprises. ORDER NO. SX80
1 High Quality 40 watt General Purpose Lightweight Soldering Iron 240v mains incl 3/16" (4.7mm) bit
1 Quality Desoldering pump. High Suction with automatic ejection. Knurled, anti-corrosive casing and teflon nozzle
1.5 metres of De-soldering braid on plastic dispenser
2 yds (1.83m) Resin Cored Solder on Card
1 Heat Shunt tool tweezer Type
Total Retail Value over **£12.00**
OUR SPECIAL KIT PRICE **£8.95**

BI-PAK PCB ETCHANT AND DRILL KIT

Complete PCB Kit comprises
1 Expo Mini Drill 10,000RPM 12v DC incl 3 collets & 1 x 1mm Twist bit
1 Sheet PCB Transfers 210mm x 150mm
1 Etch Resist Pen
1 ½lb pack FERRIC CHLORIDE crystals
3 sheets copper clad board
2 sheets Fibreglass copper clad board
Full instructions for making your own PCB boards
Retail Value over **£15.00**
OUR BI-PAK SPECIAL KIT PRICE **£9.75**
ORDER NO. SX81

PROGRAMMABLE UNIJUNCTION TRANSISTOR

"PUT" case TO106 plastic MEU22 Similar to 2N6027/6028 PNPN Silicon

Price:	1-9	10-49	50-99	100+	Normal Retail
Each:	20p	18p	15p	13p	Price £0.35 each

SX33A	6 small (min (SDST/SPDT Toggle Switches 240v 5amp	£1.00
SX35A	6 Rocker Switches 250V 2A.	£1.00
SX32A	12 Assorted Jack & Phono plugs, sockets and adaptors, 2.5m, 3.5mm and standard sizes	£1.00
SX71	50 "C108 "Fallouts" Manufacture's out of spec on volts or gain You test.	£1.00
SX72	A mixed bundle of Copper clad Board Fibre glass and paper. Single and double sided. A fantastic bargain	£1.00

5 watt (RMS) Audio Amp

High Quality audio amplifier Module. Ideal for use in record players, tape recorders, stereo amps and cassette players, etc. Full data and back-up diagrams with each module.
Specification
• Max Power Supply 30v • Power Output 5 watts RMS • Load Impedance 8-16 ohms • Frequency response 50Hz to 25KHz—3db • Sensitivity 70mv for full output • Input Impedance 50k ohms • Size 85 x 64 x 30mm • Total Harmonic distortion less than 5%
BI-PAK'S give away price

£2.25

You could not Build one for this price.

TECASBOTY

The Electronic Components and Semiconductor Bargain of the Year. A host of Electronic components including potentiometers – rotary and slider, presets – horizontal and vertical. Resistors of mixed values 22ohms to 2M2 — 1/8 to 2 Watt. A comprehensive range of capacitors including electrolytic and polyester types plus disc ceramics etcetera. Audio plugs and sockets of various types plus switches, fuses, heatsinks, wire, nuts/bolts, gromets, cable clips and tyes, knobs and P.C. Board. Then add to that 100 Semiconductors to include transistors, diodes, SCR's opto's, all of which are current everyday usable devices. In all a Fantastic Parcel. No rubbish all identifiable and valued in current catalogues at well over £25.00. Our Fight Against Inflation — Beat the Budget — Down with Depression. Price — **JUST £6.50.**

SX38 100 Silicon NPN Transistors—all perfect Coded mixed types with data and eqvt sheet. No rejects. Real value. **£3.00**
SX39 100 Silicon PNP Transistors—all perfect. Coded mixed types with data and eqvt. sheet. No rejects. Fantastic value. **£3.00**

2N3055 The best known Power Transistors in the World – 2N3055 NPN 115w.
Our BI-PAK Special Offer Price:

10 off	50 off	100 off
£3.50	£16.00	£30.00

BD312 COMPLIMENTARY PNP POWER TRANSISTORS: TO 2N3055.
Equivalent MJ2955 – BD312 – T03
SPECIAL PRICE £0.70 each
10 off £6.50

MORE BARGAINS!

SX51	60 metres PVC covered Hook-up wire single and stranded. Mixed colours.	£1
SX58	25 Assorted TTL Gates 7400 Series 7401-7460	£1
SX59	10 Assorted flip Flops and MSI TTL	£1
SX60	20 Assorted Slider Potentiometers	£1
SX62	40 Assorted Pre-Sets Hor/Vert etc.	£1
SX79	10 Reed Switches – glass type 3 Micro Switches – with lever	£1

BI-PAK

Send your orders to Dept. PW1, BI-PAK PO BOX 6 WARE HERTS. SHOP AT 3 BALDOCK ST. WARE HERTS. TERMS: CASH WITH ORDER. SAME DAY DESPATCH. ACCESS. BARCLAYCARD ALSO ACCEPTED. TEL (0920) 3182. GIRO 388 7006. Add 15% VAT AND 75p PER ORDER POSTAGE AND PACKING

Use your credit card. Ring us on Ware 3182 NOW and get your order even faster. Goods normally sent 2nd Class Mail.
Remember you must add VAT at 15% to your order. Total Postage add 75p per Total order.

www.americanradiohistory.com

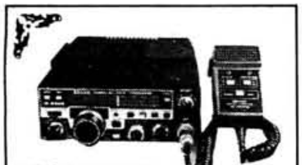
The Amcomm Hotline.

Call FREEFONE 2705 now for fast delivery!

Prices & Orders Only.

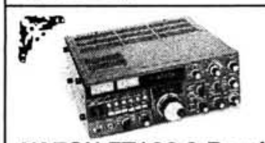
BARCLAYCARD VISA

JUST ARRIVED! YAESU FT 980 H.F. Tcvr. SEND FOR DETAILS.



ICOM 290E
2 mtr. all mode tcvr.
Check Freefone Price.

YAESU FT1 Gen. Cov. Tcvr. Call now for ex stock fast delivery.



YAESU FT102 9 Band Tcvr. Call before 2pm for price and you'll have it next day.

YAESU FT290R/ FT790R. Waiting for you with free Nicads and Charger CALL FREEFONE NOW.

ICOM 720A Gen. Cov. Tcvr. Call Freefone and we'll put a smile on your face.

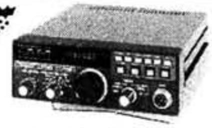
ICOM IC-R70 RECEIVER

Here's a Receiver that's going to be around a long time. Yes, it is up-market a bit but then so is the performance! ICOM have really produced a right gem, and we'll tell you now, it's real value for money. We expect to have plenty of stock as you read this, so call Freefone to place your order for next day delivery. If you want details of the R70, write or call us on our general enquiry number 01-864 1166. We'll send you a leaflet on this or any other product that may interest you. Remember – most items advertised are available on our super No Interest HP.

ICOM 730 8 Band Tcvr.
Guaranteed (like everything on the page) for two years.

YAESU FT707 Tcvr.
Call Freefone now for price and fast delivery.

YAESU FRG7700.
Still with free antenna tuner – call fast – we'll deliver fast.



YAESU FT480R All mode 2m tcvr. YAESU's big success. Call Freefone now to make it yours.

ICOM 251 E 2 mtr all mode base. We can't get enough – call now and try us for price and delivery.

ICOM 740 WARC Tcvr.
A host of features at a real competitive price – call now.

TONO 7000E/9000E.
We just need your call and it's on the way.
FREEFONE 2705.

ICOM Twins IC4E/1C2E
Both ex stock. Call Freefone now.

YAESU's Handheld Twin FT708 and FT208
Try Freefone now.

BARCLAYCARD VISA

AMCOMM

Amcomm Services,
194, Northolt Road, South Harrow,
Middlesex HA0 2EN.
Telephone: 01-864 1166,
Telex: 24263.

OPPOSITE SOUTH HARROW TUBE STATION ON THE PICCADILLY LINE

SHOWROOM OPENING HOURS
TUE-FRI 10.00am–6.00pm CONTINUOUS
SAT. 9.00am–5.00pm CONTINUOUS

ASK FOR DETAILS OF OUR INTEREST FREE AND LOW DEPOSIT H.P.

Amcomm Services would like to wish all Amateur Radio Enthusiasts a Very Merry Christmas and a Peaceful New Year.

www.americanradiohistory.com

comment...

Hi!

EDITING is a two-way street. We try our best to respond to your needs as you put them to us in letters, phone calls, or chats at rallies and exhibitions. There are ways you can help us to assist you faster and better, though, as follows.

- If you wish to order an old issue of *PW*, please order it through our Post Sales Department (see below under "Back Issues"). They have stocks of most recent issues, but some of the more popular ones have sold out. If you don't want to be disappointed on future issues, place a regular order with your newsagent, or take out a subscription (further details below, too).
- Should you have a subscription problem — not receiving an issue, receiving two in the same month, etc. — don't call or write to the editorial office. Instead, write to Practical Wireless Subscriptions, Room 2613, King's Reach Tower, Stamford Street, London, SE1 9LS. They're closer to the demon computer than we are!
- Owing to the great volume of mail we receive from our more than 66 000 readers, we cannot help you modify a published design or provide circuit details for an idea you have.
- In most cases, we can't answer questions by phone and meet publishing deadlines at the same time. It's best to send a letter with a stamped, addressed envelope for a reply. No s.a.e. and it's likely to be just filed.
- You should assume that information published constitutes everything we have in our files. To research beyond what appeared will jeopardise our magazine deadlines, which is tantamount to attacking the last night of the Proms, or fish-and-chips!
- If you wish to contact one of our authors (other than *On The Air* columnists, whose addresses are given at the start of their column), send your query with an s.a.e. in an envelope addressed to the author c/o *Practical Wireless* at the Poole address (see page 1). We'll forward it. But don't expect him to act as your personal design consulting service, to perform prodigious research tasks, or to give you a short correspondence course on the subject he wrote about.
- If you're looking for a specific article from a past issue, before writing with your enquiry, refer to the annual index we publish in our December issues.

The above may sound familiar to some of the more well-read amongst you. I'd better confess to having based it largely on a piece by Arthur P. Salsberg in the May issue of the American magazine *Popular Electronics*, of which he is Editorial Director. They obviously get just the same sort of problems that we do, and he summed them up so well, I felt I could hardly better what he said. Hope you don't mind, Art!

If you're a budding author, and think you have something to say or a piece of equipment that will interest other radio enthusiasts, I'll always be pleased to hear from you. We've got an information sheet which tells you how to go about putting your article together for us, and one can be yours if you send an s.a.e. (sorry to keep on, but postage rates being what they are . . .).

services

QUERIES

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

Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the "Buying Guide" box included in each constructional article.

PROJECT COST

The approximate cost quoted in each constructional article includes the box or case used for the prototype. For some projects the type of case may be critical; if so this will be mentioned in the Buying Guide.

CONSTRUCTION RATING

Each constructional project will in future be given a rating, to guide readers as to its complexity:

Beginner
A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently. Generally this category will be used for simple projects, but sometimes for more complicated ones of wide appeal. In this case, construction and wiring will be dealt with in some detail.

Intermediate
A project likely to appeal to a wide range of constructors, and requiring only basic test equipment to complete any tests and adjustments. A fair degree of experience in building electronic or radio projects is assumed.

Advanced
A project likely to appeal to an experienced constructor, and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Constructional information will generally be limited to the more critical aspects of the project. Definitely not recommended for a beginner to tackle on his own.

SUBSCRIPTIONS

Subscriptions are available to both home and overseas addresses at £13 per annum, from **"Practical Wireless" Subscription Department, Room 2816, King's Reach Tower, Stamford Street, London SE1 9LS.** Airmail rates for overseas subscriptions can be quoted on request.

BACK NUMBERS AND BINDERS

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

Binders are available (Price £5.00 to UK addresses, £5.25 overseas, including post and packing) each accommodating one volume of *PW*. Please state the year and volume number for which the binder is required.

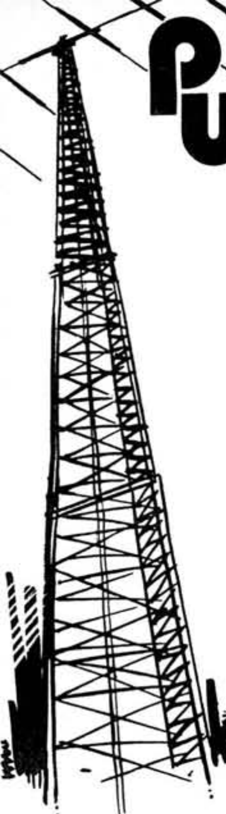
Send your orders to **Post Sales Department, IPC Magazines Ltd., Lavington House, 25 Lavington Street, London SE1 0PF.** All prices include VAT where appropriate.

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

INSURANCE

Turn to the following page for details of the PW Radio Users Insurance Scheme, exclusive to our readers.

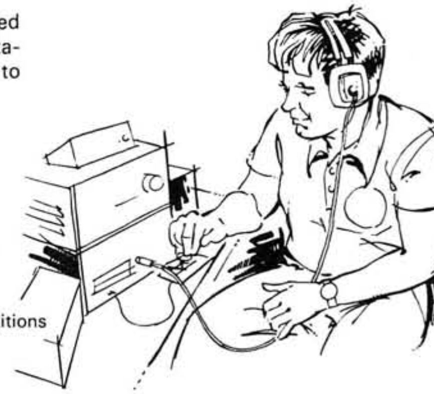
www.americanradiohistory.com



PW RADIO USERS INSURANCE SCHEME

Practical Wireless Radio Users Insurance Scheme was devised by Registered Insurance Brokers B. A. LAYMOND & PARTNERS LIMITED following consultation with PRACTICAL WIRELESS to formulate an exclusive scheme designed to meet the needs and requirements of:

Amateur Radio Enthusiasts ● CB Radio Users ● Taxi Companies and Fleet Users with Radio Telephones and any individual or company needing cover for communications equipment which is legal to use and properly licensed.



SPECIAL FEATURES

- All Risks Cover
- "New Lamps for Old" Cover (as defined in policy)
- Index Linked Cover to combat inflation
- Licence protection—covers legal costs arising from any breach of your licence conditions
- Equipment covered anywhere in the UK, Channel Islands and Isle of Man, but not Northern Ireland and Eire
- Fixed Antennas (Aerials) covered
- Frequency, Power and SWR Meters and similar radio-related test equipment covered
- 30 days cover in Western Europe included Free of Charge
- Absolute Security as this scheme is underwritten by a leading member of the British Insurance Association on the London Insurance Market
- Practical Wireless radio receiver and transmitter projects covered (when stated in feature)
- Available to Clubs and Organisations†
- Available to Companies†

†Write directly to B. A. LAYMOND & PARTNERS LTD, 562 North Circular Road, London NW2 7QZ, for a special application form and full details, enclosing the coupon below.

B. A. Laymond & Partners Limited, Practical Wireless and the Underwriters wish to make it clear that it is an offence to install or use an unlicensed radio transmitter in the United Kingdom and it is not their deliberate intention to encourage or condone the illegal use of any radio communications equipment.

COST OF PRACTICAL WIRELESS RADIO USERS INSURANCE SCHEME:

Sum to Insure	£100	£150	£300	£500	£750	£1000	£2000
Annual Premium	£6.00	£6.50	£8.00	£9.00	£10.00	£12.00	£14.00

The premium is charged on sums insured in pre-selected bands. Thus equipment totalling £250 would be in the band up to £300. Quotations for larger sums available on application.

Claims will be settled after deduction of the Policy Excess which is: £10 on sums insured up to £500; £25 on sums insured up to £3000.

HOW TO INSURE: Complete the application form below to obtain immediate insurance cover. Photocopies will not be accepted.

APPLICATION FOR PRACTICAL WIRELESS RADIO USERS INSURANCE SCHEME PW1/83

Name in full (State Mr, Mrs, Miss or Title)

Address

Post Code

Occupation Age Phone No. (Home) (Work)

I/We hereby apply to insure the equipment detailed below

COMPLETE IN BLOCK LETTERS

	Manufacturer's Name	Model	Serial No.	Description of equipment to be insured e.g. Base station; Mobile; CB; etc.	VALUE £
1					
2					
3					
4					
5	Antennas (Aerials), s.w.r. meters, etc.				

Please continue list of equipment on a separate sheet if necessary **TOTAL SUM TO INSURE £**

DECLARATION: I/We hereby declare that: 1. The sums insured represent the full replacement value of the equipment. 2. I/We have not* had insurance cancelled, declined, restricted, or other terms imposed in any way other than the normal Policy terms. 3. This proposal shall be the basis of the contract and that the contract will be on the Underwriters normal terms and conditions for All Risks and Legal Costs/Expenses cover unless otherwise agreed. 4. I/We have not* sustained any loss or damage to any radio communications equipment or been involved in litigation relating to use of radio equipment during the past three years, whether insured or not. 5. All the above statements made in connection with this proposal are true and no material information has been withheld. 6. I/We understand no liability shall attach until this proposal shall have been accepted by Laymond's and the premium paid in full and a Certificate issued.

* If you have, please give details on a separate sheet.

Date Signed

Rush us details of PW Club Insurance ☐
PW Company Insurance ☐

DELAY IN ARRANGING COVER COULD COST YOU A GREAT DEAL OF MONEY. COMPLETE THIS APPLICATION AND POST WITH YOUR PREMIUM MADE PAYABLE TO "LAYMOND'S" NOW. ADDRESS TO: PRACTICAL WIRELESS (INSURANCE), B. A. LAYMOND & PARTNERS LTD., 562 NORTH CIRCULAR ROAD, LONDON NW2 7QZ. TELEPHONE: 01-452 6611.

www.americanradiohistory.com

A dummy load should be regarded as a precision component especially when used for determining the power output from the transmitter or estimating coaxial cable line loss in conjunction with a suitable r.f. power measuring instrument. A dummy load is also an asset when checking modulation level, etc. and avoids annoying others by carrying out such tests on an open antenna.

The two models described in these articles cover between them the amateur h.f. bands 1·8 to 30MHz and v.h.f./u.h.f. bands from 30 to 500MHz. Each can be used at different power ratings as indicated, either continuous or intermittent, and have a nominal d.c. resistance of 50 ohms ±1 ohm under either of the operating conditions given.

R.F. Dummy Loads

PART 1

F.C. JUDD G2BCX

Evolution of the Dummy Load

A line for the transmission of r.f. energy may be represented by an infinite number of incremental series inductances each shunted by a capacitor as shown in Fig. 1. The values of these reactances depend on the physical structure of the transmission line, but each one possesses a characteristic impedance given by $Z_0 = \sqrt{LC}$ and which, for a line with virtually no loss due to other causes, is purely resistive. As the r.f. waves travelling along the line see nothing but the resistance of the line and providing the line termination is also purely resistive — which it rarely is — there will be no reflection of power back along the line. However, if the length of the line is infinite, or nearly so, the power travelling down it would eventually be completely absorbed. In fact engineers did at one time use long lengths of unterminated transmission line as a dummy load. However, since an infinite line looks exactly like a pure resistance, the obvious procedure was to use an actual resistor as a load.

At first, solid rods of carbon were used and still are in some dummy loads on the market, but solid carbon rod has the disadvantage of changing value as the r.f. frequency is increased because the current flowing is concentrated on the surface. More recently special resistors have been made with film coatings whose thickness is between one hundredth and one thousandth of the skin penetration of r.f. current. The only problem remaining was to mount the resistors at the end of a line without introducing undesirable stray reactances which would cause power to be reflected to the transmitter output. At the same time it is essential to provide sufficient heat dissipation to allow the resistive load to accept low power for long periods or high power for short periods. Dummy loads for professional use are also designed to have the above properties and can usually dissipate hundreds of watts continuously. They are of necessity extremely expensive.

It has been found, however, that many of the 50 ohm dummy loads available for amateur radio use have not only incorrect ohmic value but are incapable of dissipating even half the quoted rated power for periods of more than a few minutes. Not that this matters too much because measurement of power or cable loss etc. should take only a few seconds, thus preventing the resistive load from overheating and possibly even changing its value. The dummy loads described in these articles will dissipate rated power as quoted continuously but will accept much larger power levels for short periods without changing value by more than ±1 ohm.

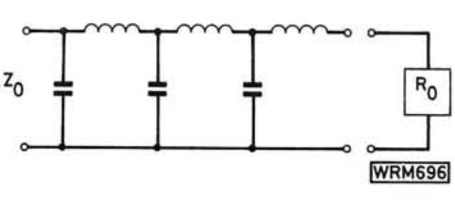


Fig. 1: Analogy of a transmission line

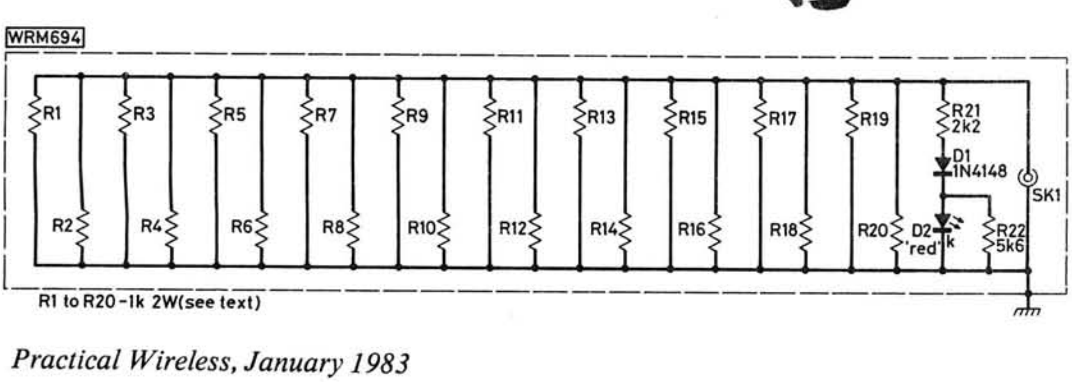


Fig. 2: Circuit of the 50 ohm dummy load. The Western Electronics PM2001 meter (above) handles 200W continuous r.f. power at frequencies up to 150MHz. It also indicates v.s.w.r.

www.americanradiohistory.com

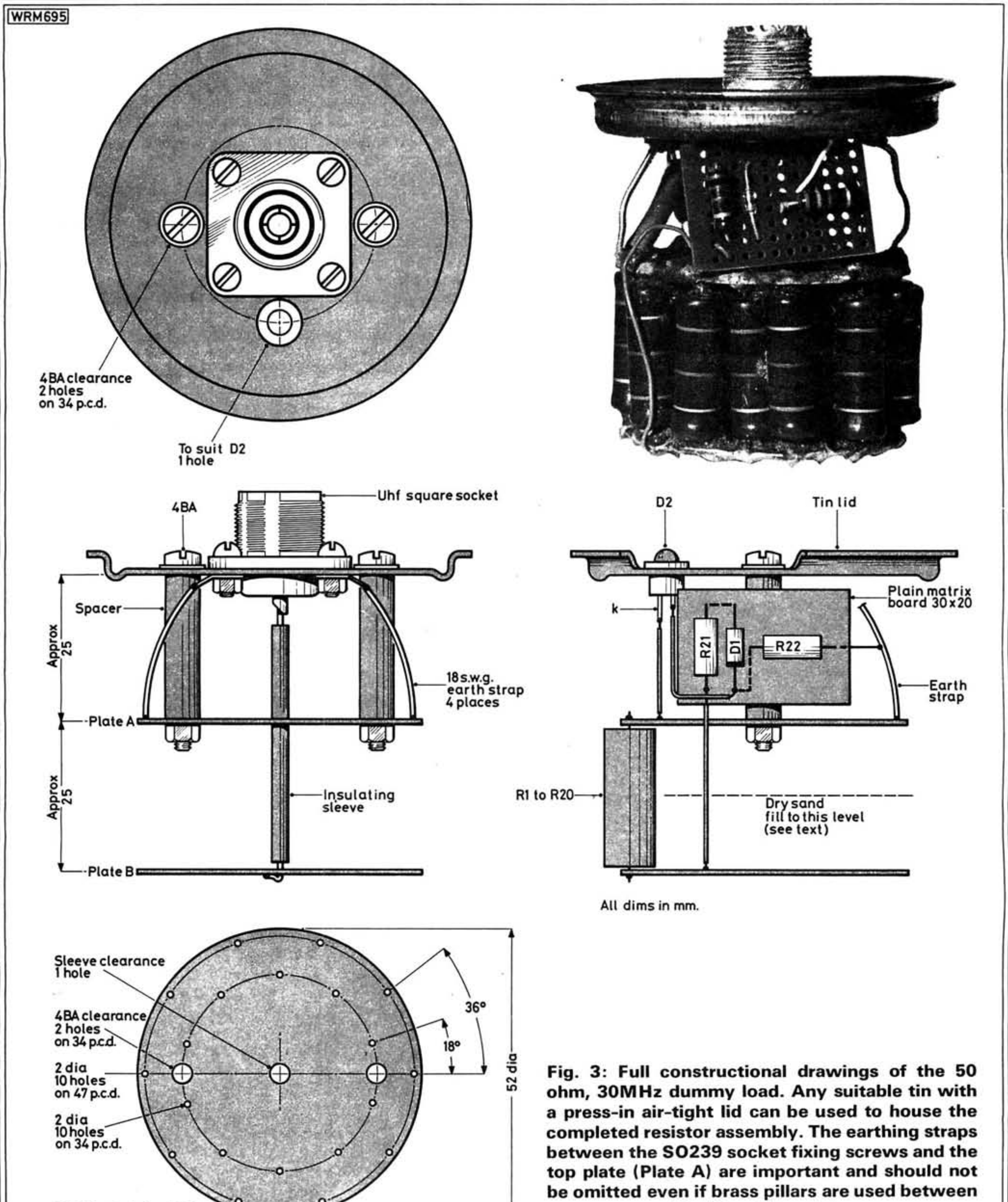


Fig. 3: Full constructional drawings of the 50 ohm, 30MHz dummy load. Any suitable tin with a press-in air-tight lid can be used to house the completed resistor assembly. The earthing straps between the SO239 socket fixing screws and the top plate (Plate A) are important and should not be omitted even if brass pillars are used between the lid and top plate

A 50 ohm HF Dummy Load

The circuit for this is shown in Fig. 2 and will cater for frequencies up to 30MHz with a self v.s.w.r. of 1 to 1. The power rating specifications are shown in Table 1.

The dummy load can be used for higher powers but only for very short periods (e.g. 30 seconds) especially at high peak levels.

The h.f. bands dummy load is housed in a cylindrical can with a tight fitting lid (a syrup tin or similar) measuring about 90mm high and 75mm diameter. This model is dry sand cooled and details about this will be given later.

As the circuit shows there are 20 load resistors of high stability carbon film type each rated for 2 watts and all

www.americanradiohistory.com

★ components

Resistors

¼W 5%

2·2kΩ	1	R21
5·6kΩ	1	R22

2W 5% carbon film

1kΩ	20	R1–R20

Semiconductors

Diodes

1N4148	1	D1
Red l.e.d.	1	D2

Miscellaneous

UHF socket SO239 (see text); 25mm long 4BA pillars (4); Tin can with lid (see text); Tinplate; Silver sand (see text).

connected in parallel. Each resistor has a value of 1000 ohms so the total value for parallel connection is 1000 ÷ 20 = 50 ohms. The input is via an SO239 socket and the unit is equipped with an l.e.d. that indicates power present in the load. This will glow with a minimum power of 1 watt into the load but not exceed normal brilliance at high input power levels.

Table 1

	Power	Time	Can Temp.
Continuous power	50W	Indefinite	24°C
Carrier with white noise or speech and s.s.b. modulation	100W	5 min. max.	27°C
	200W	2 min. max.	27°C

CONSTRUCTION RATING **Beginner**

BUYING GUIDE

All components are readily available from many of our regular advertisers. The SO239 socket must be a square flange type (RS Components 455–725 or similar). The silver sand can be obtained from a garden centre or seed merchants while a suitable tin is a well washed out syrup tin, small size of course.

APPROXIMATE COST **£3.50**

Construction

The 20 resistors R1 to R20 are mounted between two circular plates made from ordinary thin tinplate as shown in Fig. 3. These are supported on the lid of the tin on 25mm long brass or plastics pillars. Each plate has a hole through the centre as shown to allow the lead from the socket connection to pass through to the lower plate. The SO239 socket is the square base type held to the lid of the can by four screws.

When this assembly is complete, four wire connections, one from each solder tag under the SO239 socket, are wired to the upper (earthed) circular plate with 18 s.w.g. tinned copper wire. The small circuit board carries the resistors R21 and R22 and the 1N4148 diode. It is held in position by the earthed wire from R22 to one of the main earth straps.

Sand

The can is filled to about half way up with fine grain dry silver sand such as is used for lawn dressing. It can be purchased from garden shops but do ensure absolute dryness by heating at low temperature in an oven for a short period. This sand is about as fine grained as sugar. When the resistor bank is inserted in the can it will need to be worked down so that the lower plate and bottom halves of the resistors are in contact with the sand.

Accuracy

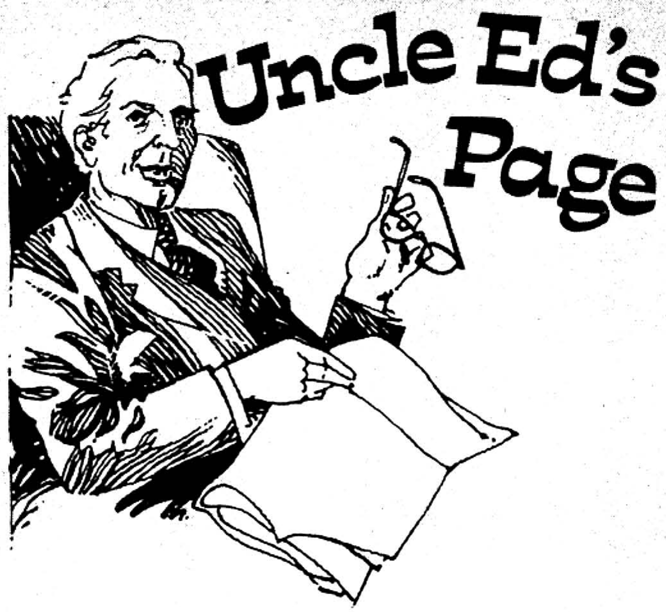
It is unlikely that the d.c. resistance of the finished load will vary by more than 1 ohm from the 50 ohms being aimed for. Do not, however, rely on an ordinary ohmmeter for checking the final value. Few, if any, will read to that degree of accuracy. If the specified resistors are used there should be no problem in this respect. Exhaustive tests were carried out on the ohmic values of several assemblies of the dummy loads by comparison with a Bird Termaline r.f. coaxial 50 ohm load resistor and a Bird Thruline directional wattmeter.

RF Power Meters

It is of course essential to use a meter directly calibrated in r.f. power when measuring the power output from a transmitter. Ordinary cheap so-called power/v.s.w.r. reference type meters are of no use for this. Suitable direct reading power meters for the h.f. bands are the Daiwa CN620A which also gives direct power and v.s.w.r. readout without special reference adjustment. It will cater for power levels up to 1000 watts and frequencies up to 150MHz. For those who require to read peak power under s.s.b. conditions there is the Western Electronics PN2001 meter which caters for power levels up to 200 watts and frequencies up to 150MHz. This is a mains powered unit because of the internal active circuitry required to obtain peak power readout. It can also be used for obtaining a v.s.w.r. reading.

Meters suitable for frequencies up to 500MHz and higher will be dealt with in Part 2 which will also contain v.s.w.r. v percentage power loss conversion graphs, a meter inaccuracy correction graph, some notes on r.f. power expressed in dBW (dB Watts) as per the new amateur licence schedule requirements, and constructional details for a 50 ohm dummy load for use up to about 500MHz.

www.americanradiohistory.com



TRANSFORMERS—2

Last month, I asked you what would happen if you reversed the links between the two secondary windings in Fig. 6. In case you're not clear what I meant, look at Fig. 10. The answer to my question is (I hope) a blown fuse in the mains supply, otherwise a very overheated transformer.

Perhaps it will make it easier to understand if I substitute batteries for the secondary windings (Fig. 11), as the effect would be much the same. Redrawing this to leave out the wires going to the outside world, as in Fig. 12, should show you that what we have is a 24 volt battery (12 + 12 = 24) with a short-circuit across it. Result—BANG! Should you be silly enough to decide to prove this for yourself, tell your next-of-kin **not** to get in touch with me.

Suppose you had a transformer with two 12V 1A secondary windings and you wanted to connect them in parallel to give a 12V 2A output. You discover there are no phasing marks on the windings, how can you connect them safely? Well, Figs. 5 and 9 last month will give you the answer. All you need is an a.c. voltmeter. Connect the windings in **series** and put the meter across the two free ends. If it reads around 24V then the connections are like Fig. 5, but if it reads zero the connections are like Fig. 9. Either way, you've now got enough information to label the wires, either by putting a bit of tape on the two "in-phase" leads (or a spot of paint if the connections are on a tag-board). The tape or paint-spot is the equivalent of the black blob in Fig. 4. Parallel the windings by connecting the two tape-marked wires together, and the two unmarked wires together, and you'll be quite safe.

Sometimes you'll find a transformer with secondary windings of different voltages, for example 4V and 6V. You could connect these in series to produce 10V, or (by turning one of them round) to give 2V. It doesn't matter if they have different current ratings, the only thing is that you can't draw more current than the **lower** of the two ratings. What you mustn't do is to connect the windings in parallel, because there is always a net voltage difference (10V or 2V) whichever way round you connect them.

For the same reason, it's not a good idea to connect two secondary windings with the same nominal voltage but different current ratings in parallel, nor to connect the secondaries of two different transformers of the same voltage in parallel. The difference in the two voltages due to winding tolerances could be enough to cause overheating of the transformer(s). Modern transformers with two secondary windings of the same rating are usually intended to be suitable for safe series or parallel operation of the secondaries, and are designed and tested with that requirement in mind.

In Fig. 13 (like Fig. 7 last month) although there are two secondary windings, they are connected at the centre so that only three wires come out. You can get transformers which are wound with one secondary but with a centre-tap brought out, like Fig. 14. In a catalogue or components list, this would be described as a 12–0–12V secondary. Now, you can use a transformer with two 12V secondaries to produce a 12–0–12V output, but you **can't** use one with a 12–0–12V secondary to produce two separate 12V outputs, because the windings are linked together inside the transformer.

Fig 10

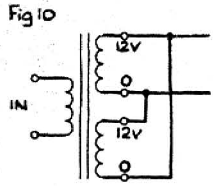


Fig 11

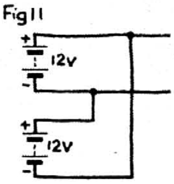


Fig 12

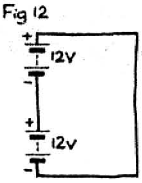


Fig 13

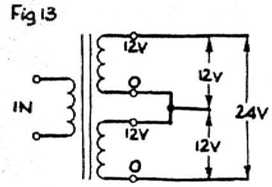


Fig 14

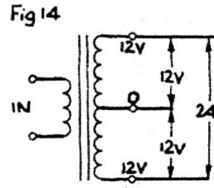


Fig 15

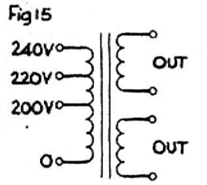
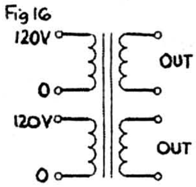


Fig 16



WRM705

I promised to talk about primary (input) winding arrangements. At one time something like that shown in Fig. 15 was common in the UK, to cope with the various supplies to be found in different parts of the country. Sometimes there was even a separate 10V primary which could be added in series with the main primary to match the transformer closely to supplies of 210, 230 or 250V as well. Since the UK mains voltage was standardised on 240V, these multi-tapped windings (which were obviously more expensive to produce) have largely disappeared. But with more international trade, the arrangement of Fig. 16 is often used. These primaries can be connected in series for 240V supplies, or in parallel for 120V supplies, using the same rules as for multiple secondaries. You might find these primaries tapped at 110V, to cope with countries having that as a standard.

Notice that the length of each winding as shown in the circuit diagram symbol for a transformer doesn't **necessarily** bear any relation to the voltage of that winding. It used to be so in the days of valved equipment, where the h.t. winding of perhaps 350V was drawn with many more loops or coils than the l.t. windings of 5 or 6·3V which fed the valve heaters. Nowadays, the length of the winding depends on how much space was available in that part of the drawing.

MORE NEXT MONTH

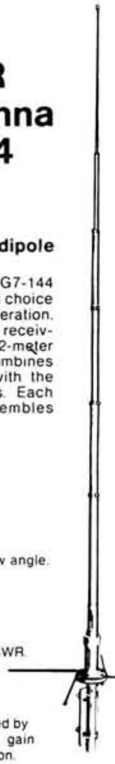
www.americanradiohistory.com

HUSTLER®
"the home of originals"

from RADIO SHACK

NEW

TWO METER Vertical Antenna Model G7-144



7 dB GAIN
— compared to ½ wave dipole

The superior performance of the G7-144 Master Gainer II makes it the ideal choice for fixed-station or repeater operation. The gain of 7 dB transmitting and receiving makes it the most powerful 2-meter antenna of its type. The G7-144 combines the latest antenna technology with the best weather-resistant materials. Each precision-built component assembles quickly and easily.

Electrical
7 dB gain over ½ wave dipole.
Omnidirectional radiation pattern, low angle.
50 ohm feed impedance.
Field adjustable: 144-148 MHz.
SWR at resonance: less than 1.1:1 measured at antenna.
Bandwidth: 6 MHz for 2:1 or better SWR.
Power: One kilowatt FM.
Feed: Shunt with dc grounding.
Radiator: collinear shunt-fed. Triple ⅝-wave elements in series, separated by 2 phasing coils to produce maximum gain and extremely low angle of radiation.

Mechanical
Vertical element: 184" long, 1¼" telescopic to ⅜" O.D. Heat-treated high strength aluminum.
Radials: four, 20¼" x ⅜" O.D. aluminum.
Connector: type N.
Wind load: 26 pounds at 100 mph.
Mounting: vertical support up to 1½" O.D.
Shipping Weight: 10.0 lb.

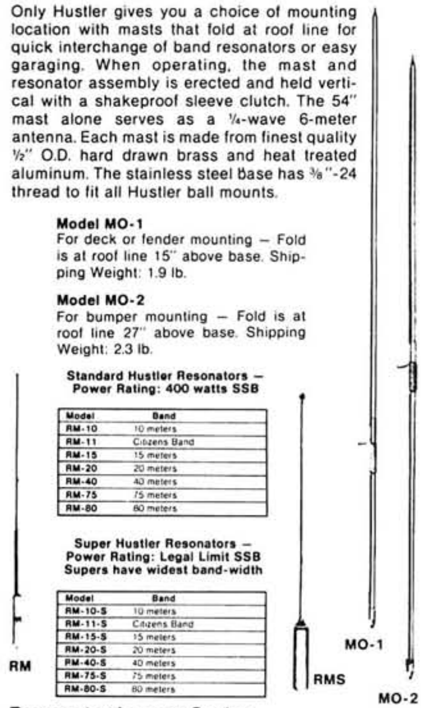
HF Mobile Antennas

FOR 6 - 10 - 15 - 20 - 40 - 75 - 80 METERS

Only Hustler gives you a choice of mounting location with masts that fold at roof line for quick interchange of band resonators or easy garaging. When operating, the mast and resonator assembly is erected and held vertical with a shakeproof sleeve clutch. The 54" mast alone serves as a ¼-wave 6-meter antenna. Each mast is made from finest quality ½" O.D. hard drawn brass and heat treated aluminum. The stainless steel base has ⅜"-24 thread to fit all Hustler ball mounts.

Model MO-1
For deck or fender mounting — Fold is at roof line 15" above base. Shipping Weight: 1.9 lb.

Model MO-2
For bumper mounting — Fold is at roof line 27" above base. Shipping Weight: 2.3 lb.



Standard Hustler Resonators — Power Rating: 400 watts SSB

Model	Band
RM-10	10 meters
RM-11	Citizens Band
RM-15	15 meters
RM-20	20 meters
RM-40	40 meters
RM-75	75 meters
RM-80	80 meters

Super Hustler Resonators — Power Rating: Legal Limit SSB Supers have widest band-width

Model	Band
RM-10-S	10 meters
RM-11-S	Citizens Band
RM-15-S	15 meters
RM-20-S	20 meters
RM-40-S	40 meters
RM-75-S	75 meters
RM-80-S	80 meters

Resonator Impact Spring
Model RSS-2
Finest quality stainless steel spring for use between resonator and masts listed above. Supplied ready to use with std 3/8"-24 threads. Shipping Weight 0.36 lb

LIFETIME PERFORMANCE
Quick Disconnect
Model QD-1
Designed for trouble-free performance 100 stainless steel. Special design assembly guards against ice and dirt freeze up. Easy press-and-twist antenna release. Accommodates any length mobile antenna. Equipped with 3/8"-24 threads, female one end and male on the other. Shipping Weight 0.40 lb

FIXED STATION FIVE BAND Vertical Antenna model 5-BTV

COVERS 10-15-20-40-AND 75 or 80 METERS

Space restricted or space unlimited, the Hustler 5-BTV is the choice of amateurs throughout the world for top signal reports, consistent contacts and unmatched dependability.

Fast, easy assembly for permanent or temporary installation and requires only one 50 ohm feedline.

Get the pleasure of multi-band operation and the complete assurance of continued reliable performance with an antenna mechanically and electrically superior to any comparable product.

- Complete coverage on 10 through 40 meters and up to 100 KHz bandwidth on 80 meters.
- Hustler exclusive trap covers. "Spritz" extruded to extremely close tolerances, assures accurate and permanent trap resonance.
- All sections 1-1/4" heavy wall, high strength aluminum.
- Extra heavy duty aluminum mounting bracket with low loss - high strength insulators, stainless steel mounting hardware included.
- Power capability - full legal limit on SSB.
- Elevated mounting requires radials, not included.

MOUNTING: Ground or tower mount with radials.

SPECIFICATIONS:

Length	25' 1"
SWR at resonance	1.15 to 1 or better
Bandwidth	1.6 to 1 at band edges on 10-40 meters (100 KHz on 75 or 80)
Mounting	Vertical support up to 1-3/4" O.D.
Shipping Weight	17 lbs

FIXED STATION FOUR BAND Vertical Antenna model 4-BTV

COVERS 10 - 15 - 20 - 40 METERS

ONLY HUSTLER GIVES ONE SETTING FOR WHOLE BAND COVERAGE...

The same quality antenna as above, but for 10-40 meter operation.

- Lowest SWR - plus!
- Bandwidth at its broadest! SWR 1.6 to 1 at band edges.

SPECIFICATIONS:

Length	21' 5"
Shipping Weight	15 lbs

HUSTLER PRICES

4-BTV	10-40m Trapped Vertical	98.90	D
5-BTV	10-80m Trapped Vertical	125.00	D
G6-144B	2m Colinear 6db gain	88.55	D
G7-144	2m Colinear 7db gain	129.95	D
BBLM-144A	2m 5 8 whip mag. mt.	37.95	D
BBLT-144A	2m 5 8 whip boot lip mt.	28.35	D
CGT-144	2m Colinear boot mt coax	46.00	D
HT-144	2m 5 8 whip speed mt.	27.60	D
SFM	2m 5 8 whip mag. mt coax	32.95	D
SF-2	2m 5 8 whip only	19.55	D
SPS-144	2m 5 8 whip fast mt coax	21.85	D
DCL	DISCONE coax plug	28.35	D
DCX	DISCONE only (40-700MHz)	18.98	D

UHT-1	140-500MHz whip coax	9.20	D
27-TDX	CB Base Station Ant.	61.50	D
MO-1	Mast (wing mounting)	21.85	D
MO-2	Mast (bumper mtg.)	21.85	D
RM-10	10m Resonator	10.85	D
RM-10S	High Power version	16.10	D
RM-11	27MHz Resonator	10.85	D
RM15	15m Resonator	16.10	D
RM-15S	High Power version	16.80	D
RM-20	20m Resonator	14.72	D
RM-20S	High Power version	20.00	D
RM-40	40m Resonator	16.79	D
RM-40S	High Power version	23.00	D

RM-80	80m Resonator	17.95	D
RM-80S	High Power version	35.65	D
BM-1	Bumper Mount	16.10	D
C-29	St. Steel Spring	12.95	D
C-32	Chrome Ball Mount	8.28	A
HLM	Deluxe Boot mt/coax plug	16.79	A
MM-1	Universal cowl mt.	10.00	B
MM-3	ditto plus 17ft coax	16.79	B
QD-1	Quick-disconnect	13.00	A
RSS-2	Res. Impact Spring	6.30	B
SSM-1	Ball mt st.steel Spring	30.00	B
SSM-2	Ball Mt. only (st.steel)	17.25	B
SSM-3	H.duty Spring st.steel	16.97	B

CARRIAGE: A £1; B £2; D £5.00

SPECTACULAR 1 DAY STOCKTAKING SALE
ALL TYPES OF EQUIPMENT
NEW YEAR'S BANK HOLIDAY MONDAY
JAN. 3RD 9.00–6.00 PM. CALLERS ONLY

RADIO SHACK LTD.
188 BROADHURST GARDENS, LONDON NW6 3AY

Giro Account No. 5887151 Telephone: 01-624 7174 Telex: 23718

BARCLAYCARD VISA

Just around the corner from West Hampstead Station on the Jubilee Line.

www.americanradiohistory.com

GAREX (G3ZV1)

RESISTOR KITS a top-selling line for many years. E12 series, 5% carbon film, 10Ωto 1M, 61 values, ratings ¼W or ½W (state which).
Starter pack 5 each value (305 pieces) **£3.10**
Standard pack 10 each value (610 pieces) **£5.55**
Mixed pack, 5 each ¼W + ½W (610 pieces) **£5.55**
Giant pack, 25 each value (1525 pieces) **£13.60**

SR-9 monitor: 2m FM with 144-146MHz full coverage VFO + 11 xtal controlled channels; ideal for fixed,/M,/P use. 12V DC operation **£47.50**

Marine band SR-9, 156-162MHz, same spec. and price.

CRYSTALS FOR NR-56, SR-9, SR-11, HF-12, TM-56B All 2m channels from 0 (145.00) to 33 (145.825) incl. also 144.80, 144.825, 144.85 Raynet at **£2.46** (+**20p** post per order). Over 40 popular marine channels at **£2.85** (+**20p** post).

CRYSTAL FILTER 10.7MHz, 12½KHz spacing, ITT 901C **£6.90**

CRYSTAL FILTER 25KHz spacing type 914B or 909B **£6.90**

PYE RADIOTELEPHONE SPARES (sae full list). Ex. equip., fully guaranteed. **CAMBRIDGE AM10** 10.7MHz I.F. **£3.65.** 2nd mixer **£3.** 455KHz block filter 12½KHz **£9.40.** Ditto 25KHz **£3.** 455KHz AM I.F. **£4.95.** Audio bd. **£1.95**

WESTMINSTER W15/W30 AM RX RF 68-88MHz *or* 148/174MHz **£6.95.** 10.7MHz IF (inc. 12½KHz xtal filter) **£8.25.** 2nd Osc **£2.10.** 455KHz IF **£5.65.** 455KHz block filter (12½KHz) **£7.35.** Squelch **£1.45.** QQ206-40a (quick-heat) RF tested **£11.95.** Aerial relays **£1.50**

PYE SPARES ARE OUR SPECIALITY – COMPLETE UNITS ARE ALSO AVAILABLE

GAREX FM DETECTOR & squelch conversion for Pye R/T equipment. Ready assembled, full instructions. Tailor-made, easy-fit design, replaces existing squelch board, with minimum of modifications. For AM Cambridge **£6.30;** for Vanguard AM25B (Valve RX) **£6.10;** for Transistor Vanguard AM25T **£6.95**

MAIN DISTRIBUTOR OF REVCO AERIALS & SPECIAL PRODUCTS

(trade enquiries welcome).
PRICES INCLUDE UK POST & PACKING & 15% VAT.

SX200-N
THE ULTIMATE SCANNER

- ★ MICROPROCESSOR CONTROLLED 32,000 CHANNELS
- ★ AM & FM ALL BANDS
- ★ WIDER COVERAGE: 26-58, 58-88, 108-180, 380-514MHz; includes 10m, 4m, 2m, & 70cm Amateur bands.
- ★ 5kHz & 12½kHz FREQUENCY INCREMENTS
- ★ 16 MEMORY CHANNELS WITH DIRECT ACCESS
- ★ SPECIALLY DESIGNED FOR EUROPEAN MARKET
- ★ 2 SPEED SCAN   SCAN DELAY CONTROL
- ★ 2 SPEED SEARCH UP AND DOWN
- ★ SEARCH BETWEEN PRESET LIMITS UP AND DOWN
- ★ 3 SQUELCH MODES inc. CARRIER & AUDIO
- ★ RELAY OUTPUT FOR Aux. CONTROL
- ★ INTERNAL SPEAKER, ALSO EXTERNAL SPEAKER & TAPE OUTPUTS
- ★ LARGE GREEN DIGITRON DISPLAY BRIGHT/DIM
- ★ AM-PM CLOCK DISPLAY
- ★ 12V DC, 230V AC OPERATION
- ★ FACTORY-BACKED SPARES & SERVICE, 12 MONTH WARRANTY & THE ALL-IMPORTANT PRE-DELIVERY CHECK BY GAREX, THE MAIN SERVICE & SALES AGENTS.

£264.50 INC. VAT Delivered

•NEW•   **★ REVCONE ★**   •NEW•

A new top quality 16-element, all British made, VHF/UHF broadband fixed station aerial from Revco. Ideally suited to SX200 and other VHF/UHF Receivers. **PRICE £24.95 inc**

Access

GAREX ELECTRONICS
7 NORVIC ROAD, MARSWORTH, TRING, HERTS HP23 4LS.
Phone 0296 668684. Callers by appointment only.

Goods normally despatched by return

BARCLAYCARD VISA

DISCOVER TELETYPE!

The A.E.A. MBA-RO RTTY/CW/ASCII Reader displays data direct from the extension speaker socket of your receiver on a soft blue, 32 column, vacuum fluorescent display. Copies amateurs, news services and more!

"Very pleased with the reader, very easy to use".
M.R., Gosport

"A very impressive piece of equipment. I am personally delighted with it."
A.K., Oman

"I am very happy with the MBA-RO reader".
K.W., Manchester

MBA-RO	Reader	**£175.00** (plus £2.50 P & P & Ins.)
STD-1	45° Tilt Stand (matching)	**£4.95** (plus £1.00 P & P)
PS-1	12V D.C. Power Supply	**£16.50** (plus £2.00 P & P)

The above prices include V.A.T. at 15%.

All I.C.S. products carry a full 12 months parts and labour warranty.

Send large S.A.E. for details. Allow 14 days for delivery.

I.C.S. ELECTRONICS LIMITED,
PO Box 2, Arundel, West Sussex BN18 0NX.
Tel: 024 365 590.

VIDEO RECORDERS as follows: **Philips N.1500** type colour, int off air Rx, cassettes type (no cassettes) RF or Vid out. **£85. Philips LDL1000** reel to reel type Blk/Wht video out **£65. Sony CV2100** reel to reel Blk/Wht video out **£75.** All supplied with circs & reel to reel type with 3 tapes, all 240V mains.

PORTABLE LIGHT UNIT ex Army reqs 2× SP.2 batteries, comprises case size 9 × 5 × 3 this contains 2× batt & 4 spare lamps, the two lamps are on flex leads about 1 mt long sim to pen torch with swts, in new cond with carrying strap **£4.50,** two for **£8.**

AIRPORT TAPE REC.6 track unit for speech for 240V tape deck plus separate Rec, Playback & mon unit fuller details on list **£115.**

H.F. TUNING ASS from Tx unit 100W tunes nom 2/18Mc/s as 3 roller coaster coils tuning 2× Amp & PA stage, also contains trimmers & relays with circ. **£12.50.**

PAN & TILT HEADS heavy duty type normally used for remote control of CCTV Cameras, for 240 as two motors to give 360' Pan & Tilt approx ext size 10 × 11" 19" high about 75 lbs reqs ext one pole two way swt for control, note these are ext soiled due to out door use **£65.**

SOLARTRON BENCH P.U. 240V mains O/P var 0 to 40V DC in 100 Mill/V steps current var 0 to 5 amps, O/P volt set by decade swts, fitted meter to read current size 9 × 7 ×13" supplied tested with book **£75.**

INSULATION TEST SET made by Runbaken for 240V provides O/Ps of 15,20 or 25KV uses vibrator contact breaker supplied with leads in fitted wood case size 9 × 7 × 13" thought to be for testing Ignition Harness **£27.**

AUDIO OSC. General purpose Sine Sq wave ose 10c/ to 100Kc in 4 decade ranges O/P var up to 5V RMS into 600 ohm, compact unit size 13 × 9 × 6" tested good cond. **£38.**

AERIAL UNIT single dipole nom 200 Mc/s approx 27" with 10" boom fitted 50/75 matching section, ex A/C new **£5.50.**

FREQ CONV UNIT I/P 240V AC O/P 115V 400c/s 100 watts sine wave single phase all solid state new **£115.**

PYE PF.1 UHF FM pocket phone Rx nom 450Mc/s with circ req 9V battery **£9.50.** Also 12v car adaptor including amp **£5.50.**

Above prices inc/carr/postage & VAT. Please allow 14 days for delivery. Goods ex equipment unless stated new. SAE with enquiry or 2 × 15½ stamps for List 29.

A. H. SUPPLIES
122, Handsworth Rd., SHEFFIELD S9 4AE. Ph. 444278 (0742)

www.americanradiohistory.com

RADIO INTERFERENCE SUPPRESSION

PART 3

E.A. RULE G3FEW

In this, the final part of this short series on r.f.i., we shall be dealing with the problem as it relates to hi-fi equipment, although of course the same remedies can be applied to many other types of electronic equipment. Let it be said right now that there is almost nothing you can do at the transmitting end to cure r.f.i. on hi-fi equipment. Even f.m. still causes problems and in practice actually makes the solution more difficult because you often can't hear anything to identify the cause, unlike s.s.b. or a.m. when the cause is only too obvious! Unless you have heard 50 plus 50 watts of hi-fi stereo s.s.b. in your living room you haven't lived!

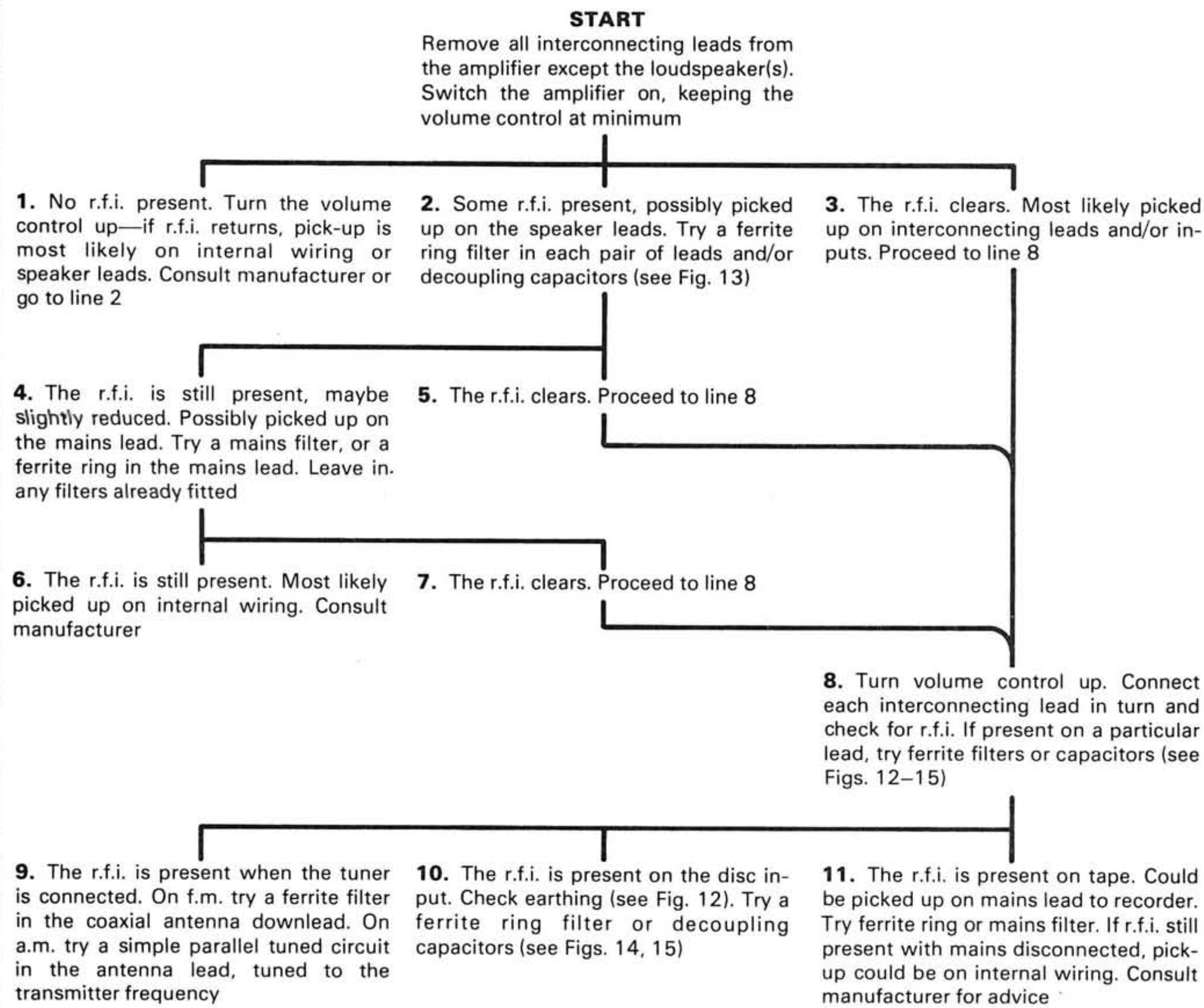


Fig. 11: Hi-fi interference tracing chart. This chart is intended as a general guide only, and does not give all the possible combinations that can cause r.f.i. to be present in an audio system. Start with the basic amplifier and add the various other items one by one, checking each in turn. The effect of r.f.i. can range from mild audio distortion to full-power breakthrough of modulation

www.americanradiohistory.com

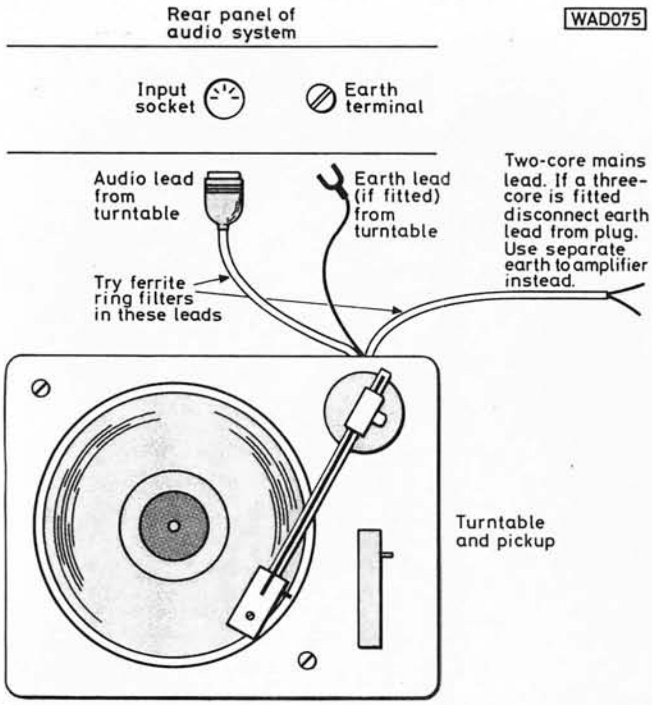


Fig. 12: Correct method of wiring a turntable to an amplifier to avoid r.f.i. Tape recorders, tuners, etc., should be wired in a similar way

You can be almost 100 per cent sure that the fault is in the audio equipment suffering from the r.f.i., but this does not mean you don't have to do anything about it. You have a moral responsibility to effect a cure providing the person suffering is willing to co-operate. Unless they are willing to co-operate you stand no chance of effecting a cure other than to stop transmitting, so it's worth repeating: "Do nothing that is likely to sour relationships with your neighbours". Most remedies can be applied externally to the hi-fi equipment and these should always be tried first. If you do find that internal modifications are required, let your neighbour choose a qualified engineer to do the work under your supervision, otherwise you may find that if you touch the internals of their pride and joy, you will be held responsible for every defect from then on. Much depends on your relationship with the neighbour but tread carefully. It is suggested that you pay for any external work and the owner of the audio equipment pays for any internal work, but again this will depend on the local situation.

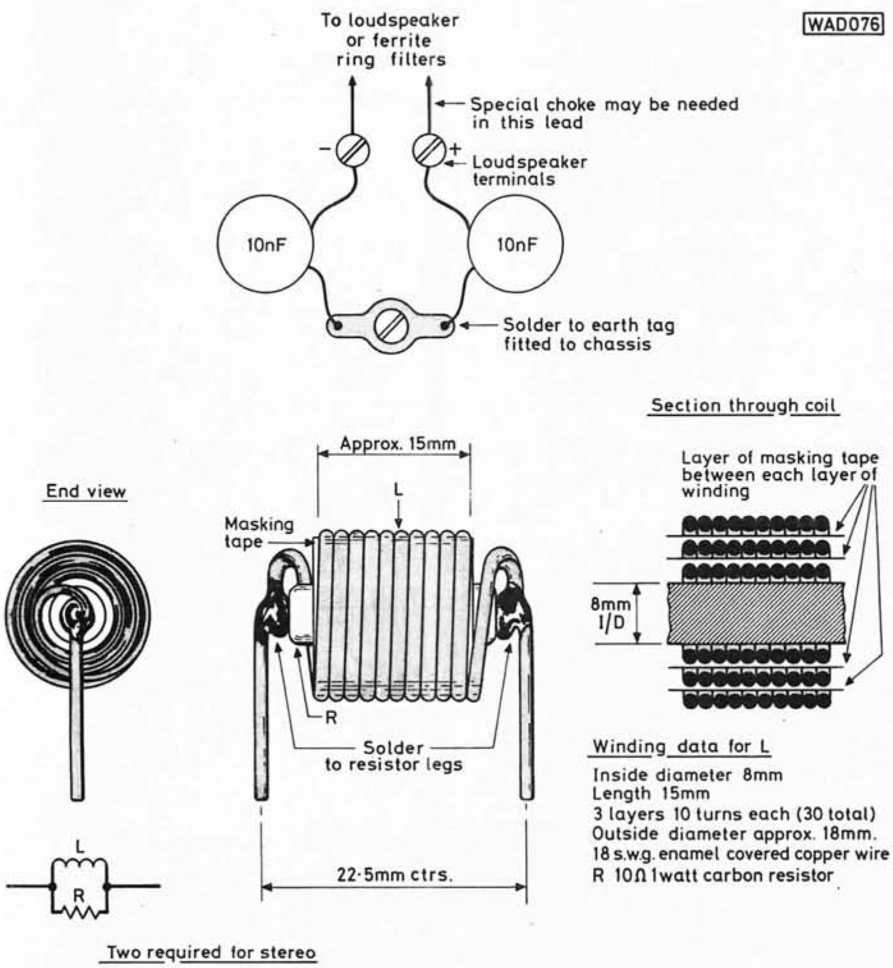


Fig. 13: Correct methods of filtering loudspeaker leads ▲

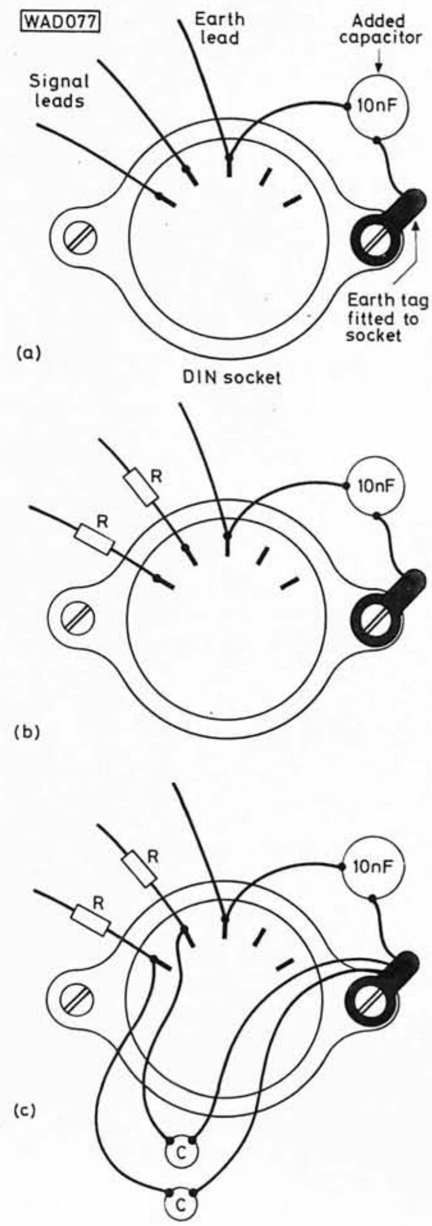


Fig. 14: (a) Adding a decoupling capacitor to bypass r.f.i. picked up on input lead screen. (b) and (c) Adding "stopper" resistors and capacitors to decouple r.f.i. on input signal leads ▶

www.americanradiohistory.com

The chart shown in Fig. 11 is similar to the one given for receivers, but relates to the situation regarding r.f. getting into sensitive audio circuits.

One of the most common ways in which r.f.i. enters an audio system is via the disc (record deck) input. A turntable and pick-up with their wiring are shown in Fig. 12. Some manufacturers fit a wire link underneath the turntable, bonding the metal chassis to the audio earth return. This link should be removed and a separate earth connection run from the turntable chassis to the amplifier earth terminal, not the audio input earth.

It is important that there is only one actual earth connection between the various items making up the system. In general this will be via the audio leads, in which case any other additional earths can be removed if causing r.f.i. Each item (recorder, turntable, tuner, etc.) should be earthed to the main amplifier and **not** to a mains earth. Only the main amplifier should be connected to the mains earth.

Outputs and Inputs

Two methods of filtering loudspeaker leads are shown in Fig. 13. The capacitors, which should be disc ceramic type, should be fitted with the shortest leads practicable, at the speaker terminals or sockets on the amplifier. Some amplifiers may go unstable when capacitors are connected to the speaker terminals. In this case fit one of the chokes shown into the live (non-earthy) lead to the amplifier speaker connectors.

Filtering of input sockets for tuners and tape or record decks should be tackled as shown in Fig. 14. If the input lead screen (pin 2 on DIN sockets) is not taken direct to chassis at the input connector, but goes instead via internal wiring, a 10nF disc ceramic capacitor should be added, as in Fig. 14(a), to decouple this connection from r.f.i.

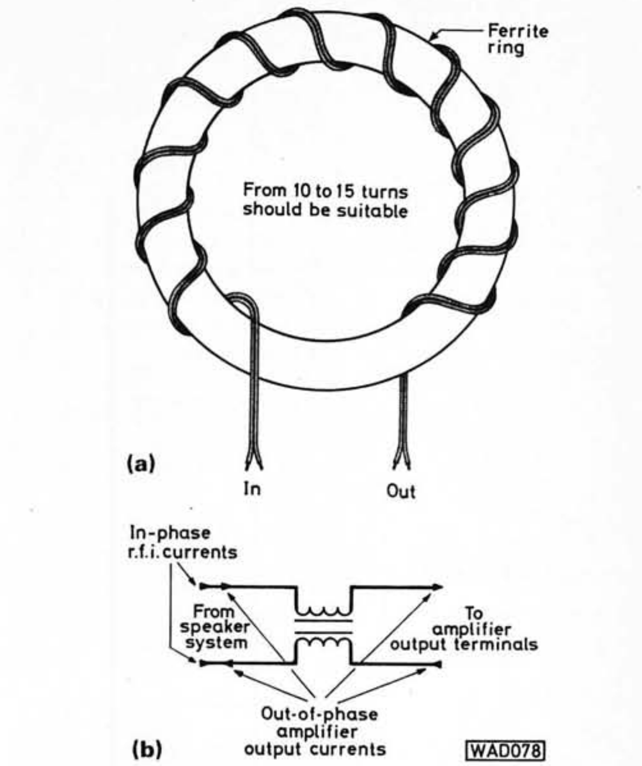
In severe cases, the addition of "stopper" resistors (Fig. 14(b)) and/or capacitors (Fig. 14(c)) may help. For tape and tuner inputs, the resistors "R" may be 10kΩ, but for disc inputs 1kΩ should be suitable. The extra capacitors "C" must be of low value—100pF or less—otherwise the treble response of the amplifier will suffer.

The use of ferrite ring filters is mentioned for mains, loudspeaker, and f.m. antenna leads in Fig. 11. The method of winding the lead onto the ring is shown in Fig. 15(a). The filter should be fitted as close to the amplifier (or the tuner in the case of the f.m. antenna lead) as possible. The principle of operation of the ferrite ring filter for twin leads is shown in Fig. 15(b).

Stopping Detection

All the methods described are intended to stop the interfering radio frequency signal from getting into the amplifier. It will otherwise be "detected" by one of the stages (Fig. 16(a)), after which there is nothing you can do about it, as it will then be treated as a normal audio signal. You MUST prevent the r.f. getting into the amplifier in the first place. However, it is possible to prevent the "detection" process by making certain amplifier stages unsuitable for r.f. operation. Fitting a bypass capacitor (C) of 1nF to 4·7nF across the base/emitter junction of an audio amplifying stage transistor (Fig. 16(b)), will prevent it operating as a detector. In severe cases, a "stopper" resistor (R) of 100Ω to 1kΩ may be added (Fig. 16(c)), but check for any effect this may have on audio reproduction. Normally, only the first stage in the main power amplifier section will need this treatment. Wire the extra components as close to the base/emitter leads as possible.

Fig. 15: (a) Winding a lead onto a ferrite ring to obtain r.f.i. filtering. (b) Principle of a twin-lead ferrite ring filter



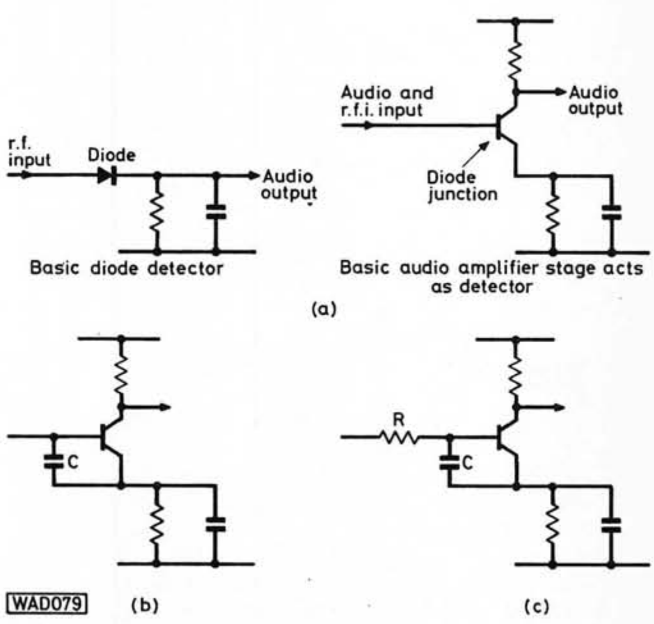


Fig. 16: (a) Similarity between a diode detector circuit and an audio amplifier stage. (b) and (c) Adding suppression components to prevent "detection" taking place

It has not been possible to cover all the aspects of r.f.i. in this short series but it is hoped that the basic ideas given will enable you to work out a solution. Remember that quite often more than one source may be causing the r.f.i. and several filters may be needed before a complete cure is achieved. ●

www.americanradiohistory.com

MODS

IMPORTANT—The ideas presented here are suggestions only, and as they are untried by this magazine, we cannot accept responsibility for any resultant damage, however caused. Before alterations are attempted, care should be taken to ensure that any guarantee is not invalidated, and it should also be borne in mind that modifications usually have an adverse effect on resale prices. In cases where specialist skills or equipment are needed, most dealers will undertake the work for a reasonable fee.

Roger Hall G8TNT (Sam)

No. 19

More mods for the FT-290R this month

Reset to 145MHz

This mod, by Dave Joyce G8MFE, was kindly supplied by SMC Ltd. It should prove very useful to blind operators as it resets the dial to 145MHz (UK versions; 147MHz USA) at the touch of a button and sounds a bleep to signal that it has reset. The first step is to remove the top and bottom covers. Then locate the hole in the case that is very near to the SO239 socket. It is covered on the outside by a stick-on aluminium label. Make a hole in this label and install a push-to-make, non-latching switch. Connect one side of this switch to ground and the other side to Pin 4 of J5003 which connects the keyboard unit to the control unit. A 1nF capacitor should also be connected from Pin 4 to ground for decoupling. Now replace the covers and dial up any frequency. Press the new button and the set should bleep and display 145·00 (147·00 USA).

Mic Gain

Tom G8HUH has sent in two very nice mods. The first allows the user to adjust the gain of the microphone amplifier which, in the FT-290, is normally running at full gain. Tom believes this to be the reason why so much extraneous noise is evident on f.m. transmissions when operating mobile on motorways or in noisy vehicles with this rig. Tom says that to overcome this problem it is essential to be able to reduce the microphone gain and not to be tempted to twiddle with the f.m. deviation control as this is best left alone, especially as it will not make any difference to the background noise. This is another relatively easy mod and the first step is to find chip Q2004. Then lift the earthy end of the 10μF Tantalum capacitor, C20, and re-connect it to earth via a 1kΩ preset pot. Putting this resistance in series reduces the decoupling effect of C20, increasing the amount of negative feedback to the input which in turn reduces the gain of the stage. For ease of adjustment, the pot is best fitted to the component side of the main board. There is a convenient earth pillar nearby. Adjustment should be carried out with a noise source in the background, Tom suggests a vacuum cleaner. Ask several people for their opinion but beware of becoming involved with those strange amateurs who delight in giving false reports. It is also a good idea not to try to carry out these adjustments while mobile on a motorway, even though it might be a test of real life conditions!

Meter Mod

This mod was also supplied by Amateur Electronics UK Ltd., and it is for improving the performance of the output power meter. It should be noted that this meter cannot be used to tune the telescopic whip antenna, even though the meter deflection does vary with changes in the length of the whip. The radiation from this antenna is not necessarily at maximum when the meter is peaked. This mod ensures that the meter indications are relatively independent of the length of the antenna.

This mod is extremely easy to carry out as all that is involved is unsoldering one end of a capacitor (C2038 on the main unit) and re-soldering it in a slightly different position. Fig. 3 shows the original configuration of the circuit and Fig. 4 shows how the top end of C2038 has been moved from the end of L2010 and soldered to the track connecting L2009 to C2098. The readings on the meter should now be much more reliable.

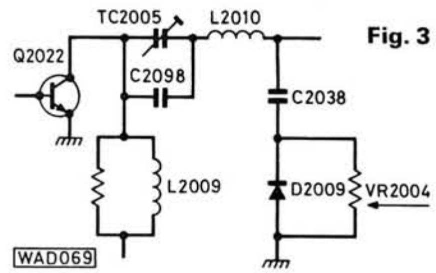


Fig. 3

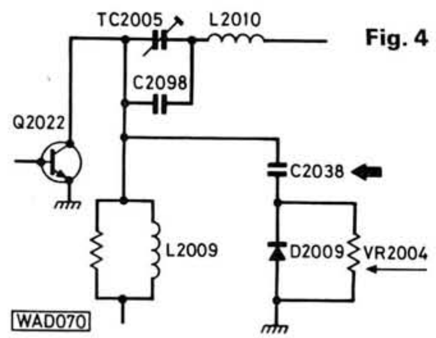


Fig. 4

Squelch Mod

The effects of this mod are threefold:

1. A reduction in squelch hysteresis (the difference in level between the opening and closing points).
2. A speeding up of squelch operation which enables the scanner to work better, also reducing the *squelch tail*.
3. A reduction of hiss level when the squelch is closed. To carry out this mod, reduce C94 from 4·7μF to 1μF, increase R79 from 270kΩ to 330kΩ and then add Cx. This is a 10μF tantalum or sub-miniature electrolytic capacitor and it should be fitted from the leg of R78 (4·7kΩ) to the body of transistor T1007. This useful mod was again supplied by Nick G8MCQ.

The final set of mods for the FT-290R will appear next month

www.americanradiohistory.com

Tandy CB

DON'T BE CAUGHT OUT THIS WINTER!

Versatile 40 Channel 4 Watt Emergency CB UNIT

£79.95

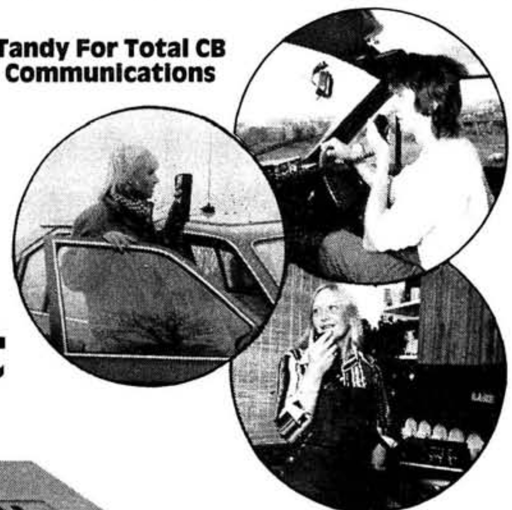
Stuck in a snow drift, run out of petrol, broken down in the middle of nowhere...! It can happen anytime and probably will in the worst of weathers. With the prospect of another bad winter approaching, here is a device that could save a lot of worry, money and lives.

It's an incredibly easy to use 40 channel 4 watt emergency CB Unit that can be stored under your seat or in the boot in its protective case ready for that day of crisis, or be used for long periods as a normal unit with all "big rig" features.

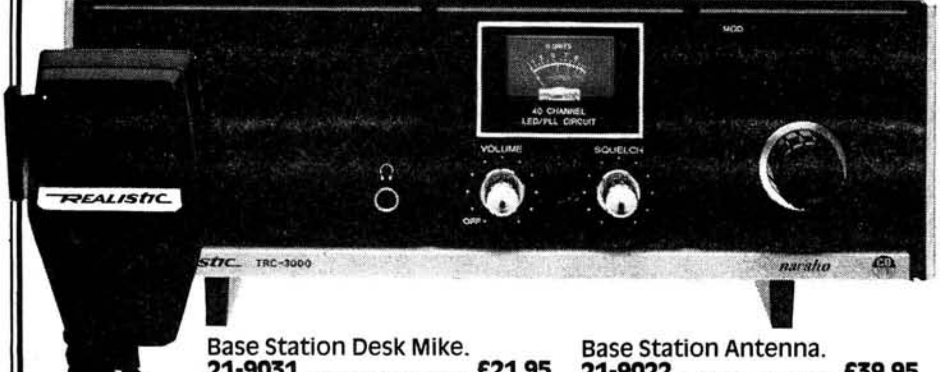
21-9113 .... **£79.95**

Includes Protective Storage Case

Tandy For Total CB Communications



Navaho 40 Channel 4 Watt CB Base Station



£129.95

Realistic TRC-3000. With a mobile set in the car and a base station in the home or office you can keep in touch! The PLL gives precise frequency control, RF output and signal strength meter, LED modulation indicator. Full 40 channels and 4 watts output. Speaker jack and headphone jack. Includes microphone.

21-9115 .... **£129.95**

Base Station Desk Mike.
21-9031 .... **£21.95**

Base Station Antenna.
21-9022 .... **£39.95**

OVER 290 STORES AND DEALERSHIPS NATIONWIDE

Check your phone book for the **Tandy** Store or Dealer nearest you

Known as Radio Shack in the USA

Prices may vary at individual stores.

Offers subject to availability.

www.americanradiohistory.com

RAEM.....RAEM.....RAEM.....R

RAEM CALLING

Tony SMITH G4FAI

EM.....RAEM.....RAEM.....RA

Ernst Krenkel was a famous Russian radio amateur whose exploits in the 1930s are depicted on a commemorative QSL card used by many Russian amateur stations today. Some recipients of the card will know that he was an Arctic explorer/radio operator who played a vital part in a Polar rescue. Some may also know that he was honoured by the issue of a special postage stamp in 1973, that the Central Radio Club of the USSR is named after him and that he was allowed to use a special callsign unlike that of any other Russian amateur.

In July 1933 Krenkel was chief radio operator on the *SS Chelyuskin* under the command of Prof. Otto Schmidt who had special responsibility for opening up the shipping lanes through coastal waters north of Siberia. Unfortunately, like so many of her predecessors, the *Chelyuskin* became trapped in the Arctic ice and her plight eventually became world headlines. Ships have survived this ordeal before and to start with, at least, it was just a question of waiting through the winter until the thaw set in. On 13 February 1934, however, disaster struck. The ship was crushed by the ice-pack and sank in the Chukchi Sea off the north coast of Siberia. The survivors, some hundred men, women and children, fled to the ice with such supplies as they could take from the sinking ship. Krenkel's own personal QSL card illustrated here shows the dramatic scene.

For nearly two months, in Polar darkness, the survivors remained on an ice-floe with Krenkel's radio their only lifeline to the outside world. Fissures began to appear in the ice and desperate plans were made to send in Russian Air Force planes to effect a rescue, something which had never been attempted before in the Arctic region.

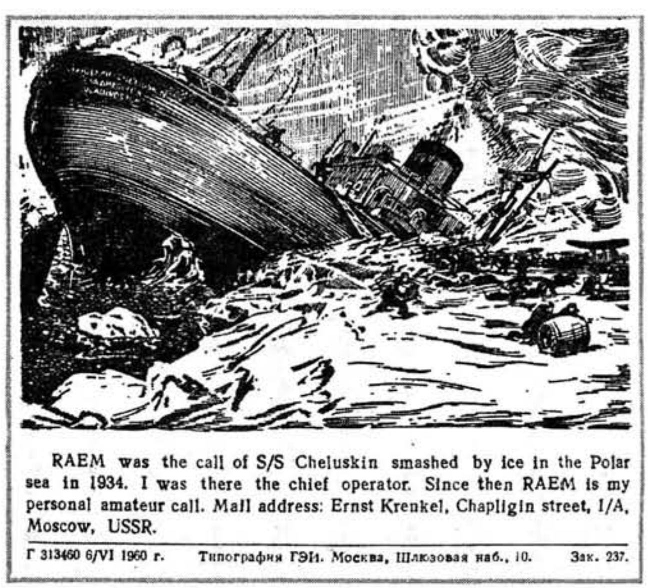
Three aircraft were used and the daring rescue attracted world-wide interest. On April 13 the last six people, plus eight dogs, were airlifted to the rescue base at Cape Vankarem, some 483km away. The Soviet Government instituted a new title on April 16, Hero of the Soviet Union, the highest personal award that could be made to anyone, and the first recipients were the three young aviators who had rescued the *Chelyuskin* expedition.

For his part Ernst Krenkel was also awarded a high honour and was allowed to take the *Chelyuskin*'s call, RAEM, as his personal amateur callsign, a privilege which has never been bestowed on any other Russian operator. He had been trained as a wireless operator in 1920 and first worked amateur stations from the Arctic in 1927 when he was based in the northern island of Novaya Zemlya.

In January 1930, when based in Franz Josef Land, he established contact with Admiral Byrd's expedition in the Antarctic, on 7·4MHz (42m), using 250 watts. This was literally from one end of the globe to the other and was the first time such a contact had been achieved.

For some years after the *Chelyuskin* the idea had been debated of setting up a scientific station on a drifting ice-floe in the Arctic Ocean. The man charged with bringing this idea to reality was Otto Schmidt. A base station was set up on Rudolph Island, north of Franz Josef Land, and on 21 May 1937 the world was astounded to learn that an expedition had been landed at the North Pole by air. Four 4-engined aircraft equipped with ski-runners flew over 10 tonnes of supplies to the Pole. Schmidt, with a supporting party, stayed there for eleven days. They then departed with the aircraft leaving four men and a dog on the floating station. The leader was Ivan Papanin and other members were Peter Shirshov and Eugene Fedorov, both scientists, and Schmidt's old radio operator from the *Chelyuskin,* Ernst Krenkel.

The first activity on May 21 was the setting up of the expedition's wireless station and the initial signal was put out that day using the callsign UPOL, which was to become internationally famous in the months ahead. The main purpose of the expedition was to carry out a wide range of scientific observations as the floe drifted southwards and, of course, the radio's main purpose was to communicate all findings to base on Rudolph Island immediately they were available. Four weather reports were sent daily and all members of the party were commissioned to write and despatch articles on their experiences to various newspapers and magazines. All of this, coupled with personal traffic for each member, plus official business, kept Krenkel very busy. Yet, at various times he also managed to communicate with amateur operators in many countries.



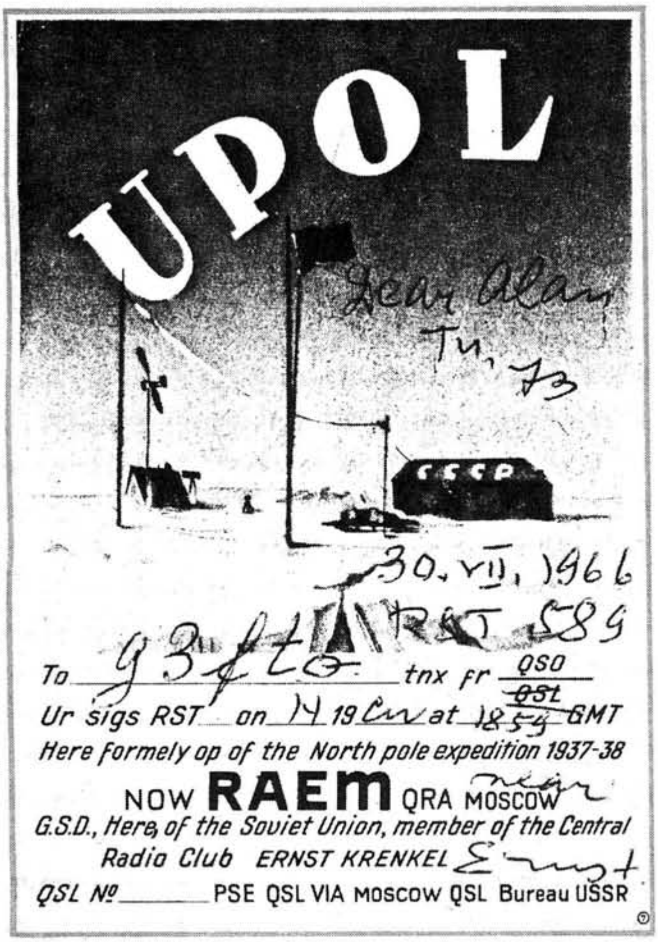
The reverse of Krenkel's personal card

www.americanradiohistory.com

The first amateur contact was on June 24 when he worked a station in Aalesund, Norway, and he was then hopeful of soon establishing contact with amateurs from his own country. He had already announced that his own receiver, which he had lodged with the office of the journal Radiofront, would be presented to the first USSR station to work him on UPOL. In the meantime other amateurs worldwide were clamouring to make contact with him. On June 26 he worked stations in France, Brazil, Hawaii and the USA. By July 3 he had established contact with the USSR, and worked other amateurs in Norway, France, England, Ireland, Iceland and North America on that day. He also managed to work South Australia on September 7.

His transmitter power was only 20 watts, with an antenna that was 76 metres long, strung between two masts. His basic power supply came from accumulators which were charged by a wind generator. When there was no wind and the accumulators were flat there was a stand-by "bicycle" generator which took two men to operate, using hands and feet, so that on those occasions only the most essential messages were transmitted. There was also a stand-by petrol generator but this was rarely used because of the need to conserve fuel in case of a genuine emergency.

Much meteorological data was collected as the floe began its long drift to the south as the Soviets were very interested at the time in the proposed polar air route between Russia and the USA. During June the first flight took place between Moscow and Vancouver, passing very close to the Polar station in the process. Less than a month later, in July, a world record non-stop, non-refuelling flight of 10 077km followed the same route and landed in San Jacinto, California, 62 hours after leaving Moscow. Then in August a polar flight went missing in the Arctic. The expedition was put on alert to prepare an airstrip on the ice in case it was needed by rescue aircraft, and Krenkel spent many long hours monitoring the aeronautical frequency in case help was required.



Ernst Krenkel's own card confirming a contact with G3FTQ in 1966

By early December they were nearly 1287km from the Pole and fast approaching the danger line of latitude 80°N. Here the floes begin to crumble and break up before sweeping down the east coast of Greenland. Cracks were beginning to appear and the party was preparing to move to find firmer ice if necessary. Conditions became appalling. In the darkness of the polar night there were violent blizzards, continual movement of the ice-pack, and heavy snow falls.

The radio antenna had to be re-erected several times in the teeth of fierce gales, and in the sub-zero conditions they had to repair the wind generator. On February 2 the camp had to be moved, together with all supplies, away from dangerous fissures threatening to split the site in two.

All this time meteorological, hydrological and other scientific observations continued to be made. Krenkel kept at his transmitter to ensure everything was recorded at Rudolph Island and to maintain contact with the ships now coming to their rescue through the icefields. At one point the radio equipment was mounted on a sledge and operated in the open air ready to be moved to safety at a moment's notice. To operate his telegraph key Krenkel had to use bare hands so he could only manage this for ten minutes at a time; the conditions under which he worked can be imagined. As they drifted further south contact with Rudolph Island became difficult and messages were then relayed through the approaching ships or through the Norwegian radio station on Jan Mayen Island.

They were finally rescued by the icebreakers *Murmanetz* and *Taimyr* in the face of many difficulties on 19 February 1938. The solid ice which had measured about two by four kilometres when they started, and on which four large aircraft had landed, now measured about thirty by ten metres. They had drifted 2510km and had arrived off the east coast of Greenland. All the scientific equipment was saved and before the transmitter was removed Krenkel sent a final message saying the North Pole station was being closed down in latitude 70° 54′ N, longitude 19° 48′ W.

It was all over, but it was not forgotten. The party returned in triumph to Moscow and all received important decorations and rewards for their success. Ernst Krenkel, Hero of the Soviet Union, was subsequently honoured by his country in several ways. He was an active operator on the amateur bands in the 1960s and many stations round the world must have received his original and unique QSL card which is shown here.

After a lifetime of remarkable achievement he died on 8 December 1971. He had been made President of the USSR Federation of Radio Sport in 1959, he was on the boards of the magazine of Radio and the publishing house Energiya and he was head of the All-Union Society of Philatelists. He achieved his final ambition when he commanded an Antarctic research expedition in 1968/9 which travelled 51 000km.

A gulf in the island of Komsomets is named after him as is a Polar Geophysical Laboratory and a Communication Polytechnic in Leningrad. He was one of a breed of men, found in all countries, for whom achievement is measured in terms of personal qualities of skill, courage and endurance. Amateur radio itself is honoured by having had such a man in its ranks. ●

www.americanradiohistory.com

NEWS NEWS NEWS

Passport to Amateur Radio Reprint

As promised last month, I can now confirm that the reprint of our very popular series *Passport to Amateur Radio* will be available at the beginning of January 1983.

The 88-page publication contains all the *Passport* series, plus a number of reprinted articles of particular interest to the aspiring Radio Amateur Examination candidate.

Costing only £1.50, which includes postage, the reprint will be available, at the beginning of January 1983, from: *IPC Magazines Ltd., Post Sales Department, Lavington House, 25 Lavington Street, London SE1 0PF.*

1·3GHz ATV Repeaters

The Microwave and Repeater Working Group committees of the RSGB are finalising the technical specifications for 1·3GHz ATV repeaters (six proposals are in the pipeline). It is our understanding that the specification will amount to a working compromise between groups wishing to build a.m. or f.m. units.

The proposal is to utilise the 1300–1325MHz sub-band and provide ATV repeaters with two separate channels. The separate channels would be designed so that the first would accept either a.m. or f.m. inputs and provide a.m. only out, the other channel would accept f.m. only in with f.m. only out. It is hoped that the power output would be the same as that for voice repeaters on the band.

Antennas would consist of Alford Slots—Big Wheels or steerable Yagi beams. Sites will be chosen to allow coverage of a town size area or to allow linking two areas of amateur population.

The proposed frequencies for the 1·3GHz ATV repeaters are for f.m. systems 1·318GHz output and 1·283GHz input, for a.m. systems 1·312GHz output and 1·277GHz input. Of the six proposals going to the HO, the mode breakdown is, GB3TV Luton on f.m., GB3VR Worthing on f.m., GB3UD Nr Stoke-on-Trent on f.m., GB3UT Bath on a.m. and GB3GV Leicester on a.m.

AMSAT News

UOSAT — OSCAR 9: Latest information confirms UOSAT is still firmly under control and has been interrogated to yield the following; 1: The spacecraft is spinning around its long (Z) axis about once every 10 seconds. This is a factor of 3 increase since April 1982. 2: Data has been dumped into the 1802 computer memory and no errors found. 3: The F100 computer is believed to have suspect CMOS elements resulting in an increase, since April, in its current consumption.

On Thursday 14 October the c.c.d. camera and imaging unit was tested using a picture dump. This was successful, but the results were degraded by the presence of terrestrial f.m. signals within the satellite sub-band. Note! Do not use the 144MHz subband 145·800 to 146·000MHz unless participating in a space experiment, and then only use the approved modes — s.s.b. or c.w.

Surrey University have since successfully carried out a spin down, spin up and a spin down and change of spin rate — all controls worked correctly. During the week ending 31 October 1982, Surrey hoped to slowly spin down the Z axis to about one revolution in every two minutes, at which point they will change the orientation from 90° to the orbit to the parallel plane prior to putting out the beam.

Phase IIIB: At the time of writing this report the Phase IIIB satellite, the next active transponder in the OSCAR series, is due for launch in early April 1983. Evaluation tests have been carried out to determine the effects of thermal variations on the r.f. package. The Eng. Beacon was radiating a signal on 145·9870MHz at 25°C and 145·9830MHz at 0°C. Under the same conditions, the General Beacon's radiated signals were 145·8100 and 145·8105MHz. Power output of the Mode B transponder is expected to be 50W p.e.p. An uplink frequency of 435·100MHz produced a downlink output of 145·903MHz at 25°C, shifting upwards by 3kHz at 0°C.

The Mode L transponder output is now reckoned to be 32W (d.c.) and much lower than expected. The weight of the vehicle has been reduced as a result of carrying less propellent for the kick motor and will result in a final inclination of 63·4° and a perigee of between 230 and 235km.

Once again our thanks to Ron Broadbent G3AAJ for the information. Readers may be interested to know that the excellent AMSAT-UK booklet *Guide to OSCAR Operating* is once again available for only 84p, as is the recently introduced *Computer Handbook* which contains many space-related computing articles, priced £3.29 to non-members and £2.79 to members. Prices quoted include p&p.

These publications are obtainable from: *AMSAT-UK, 94 Herongate Road, London E12.*

Cornish Beacons Return

At 1600 on Saturday 16 October 1982 the resited Cornish beacon complex GB3CTC returned. Three beacons are now operational from the Hensbarrow Downs (XK46D) site and the operational frequencies are 70·030, 144·915 and 432·970MHz, all beaming NNE.

Output levels of the 70 and 144MHz beacons are approximately 50W e.r.p., using 3-element beams and 10W e.r.p. on 432MHz. The common mast is at 279m a.s.l. with the antennas mounted between 15 and 18m a.g.l. At the time of writing the 144MHz beacon was presenting a good signal at the East Dorset QTH of G8MCP but there was no sign of the 432MHz beacon.

Our thanks for this information and congratulations on the considerable engineering work go to Bill Colclough G3XC. All reports would be welcomed by Bill, who is QTHR.

Morse Course

The Bradford and Ilkley Community College is intending to run a course to prepare students for the Post Office Morse Examination.

The one year course will commence on Wednesday 12 January 1983, and classes are on Wednesday evenings between 1900 and 2100 hours.

Before the starting date, prospective students should contact the Course Tutor, P. Nurse, at: *Bradford and Ilkley Community College, Division of Electrical and Electronic Engineering, Great Horton Road, Bradford, West Yorkshire BD7 1AY.*

www.americanradiohistory.com

NEWS

Short-course for May RAE

A short-course to prepare candidates for the May 1983 RAE has been arranged at the Arnold and Carlton College of Further Education in Nottingham.

The course, which is intended for students with some knowledge of the subject, is not really suitable for absolute beginners, will run for 13 weeks commencing on Thursday 24 February and the Course Tutor will be Alan Lake G4DVW.

Full details of enrolment etc. are available from: *The Arnold and Carlton CFE, Digby Avenue, Mapperley, Nottingham. Tel: (0602) 876503.*

Can Anyone Help?

A reader in the western area of Southampton, who is suffering from a progressive disease affecting the use of his hands, is looking for someone to help him in the rebuilding of a solid-state audio amplifier.

Anyone willing to assist please write to the Editor, who will pass your offer on. *Thank you.*

Repeater News

u.h.f.: It is understood from the RSGB-RWG that u.h.f. Phase 6 proposals, which have been awaiting clearance by the HO for 11 months (at November 1982) are now cleared, but operating frequencies are still to be considered by the appropriate inter-departmental committee. This secondary procedure has now been adopted as standard for all subsequent beacon and repeater proposals within shared bands.

A proposal has been received for repeaters in the Hendon district of London and Breckland in Norfolk—GB3AH on RB13.

The Hull u.h.f. repeater GB3HU is to be co-sited with the 144MHz repeater GB3HS, at the same time changing channel from RB10 to RB6.

v.h.f.: The final technical specifications for GB3SF, the Sheffield University based s.s.b. repeater project, are about to be submitted to the HO. *PW* hopes to feature a detailed report on this unique UK experimental device in the near future.

Food for Thought: Several would-be repeater groups now holding licences for 1·3GHz voice repeaters have failed to bring machines on-air. It would appear that aspiring groups in other locations are unable to obtain licences until the initial applicants have put their machines to the test. There is a danger that should the original licence holders not utilise the permission they have been granted, the licences will be withdrawn by the RSGB. This situation also applies to a number of long off-air 144MHz (2m) and 432MHz (70cm) repeaters in the London area.

The RSGB has moved

Since moving into their Doughty Street premises in 1968, the RSGB has finally outgrown those offices and moved to a new HQ in Potters Bar, Hertfordshire, some 15 miles to the north of Doughty Street.

The move to the new HQ, which provides some three to four times the floor space of 35 Doughty Street, and follows a good deal of searching and long, protracted negotiation, should have been completed by 8 November 1982.

Full details of the Society's new HQ and services are: *RSGB, Alma House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JW. Tel: (0707) 59015. Listen only to headline news service (0707) 59312. Members with news items for GB2RS, or the headline news service may now telephone into a dedicated answering machine which will be transcribed every day, (0707) 59260. The telex number remains unchanged, 25280.*

DXTV Newsletter

Cyril Willis of Ely, Cambridgeshire, intends producing a Newsletter specifically for the DXTV enthusiast.

The plan is to publish twelve issues a year, consisting of between four and eight A4 pages, which will contain DXTV news, logs, photographs etc., plus features on DXTV personalities.

For further details, by post, send an s.a.e. to: *Cyril Willis, 17 Main Street, Little Downham, Ely, Cambs. CB6 2ST. Tel: (0353) 87755.*

Gazetted Changes

We have yet to see a copy of it, but the *London Gazette* published, we believe, on 1 October 1982 the following revisions to the Amateur Class A and B licence conditions.

18·068 to 18·168MHz and 24·890 to 24·990MHz: Operation allowed on a non-interference secondary status. Primary use remains with fixed and land mobile services until they have been transferred to new frequencies, or until amateur primary status is achieved, which will not be later than 1 July 1989. Until then, and in the light of operating experience, the conditions of use may be altered, or the allocation withdrawn.

430 to 440MHz: The sub-band 431 to 432MHz will be allocated to p.m.r. in the London area. Although this sub-band has not been withdrawn *at present*, amateurs are asked *voluntarily* not to use it within 100km of central London. Amateur access to the complete 430 to 440MHz band is confirmed as being on a *secondary basis to all* other users.

2300 to 2450MHz: The sub-band 2300 to 2310MHz will be withdrawn and allocated for fixed (non-amateur) use. Beacons presently located in this sub-band may remain until 31 December 1983. This sub-band has also been withdrawn from amateur use in other European countries.

10·0 to 10·5GHz: Fixed and mobile services are to be introduced into the sub-band 10·25 to 10·40GHz as a result of the new Mercury microwave system. It is not being withdrawn from amateur use, but this may prove necessary if primary services suffer interference.

Above 40GHz: Four new bands have been allocated internationally as a result of WARC 79. Conditions for use will be the same as for the rest of the bands above 1GHz. The new bands are: 47·0 to 47·2GHz; 75·5 to 76·0GHz; 142 to 144GHz and 248 to 250GHz.

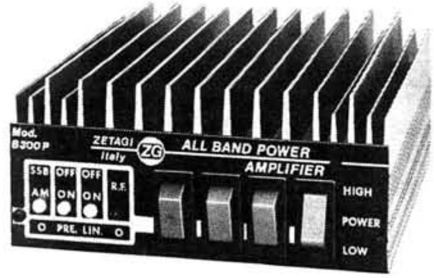
Acknowledgement is also made of the intention to issue 40 class A amateurs with *limited* experimental licences, to operate on a strict non-interference basis within the band 50 to 52MHz (conditions are as for 70MHz).

Our sources indicate that subject to this experimental phase being satisfactorily concluded and all interested parties being in agreement, a general allocation will be made to the UK amateur. This is unlikely to occur for at least two years and is subject to the final pronouncements by the HO in respect of the re-use of the vacated TV band. Now is the time to monitor and collect data about 50MHz—even if you are not able, at this time, to transmit, much valuable research data can be obtained. The RSGB have confirmed that the band *will* be available to class B licence holders.

www.americanradiohistory.com

PRODUCTION LINES

ALAN MARTIN G8ZPW



Want a Crunchproof Icom?

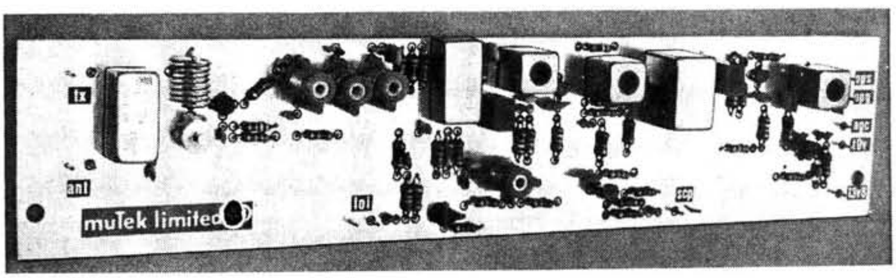
MuTek Ltd. announce a new addition to their range of products for the radio amateur. Entitled the RPCB251ub, it is a complete receiver front-end for the Icom IC-251 and IC-211 144MHz transceivers. The unit utilises advanced circuit design techniques to provide a combination of a low noise figure with superior dynamic performance.

A low-loss nitrogen filled relay replaces the lossy diode antenna switching used by Icom. This is followed by a very low noise r.f. amplifier with a gain dimensioned to set the overall noise figure to a level at which externally generated noise becomes the limit to receiver sensitivity.

Image filtering is provided by a high-performance Tchebyshev bandpass filter. A properly terminated diode-ring switching mixer is followed by a high dynamic range MOSFET amplifier using a combination of resistive and noiseless negative feedback techniques. This interfaces with a six-pole monolithic crystal filter which is followed by a MOSFET amplifier operating under a.g.c. control.

An input buffer for the local oscillator signal and an output buffer for an oscilloscope or spectrum analyser are also provided.

All the components are mounted on a high-quality plated-through-hole p.c.b. Complete step-by-step installation instructions are provided, whilst for those UK customers who do not wish to perform their own installation, a fitting service (at extra cost) has been negotiated. The all-inclusive price for the unit is £69·90 and is available, along with details of the installation service, from: *MuTek Ltd., Bradworthy, Holsworthy, Devon EX22 7TU. Tel: (0409 24) 543.*



Mobile Linear Amplifiers

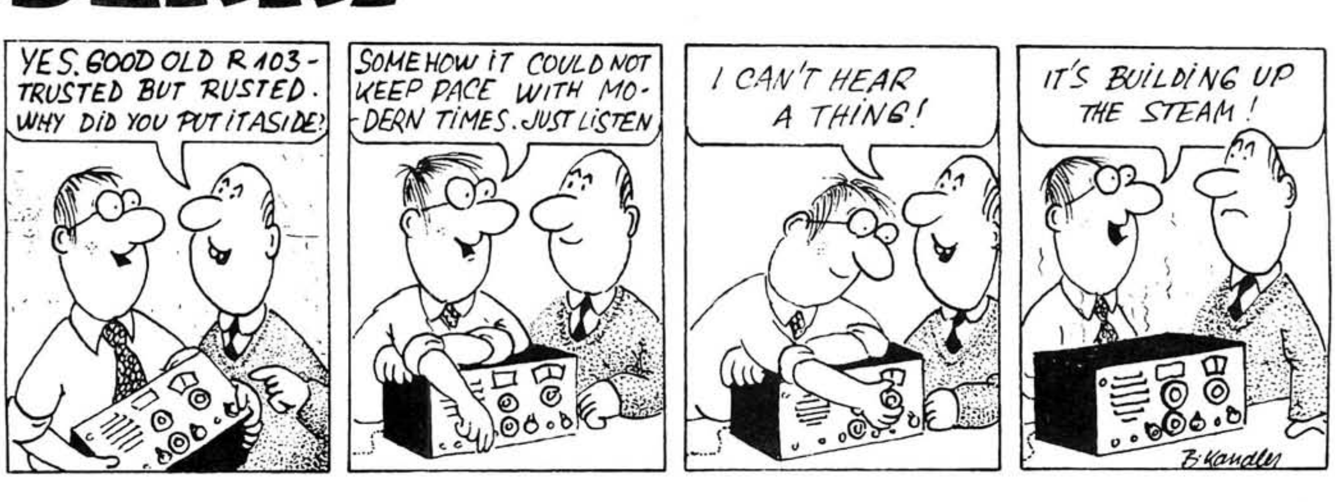
Telecomms, the exclusive UK distributors of Zetagi radio equipment, announce the availability of a new range of mobile linear amplifiers for the amateur radio market. The range comprises three linears, two specifically for the 144MHz band and a broadband linear amplifier for the h.f. bands.

First, the B40 VHF, a compact 30W mobile linear covering the 144MHz band, competitively priced at £32.07. Second, the B100 VHF, a high power version priced at £63.00. Finally, the B300 P, a very high power broadband h.f. linear amplifier, covering 3 to 30MHz with a power rating of 140 to 300W p.e.p. on s.s.b. Output power is switchable between high/low power positions and an input drive of approximately 20W p.e.p. is required to obtain the maximum power out. On receive the unit has a built-in broadband pre-amp with 25dB gain if required. The B300 P is priced at £119.00. All prices quoted include VAT but £2.00 p&p must be added.

All three units are available from: *Telecomms, 189 London Road, North End, Portsmouth. Tel: (0705) 662145.*

More on page 47

BENNY



www.americanradiohistory.com

Lee Electronics Ltd

LEE

SEASONS GREETINGS FROM NORMAN, G8TH5, AND STAFF.

SWR & POWER METERS

SWR15	Single meter SWR/FS 3.5-150MHz	£9.25
SWR25	Twin meter SWR/Power 3.5-150MHz	12.00
SWR150	Twin meter 3.5-150MHz Large black dials	15.81
SWRSC155	ATU + SWR to 30MHz	17.94
UH74	Single meter SWR/Power HF/2m/70cm	15.39
T-435	Twin meter 144/432MHz SWR/Power 5w/20w/120w	34.44
SWRVVV	2 metre only	29.95
	2 metre and 70 cms	45.00
TAL 172	150-172MHz marine/commercial	36.80
SWR 200B	Twin meter SWR/Power 3.5-150 Power range 200/2kw at 3.5-30MHz 2/30/200w at 144MHz	40.19

WELZ PROFESSIONAL POWER/SWR METERS & ACCESSORIES

SP200	1.8-160mHz 20w-200w-1kw power/SWR meter with aerial switch	59.95
SP300	1.8-500mHz 20w-200w-1kw power/SWR meter with 3 separate aerial sensors	79.95
SP400	130-500mHz 5w-20w-150w power/SWR meter	59.95
SP15M	1.8-160mHz 5w-20w-200w power/SWR meter – economy version	29.95
AC38	3.5-30mHz coax ATU. Ideal for modern SS tcvrs. 200cw/400c PEP	59.00
CT15A	50w dummy load (3:1 Tx/Rx ratio – 4 minds) 25w cont. PL259 plug	6.95
CT15N	15/50w dummy load 450mHz. N. Plug	11.95
CT150	150/400w dummy load 250mHz PL259	31.00
CT300	300/kw dummy load 250mHz PL259	43.00
CH20A	2 way coax switch. 1kw SO239	15.95
CH20N	2 way coax switch 1kw "N"	27.95
CT-03N	3w dummy load 1.3GHz "N"	24.95

MORSE KEYS

HK707	Straight up/down keyer	10.06
BK100	Semi-automatic bug	17.88
HK702	Up/down keyer on marble base	22.43
MK702	Manipulator	22.43
MK704	Squeeze paddle	10.00
MK705	Squeeze paddle on marble base	22.43
MK1024	Automatic memory keyer	120.00
EK150	Semi-Automatic keyer	74.75
EMK1A	Morse code practice oscillator	8.63

ADONIS MICS

803G	Compressor desk mic with 3 outputs, matches any equipment, uses electric mic (compression range 50.30, 10dB)	65.00
503G	Single output compressor desk mic (compression range 50 & 10dB)	43.94
202S	Mobile condenser mic with gear stick control box	23.00
202HD	Head-set mic on boom, ideal for mobile use	30.99
202FX	Mobile swan-neck amplified microphone	33.50

SHURE MICS

201	Hand ceramic omnidirectional high impedance	22.00
202	Hand ceramic noise reducing high impedance	24.70
401A	Hand-controlled magnetic high impedance	21.10
401B	Hand-cont. mag. low impedance (200 Ohm)	28.30
444D	Desk adjustable height controlled magnetic	40.80
526T MKII	Desk controlled response transistor preamp	57.60

YAESU CONVERTORS

FRV7700C	Converter 140-150, 150-160, 160-170MHz	65.95
FRV7700D	Converter 118-130, 140-150, 70-80MHz	72.45
FRV7700E	Converter FRA 7700 active aerial	36.80

STANDARD EQUIPMENT

C7800	70cm synthesised mobile 5 memories 1/10w	250.00
C58	2 mtr SSB/FM portable/mobile, 1 watt basic unit portable (or with power booster & mobile bracket 25 watts)	245.80
C78	70cm FM portable/mobile (with mobile mount bracket) 1 watt basic unit 10 watts with power booster)	229.10

NEW PRODUCTS!!!

C5800	Multimode FM/SSB Mobile 25 watt output 2 mtr	359.00 inc
C8900	2 mtr FM mobile trans. (slim line) units both	239.00
C7900	70cm FM mobile trans. (slim line) 10 watts	269.00

ACCESSORIES FOR C58/C78

CMB8	Mobile mount bracket for both models	20.50
CLC8	Carry Case	6.95
CPB78	Power booster for C78 10 watts	67.50
SR/C12/230/6	Mains charger unit	7.50
CPB58	25 watt booster for C58	79.50
AA size	A NiCads	1.15

TELECOMM ANTENNAS

TA301	Mobile 1/4 Wave 66-512MHz snap-in mount	3.99
TA309	Mobile 5/8 Wave 144-172MHz snap-in mount 3dB gain	9.95
TA144	Mobile 1/2 Wave 144-148MHz snap-in mount 3dB gain	8.50
TA550	Mobile 1/2 Wave 138-180MHz snap-in mount 3dB gain	14.66
TA330	Mobile 70cm co-linear 6dB snap-in mount	9.95
TA3MM	Magnetic mount with 5 mtrs coax PL259 fitted	9.75
TA309/MM	TA309 aerial and TA3MM Package	16.95
TA3	Solid gutter mount with 3/8 inch hole for all TA aerials	4.31
TAMSP	Folding Gutter mount, takes SO239 socket	7.50
TA3GC	Gutter clip for all TA aerials 5 mtrs coax and PL259	10.35
MASPRO	7/8 Wave	15.95

HELICALS 4 types available:–

BNC PL259, long and short threaded types to suit Icom, Standard, Trio etc.

TA 285D	6dB Base station co-linear 144-148MHz with radials	£29.95
TA 485D	6dB Base station co-linear 430-435MHz with radials	29.95
DPLC22	6.5dB mobile co-linear 144-146MHz	29.95
Araki	7/8 wave 6dB gain mobile co-linear	14.95
Araki	5/8 mobile/base station with radials	19.95

COAX CABLE

RG58	50 ohm multiwire Centre – price per metre	0.25
UR 67/213	50 ohm solid centre – low loss, price per metre	0.65

COAX (RELAYS)

(DC – 500mHz, 12v DC)

CX120A	Direct solder connection	9.75
CM230	DC – 500MHz fitted with 3 × BNC sockets	19.95
CX600N	DC – 1GHz 3 × 'N' type sockets	24.95

COAX SWITCHES

CT1	Toggle 2-in – 1-out 3 × SO239	6.84
CT2	Toggle 2-in – 1-out 2 × SO2391 × PL259	6.84
TS120	Coax slide 2-in – 1-out 3 × SO239	6.61
SA450	Diecast box 3.5-500MHz 3 × SO239	9.77

DUMMY LOADS

DL30	30w DC – 150MHz with PL259 connector	6.84
T100	100w DC 500MHz with SO239 connector	20.12
T200	200w DC 500MHz with SO239 connector	31.62

BEARCAT SCANNING RECEIVERS

BC-100	16 channels (handheld)	253.00
BC-150 FB	10 channels	129.95
BC-220 FB	20 channels	198.95
BC-250 FB	50 channels	218.50
BC-24	THINSCAN. 2 Band 4 Channel (handheld)	79.35
BC-46	THINSCAN. 4 Band 6 Channel (handheld)	96.60

ACCESSORIES FOR IC2E

ICBP3	Standard 9 Volt pack	20.00
ICBP2	7.2 volt high capacity	29.50
ICBP4	Empty case, will take 6 × 'AA' NiCads	6.95
ICBP5	11 volt pack for 2.5 watts output	39.50
ICDC1	9 volt regulator pack	9.75
ICBP1	Car charger lead with cigar plug	3.20
ICBP25	Charger as supplied for BP3	4.25
ICBP30	Desk type fast charger for all packs	39.00
ICML1	10 watt mobile booster	59.00
LC1/2/3	Cases	4.25
HM9	Speaker/Microphone	12.00
IC30L	10 watt linear for IC-402	59.00
ICSM2	Desk Mic + Preamp 4 pin plug	29.00
ICSM5	Desk Mic + Preamp 8 pin plug	29.00
ICHM3	Hand Mic 215/202/402/240/211/701	12.00
ICHM10	Scan Mic 255/260/451	20.00

MICROWAVE MODULES

LINEAR AMPLIFIERS		Incl. Vat Rate	Post
MML28/100-S	10m 100 watt linear/preamp, switchable	129.95	C
MML70/40	4m 40 watt linear/preamp	77.00	B
MML70/100-S	4m 100 watt linear/preamp, switchable	139.95	C
MML144/30-LS	2m 30 watt linear/preamp, switchable	69.95	B
MML144/40	2m 40 watt linear/preamp	77.00	B
MML144/100-S	2m 100 watt linear/preamp, switchable	139.95	C
MML144/100-LS	2m 100 watt (1 or 3w i/p) switchable	159.95	C
MML432/20	70cm 20 watt linear/preamp	85.00	B
MML432/50	70cm 50 watt linear/preamp	109.95	C
MML432/100	70cm 100 watt linear	228.65	D
MML1296/10	23cm 10 watt linear	199.00	B
AMATEUR TELEVISION PRODUCTS			
MMC435/51	70cm ATV converter, VHF output	37.90	A
MMC435/600	70cm ATV converter, UHF output	27.90	A
MTV435	70cm ATV 20 watt transmitter	149.00	B
MICROPROCESSOR CONTROLLED PRODUCTS			
MM1000	ASC11 to Morse converter	69.95	B
MM1000KB	ASC11 to morse converter with keyboard	99.95	C
MM2001	RTTY to TV converter	189.00	B
MM4000	RTTY transceiver	269.00	B
MM4000KB	RTTY transceiver with keyboard	299.00	D
MMS1	The MORSETALKER – Speaking morse tutor	115.00	B
MMS2	Advanced Morse Trainer	169.00	B
TRANSVERTERS			
MMT28/144	10m linear transverter, 2m input	109.95	B
MMT70/28	4m linear transverter, 10m input	119.95	B
MMT70/144	4m linear transverter, 2m input	119.95	B
MMT144/28	2m linear transverter, 10m input	109.95	B
MMT432/28-S	70cm linear transverter, 10m input	159.95	B
MMT432/144-R	70cm linear transverter, 2m input	184.00	B
MMT1296/144	23cm linear transverter, 2m input	184.00	C
RECEIVE CONVERTERS			
MMC27/mw	27MHz to medium wave converter	19.95	A
MMC28/144	10m to 2m up converter	29.90	A
MMC50/28	6m to 10m down converter	29.90	A
MMC70/28	4m to 10m down converter	29.90	A
MMC70/28LO	4m to 10m down converter with LO output	32.90	A
MMC144/28	2m to 10m down converter	29.90	A
MMC144/28LO	2m to 10m down converter with LO output	32.90	A
MMC432/28-S	70cm to 10m down converter	£37.90	A
MMC432/144-S	70cm to 2m down converter	37.90	A
MMC1296/28	23cm to 10m down converter	34.90	A
MMK1691/137.5	169MHz METEOSAT converter	129.95	B
MMK1296/144	23cm to 2m down converter	69.95	A
RECEIVE PREAMPS			
MMA28	10m low noise preamp	16.95	A
MMA144V	2m RF switched low noise preamp	34.90	A
MMA1296	23cm low noise preamp	34.90	A
FREQUENCY COUNTER			
MMD050/500	500MHz digital frequency meter	75.00	A
MMD600P	600MHz + 10 prescaler	29.90	A
MMDP1	Frequency counter amplifier/probe	14.90	A
FILTERS			
MMF144	2m bandpass filter, 40 watts max.	11.90	A
MMF432	70cm bandpass filter, 40 watts max.	11.90	A
VARIOUS			
MMV1296	70cm to 23cm varactor tripler	34.50	A
MMS384	384MHz frequency source	29.90	A
MMR15/10	15dB, 10 watt attenuator	11.90	A

POSTAGE/PACKING CHARGES: 'A' – £1, 'B' – £2.50, 'C' – £3.00, 'D' – £4.00.

All units are fully guaranteed for 12 months by Microwave Modules — Including PA transistors.

POWER SUPPLIES (FULLY STABILIZED & PROTECTED)

PM 103	12/9/7.5/6/4.5/3V 500 MA	14.38
PX 402	13.8V 3 amps Nom 4 amps Max	21.79
PH 5000	13.8V 5 amps Nom 7 amps Max	45.94
NC 10	Ni-Cad Charger charges 10AA size batteries	6.32
NC 4	Ni-Cad Charger charges 4AA size batteries	5.17
EP 3010	Adjustable 10-16V 25 amp continuous	126.00

DATONG

PC1	General Cov. Converter adds 50kHz to 30mHz to 2m all mode tcvrs.	120.75
VLF	Very low frequency converter adds VLF coverage to receiver with 28-29mHz coverage	25.30
FL1	Frequency agile audio filter	67.85
FL2	Multi-mode audio filter	89.70
ASP/B	Automatic r.f. speech clipper wired for Trio	79.35
ASP/A	Automatic r.f. speech clipper – wired for Yaesu	79.35
D75	Manually controlled r.f. speech clipper	56.35
D70	Morse Tutor. Go anywhere – self contained unit	49.45
MK	Keyboard morse sender. Completely self-contained unit	129.00
RFA	RF switched broad band pre-amplifier 30-200mHz	29.30
AD270	Active dipole receiving/antenna system for indoor mounting	37.95
AD370	Active dipole receiving antenna system for outdoor mounting	51.75
AD270	Head unit only	17.83
AD370	Head unit (including 8m cable & 2 steel whip ant. elements)	37.95
DATEST 1	Aut. tester & identifier for transistors & op. amps	56.35
DATEST 2	Aut. in-circuit tester for transistors FETS. SCR & TRIACS	51.75
MPU	Mains power unit built into fused 13a. mains plug	6.90
MPU/1	As MPU but no internal fuse & fitted with 40cm mains lead	6.90
DC144/28	2 metre converter complet cased	35.65

NEW: Codecall selective calling device. Self contained unit connects to speaker socket. Allow silent standby operation.

Codecall 'A'	4000 link programmable codes	27.60
Codecall 'B'	4000 switch programmable codes	29.30

NEW: Doppler direction finder for use with existing narrow band FM Receivers and transceivers.

Basic system DF	143.00
DF System	150.00
Complete mobile DF system	199.00

CDE ROTATORS

AR-22XL	Low cost Amateur Rotator	56.35
AR-30	Light duty Rotator	51.75
AR-40	For average Antennas	65.55
CD-45	Medium duty	113.85
HAM-4	For amateur Beams	189.75
BT-1	BIG TALK medium duty	91.42
T2-X	TAIL TWISTER, heavy duty	270.25

G-WHIP MOBILE ANTENNAS

TRIBANDER	Helical whip for 10/15/20	25.87
	LF 40/80/160 coils for above (price each)	6.55
	LF telescopic whip for Tribander	4.25
MULTIMOBILE	Self-select for 10/15/20	30.47
	MM 40/80/160 coils for above (price each)	6.55
	MM Telescopic whip for Multimobile	4.25
FLEXIWHIP	Basic 10m antenna with loaded mast/whip	18.11
	Coils for 15/20/40/80/160m (price each)	6.55
Base Mount	Single hole fixing type with 3m coax	5.75
Base Mount	Chrome Ball, swivel type	6.32
Base Mount	With heavy duty spring	10.95
BUMPER STRAP FOR ABOVE		7.50

THIS IS ONLY A SHORT LIST.
S.A.E. FOR DETAILS OF OTHER EQUIPMENT

400 EDGWARE ROAD
LONDON W2
01-723 5521 Tlx: 298765

Normal Postal Delivery 5 Days

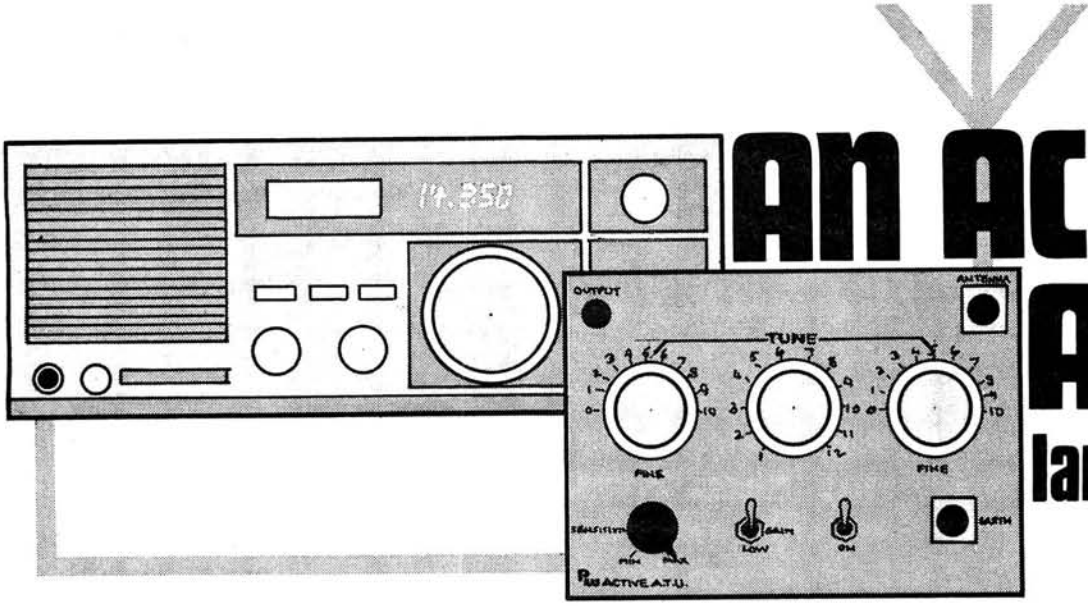
BARCLAYCARD VISA

INSTANT H.P. (with Bank Card) & P/EX. WELCOME

Send 25p for full details of our range.

OPENING TIMES:
9.30am-5.30pm Mon, Tues, Wed, Fri.
9.30am-1pm Thurs.
10am-4.30pm Sat.

www.americanradiohistory.com



AN ACTIVE A.T.U.

Ian Hickman

The unit described in this article is suitable for use over the approximate frequency range of 750kHz–25MHz, i.e. the greater part of both Medium and Short wavebands. A conventional antenna tuning unit (a.t.u.) enables almost any antenna, long or short, to be matched to a receiver, ensuring maximum transfer of r.f. energy from the antenna to the receiver's input stage.

An a.t.u. also supplies a modest amount of additional selectivity, helping to reduce cross modulation, intermodulation and blocking effects. However, effective matching and extra selectivity imply a compromise: an improvement in one resulting in less of the other and vice versa. The author therefore experimented by introducing a gain stage in the form of a broadband amplifier into the a.t.u.

Design Considerations

The basic amplifier circuit used is shown in Fig. 1 and is based on a design developed by RCA, using one of their uncommitted transistor arrays. Its performance is impressive—a gain of 49dB (about ×280) and a 3dB bandwidth of 30MHz! Run from a 9V battery it consumes a modest 4·5mA and has a maximum output swing of a little over 5V peak to peak, or roughly 2V r.m.s. With so much gain available it is possible to couple it fairly lightly to the tuned circuit of the a.t.u., enabling the latter to run at a higher working *Q* and providing more selectivity than would normally be obtained. Indeed, as the amplifier can only accept inputs of up to about 2V/280 (7mV r.m.s.), fairly light coupling is a must to prevent overloading with the consequent possibility of cross modulation, intermodulation, etc.

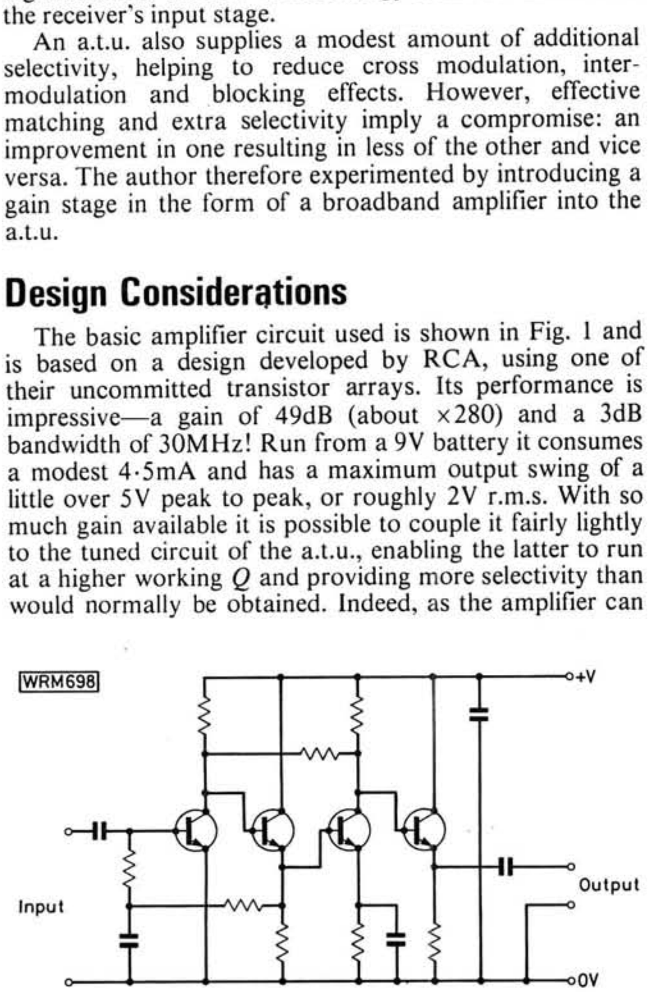


Fig. 1: Basic wideband gain-block

Besides being a useful add-on device for any receiver fitted with terminals for the attachment of an external antenna and earth, the Active a.t.u. was particularly designed to boost the sensitivity of a beginners' s.w. regenerative receiver. As this simple form of radio relies on the judicious application of reaction to obtain its selectivity, it is no good preceding it with so much gain that no reaction at all is required! A logarithmic potentiometer was therefore included at the output of the a.t.u., enabling its gain to be varied smoothly for maximum right down to zero. The coupling from the a.t.u. to the broadband amplifier is provided by a switched capacitive divider, which applies either a tenth (HI GAIN) or a hundredth (LO GAIN) of the signal voltage across C2 to the amplifier's input. The switching arrangement minimises any detuning of the a.t.u. controls when switching between HI and LO gain positions.

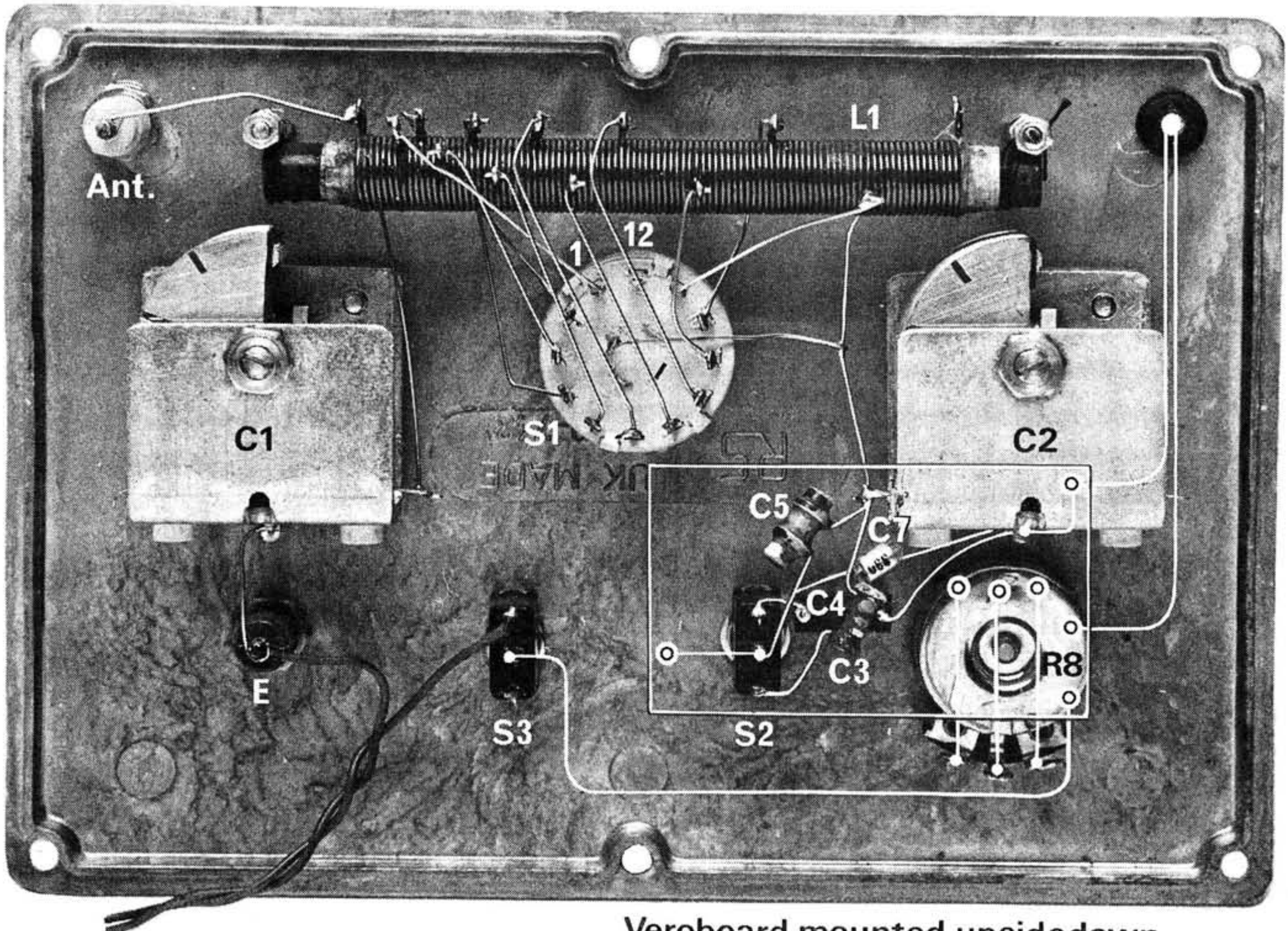
CONSTRUCTION RATING — **Beginner**

BUYING GUIDE

All components for this project are available from regular advertisers within PW

APPROXIMATE COST — **£10.50**

www.americanradiohistory.com



Veroboard mounted upsidedown

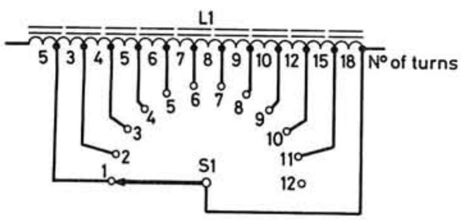


Fig. 2: (above) Details of inductor L1 and its selector switch

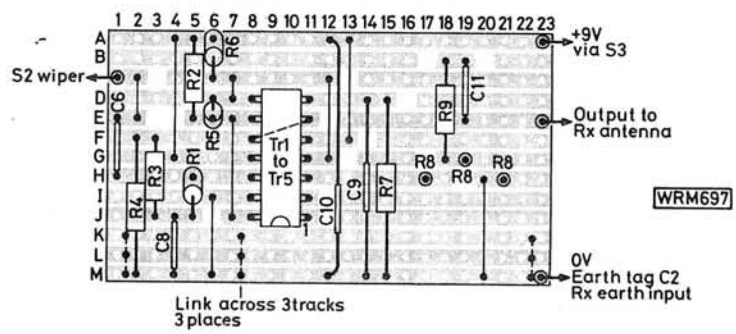
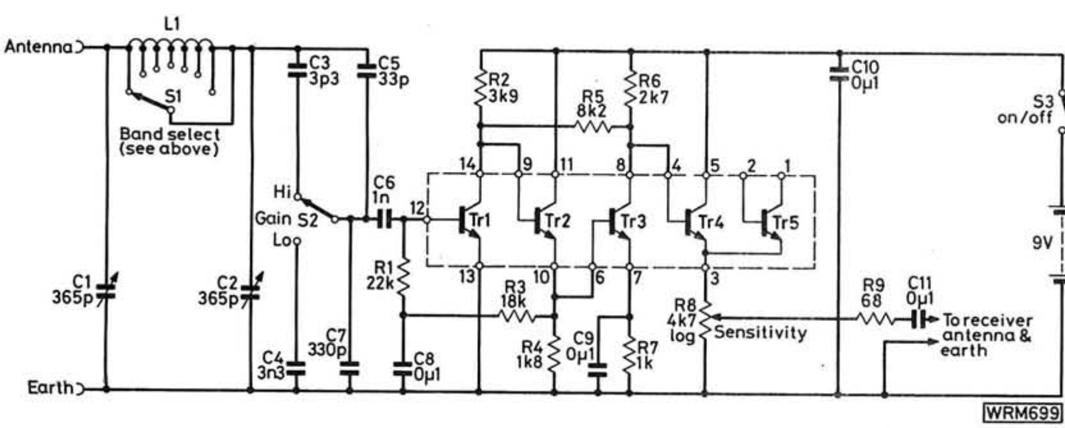


Fig. 4: Full-size layout details of the components of the a.t.u. The photograph shows the outline position of the Veroboard

Fig. 3: (below) The complete circuit diagram of the active a.t.u.



www.americanradiohistory.com

★ components

Resistors

¼W 5% Carbon Film

68Ω	1	R9	3·9kΩ	1	R2
1kΩ	1	R7	8·2kΩ	1	R5
1·8kΩ	1	R4	18kΩ	1	R3
2·7kΩ	1	R6	22kΩ	1	R1

Potentiometer ¼in shaft

4·7kΩ*(Log)* 1 R8

Capacitors

Disc Ceramic

3·3pF	1	C3	1nF	1	C6
33pF	1	C5	3·3nF	1	C4
330pF	1	C7	0·1μF	4	C8–11

Air-spaced variable

365pF 2 C1, 2

Semiconductors

CA 3046 (see text) 1 Tr 1–4

Miscellaneous

Rotary switch 1p12w (1); s.p.d.t. miniature toggle switch (1); s.p.s.t. miniature toggle switch (1); diecast aluminium box 171 × 121 × 106mm; 4mm round insulated sockets, yellow (1), green (1) with plugs; pointer knobs large (3), small (1); 0·1in Veroboard; battery terminals; Ferrite rod 8mm dia × 115mm.

Construction

The complete circuit diagram of the Active a.t.u. is shown in Fig. 3. Semiconductors Tr1 to 4 comprise four of the five transistors in the CA 3046 uncommitted transistor array. The unused fifth transistor is simply left unconnected. The CA 3045 and CA 3086 are other similar devices which could equally well be used; they all have exactly the same pin connections and more or less identical performances. Capacitor C6 was included as a d.c. block during development and testing of the amplifier alone. In the complete unit, the input is d.c. blocked by the capacitive divider associated with S2 anyway, so if desired C6 may be replaced by a wire link.

Figure 4 shows the track cutting details for the Veroboard and the associated component placement. A sleeved link on the back of the board connects pins 6 and 10 together. It is very important to note that some unused tracks are earthed, as indicated, and others are cut in two places. Unearthed, unused, tracks running right across the board would provide a capacitively coupled feedback path between the amplifier's input and output resulting in oscillation. With the track cutting and earthing arrangements shown the amplifier is completely stable under all conditions.

The Veroboard mounted amplifier is so light in weight that it was mounted onto R8 and S2 by short lengths of stiff wire; the photograph shows the general arrangement. Note the two earth connections from the board to C2.

Inductor L1 was wound on a 115mm length of 8mm diameter ferrite rod; the precise dimensions are not critical. However, there is no point in having the ferrite much longer than the winding as its purpose is simply to enable sufficient inductance to be obtained in a small volume. An earlier air wound coil provided insufficient inductance for tuning below about 3MHz. The ferrite rod does not of course pick up any signal, being enclosed in a screened diecast box.

The coil is wound over five turns of paper to space it off the rod; this construction reduces its self-capacitance and increases its *Q*. Ordinary paper may in time pick up damp and is therefore not recommended. Mounting tissue obtainable from any good photographic chemist would be ideal, as running a warm iron along it causes it to stick to itself and it will not pick up moisture. The author used greaseproof paper from the kitchen, being more readily available, the last turn being secured with a smear of beeswax. The wire should be self-fluxing 22 s.w.g. copper, the ends of the winding being held in place with a binding of cotton secured with more beeswax. Every so many turns a lug is formed in the wire to provide tappings, in accordance with the details shown in Fig. 2.

A 25W soldering iron is best for tinning the taps, as a small iron will take a very long time and may never make it at all. When completed, L1 is lashed to long 6BA screws behind the front panel and connected to S1, C1 and C2 as shown in the circuit diagram.

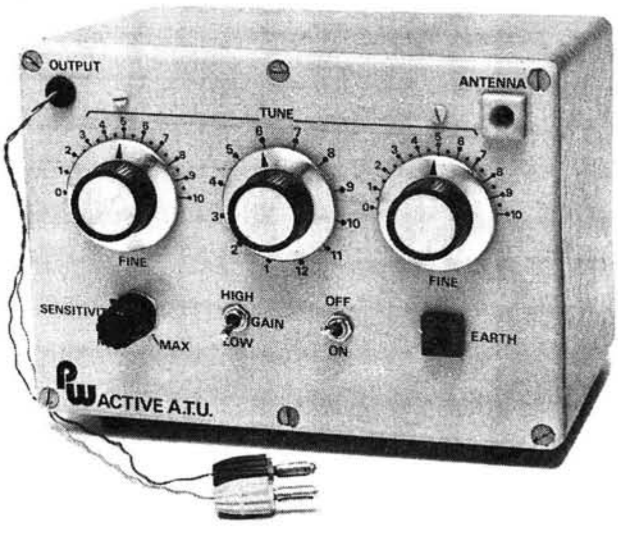
When construction is completed, connect a 9V battery—the author used a PP9, which fitted neatly into the box with a tin-plate retaining strap. The unit is almost ready for use. All that remains is to finish the box and panel and label the switches etc. as in the diagram. Simple numbered scales should be fitted to all rotary controls, so that the best settings can be recorded for each portion of the s.w. bands to be used.

Using the Active ATU

Connect the antenna and earth to the a.t.u. and the output to the receiver. A good earth is important, and for most purposes picking up the ring main earth via a 13 A plug top is adequate, although in some cases this may couple mains-borne interference into the a.t.u., in which case a separate earth should be used.

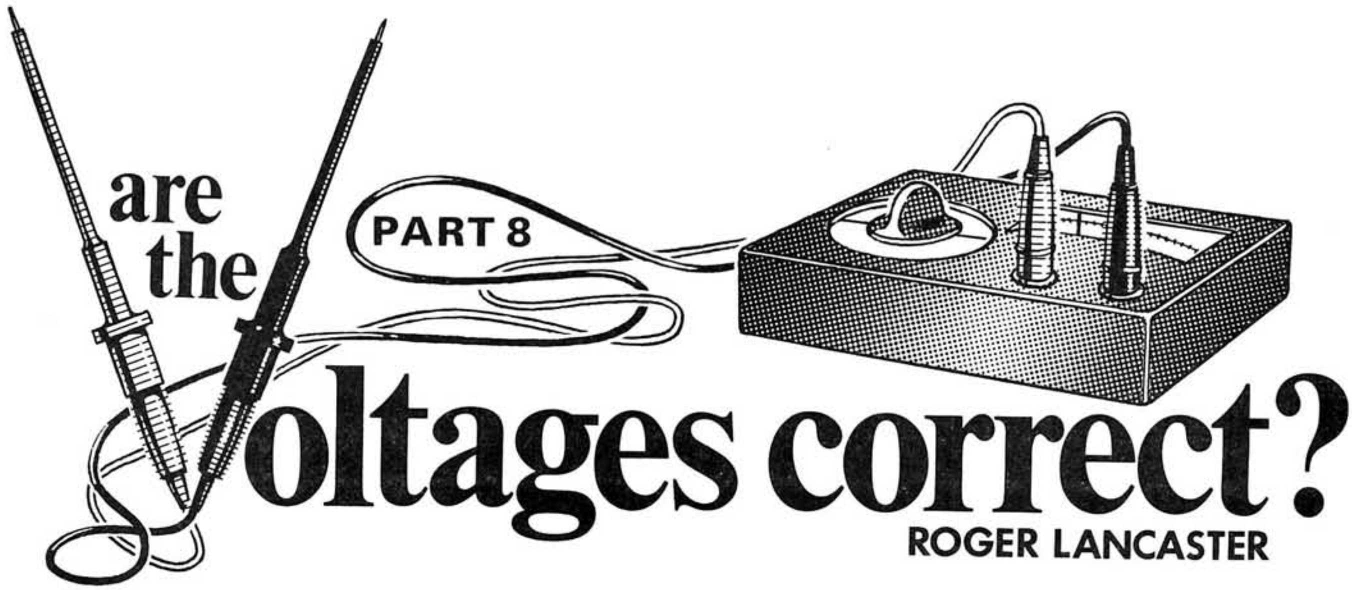
No detailed guidance can be given for the settings of the rotary controls as they will depend both on the receiver used and the antenna. However, as a general guide, C1, C2 and S1 will need to be moved progressively more anticlockwise as the frequency of reception rises.

With GAIN at HI and R8 about halfway an increase in background noise, usually accompanied by a station or two, will be heard for some setting of C1 and C2. The gain will be increased by improving the matching. This is done by rotating C1 slightly clockwise until the output falls and



continued on page 46▸▸▸

www.americanradiohistory.com



are the Voltages correct?

PART 8

ROGER LANCASTER

Solutions to last month's problem: The circuit is reproduced here in Fig. 8.1: Taking each transistor in turn, we find its immediate known power supply voltage and then calculate its base, emitter and collector voltages, in that order.

Transistor Tr1 base voltage is derived from the potential divider R1/R2, between the known potential of +3·25V and earth.

$V_{b1} = \frac{5\cdot6}{15\cdot6} \times 3\cdot25 = +\mathbf{1\cdot17V}$ (neglecting base current)

Transistor Tr1 is therefore conducting as we would expect, since 1·17V would be its open-circuit base-emitter voltage. When it conducts, we assume 0·6V across its base/emitter junction, leaving an emitter potential of:

$V_{e1} = +1\cdot17 - 0\cdot6 = +\mathbf{0\cdot57V}$

Emitter current is therefore

$\frac{V_{R3}}{R3} - \frac{0\cdot57}{2\cdot2} = 260\mu A$

Assuming all of this is collector current also, 260μA flows through T2, R4 and T3 to the +3·25V point. The only voltage dropped will be across R4 and this will be:

$V_{R4} = I_c \times R_4 = 0\cdot26mA \times 0\cdot1k\Omega = 0\cdot026V$

Thus the collector potential will be:

$V_{c1} = +3\cdot25 - 0\cdot026 = +3\cdot224V$

The meter would not be accurate enough to enable a reading of the 0·004V, so we say $V_{c1} = +\mathbf{3\cdot22V}$.

Transistor Tr2 supply rail is +3·35V and its base potential divider is R5/R6. So:

$V_{b2} = \frac{12}{45} \times 3\cdot35 = +\mathbf{0\cdot9V}$

$V_{e2} = 0\cdot9 - 0\cdot6 = +\mathbf{0\cdot3V}$

We don't need to bother about currents here, because there is no resistance between collector and +3·35V, so $V_{c2} = +\mathbf{3\cdot35V}$.

Transistor Tr3 base is at the same potential as Tr2 base, because there is no resistance in T4. So: $V_{b3} = +\mathbf{0\cdot9V}$, $V_{e3} = +\mathbf{0\cdot3V}$ and $V_{c3} = +\mathbf{3\cdot35V}$ by the same reasoning as for Tr2.

Transistor Tr4 is an audio amplifier like the one dealt with in Part 6 of this series.

$V_{b4} = \frac{15}{42} \times 3\cdot35 = +\mathbf{1\cdot2V}$

$V_{e4} = +1\cdot2 - 0\cdot6 = +\mathbf{0\cdot6V}$

$I_{e4} = \frac{0\cdot6}{1} = 0\cdot6mA$

$V_{R13} = 0\cdot6 \times 1\cdot8 = 1\cdot08V$

$V_{c4} = +3\cdot35 - 1\cdot08 = +\mathbf{2\cdot27V}$

Transistor Tr5 is similar but with no resistance in the collector line.

$V_{b5} = \frac{15}{37} \times 3\cdot35 = +\mathbf{1\cdot36V}$

$V_{e5} = +1\cdot36 - 0\cdot6 = +\mathbf{0\cdot76V}$

$V_{c5} = +\mathbf{3\cdot35V}$

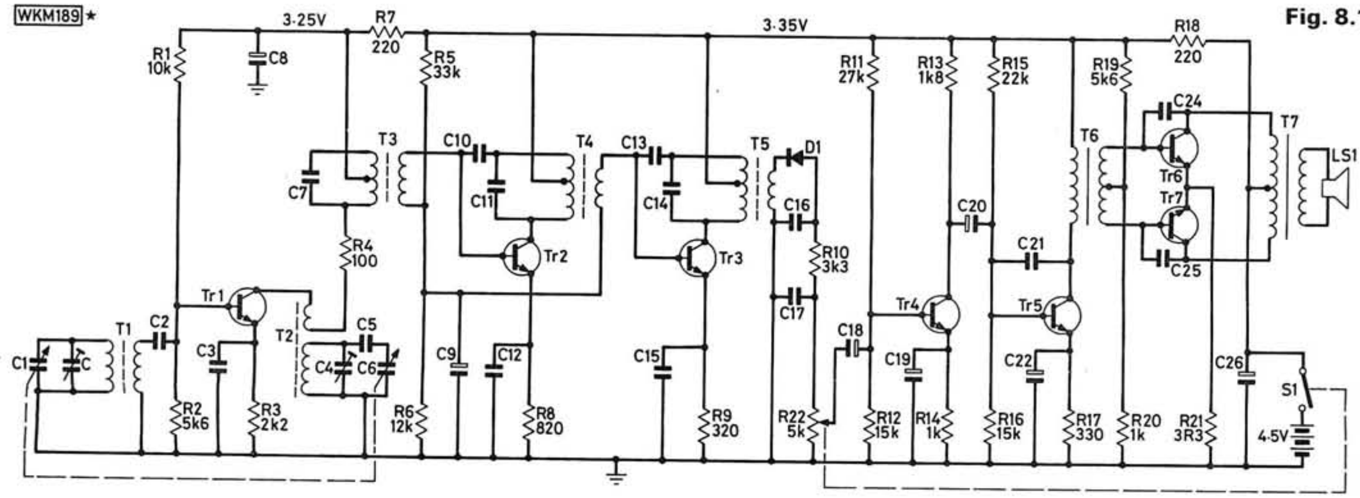


Fig. 8.1

www.americanradiohistory.com

Transistors Tr6 and Tr7 voltages will be identical under no-signal conditions, since there is no resistance in T6 or T7 and the emitters are joined together.

$$V_{b6} = V_{b7} = \frac{1}{6\cdot6} \times 3\cdot35 = +\mathbf{0\cdot5V}$$

This is the open-circuit voltage for the base-emitter junctions, so there cannot be **more** than 0·5V across these junctions. There cannot be much **less** than 0·5V across them either, or they would not conduct. If they do not conduct, the open-circuit voltage of 0·5V will exist across them. So whichever way we look at it, assuming conduction or non-conduction, the emitter potentials will be around **0V**, which means negligible current through R21 and therefore Tr6 and Tr7 are barely conducting, if at all. However, the slightest positive movement in a base potential by a signal voltage will make the corresponding transistor conduct. Collector voltages are both **+4·5V** because there is no voltage dropped across Tr7.

We have ignored base currents, so the voltages measured may differ slightly from those estimated.

The other question posed was: Why is 1·15V dropped across R18 and only 0·1V across R7? The only possible answer is that there is much more current flowing through R18 than through R7 (Ohm's Law: V = IR). This should be evident from the circuit. The only currents flowing through R7 are the collector current of Tr1 and the current through R1 and R2, whereas the current through R18 consists of the current through R7 **plus** the collector currents of Tr2–Tr5 **plus** the currents through potential dividers R5/R6, R11/R12 and R15/16.

In practice, of course, things are never as easy. For example, in a manufacturer's circuit diagram, the +3·35V and +3·25V points would probably not be quoted. We should see that current must flow through both R7 and R18, so these points must be less than +4·5V, but there is no easy way of estimating them. The only thing we can sensibly do is to measure them and, **provided they appear reasonable,** assume they are correct and proceed as before. We could guess at transistor currents and gains, but this would not be of much help. However, once we have established what these potentials actually are, even if they are not strictly as they should be, the voltage estimating procedure should work effectively. Then, when any fault has been located and rectified, these points can be re-measured if required.

"But what **is** reasonable?" I hear you ask.

Well, transistors Tr1–5 inclusive are linear amplifiers (class A) so they should always be conducting, all their base potentials being somewhat greater than +0·6V. Suppose we measured +1·5V at the junction of R7 and R18 instead of +3·35V. The base potential of Tr2 would work out to $\frac{12}{45} \times 1\cdot5 = +0\cdot4V$. This means that Tr2 could not conduct and this would be unreasonable, so the +1·5V is identified as an incorrect voltage and a first clue towards finding the fault. If the voltage measured at the same point was +4·5V, this would also be unreasonable, because it would mean no current flow through R18 to most of the circuit (e.g. a wiring break immediately to the left, circuit-wise, of R18). If the voltage measured was +3·8V this would be incorrect but we would have no way of knowing it. Nevertheless, we can use the known +3·8V in our voltage estimations and this should lead us ultimately to the fault. After repair of the fault we would find the voltage restored to +3·35V and all the other voltages in the circuit would re-adjust to their correct values.

Another snag that might arise is that you may not be able to reach a particular transistor connection with your meter prod, many printed circuit boards being very densely packed with components having very short leads. Don't give up too easily. Suppose you cannot place your prod on the base of Tr3 in Fig. 8.1. Perhaps instead you could reach the side of C13 which is not at +3·35V, or either end of T4 secondary, or T3 secondary, or the non-earthy end of R6, or the end of R5 which is not at +3·35V, or the positive plate of C9, or the side of C10 which is not at +3·35V: all these are points of access to the same d.c. potential.

The worst snag of all could be that you haven't got a circuit diagram of the equipment. This is a severe handicap to the methodical fault-finder. If you cannot lay your hands on a circuit you will have to draw it yourself by careful observation of the wiring connections. Go to each transistor in turn and trace the circuit from each electrode to the power supply rail, to earth and to the other transistor stages. Sketch in each component and all connections to it. Have an ohmmeter handy to verify connections, and it helps if you can hold up the p.c.b. so that light passes through it to reveal the connections on the side of

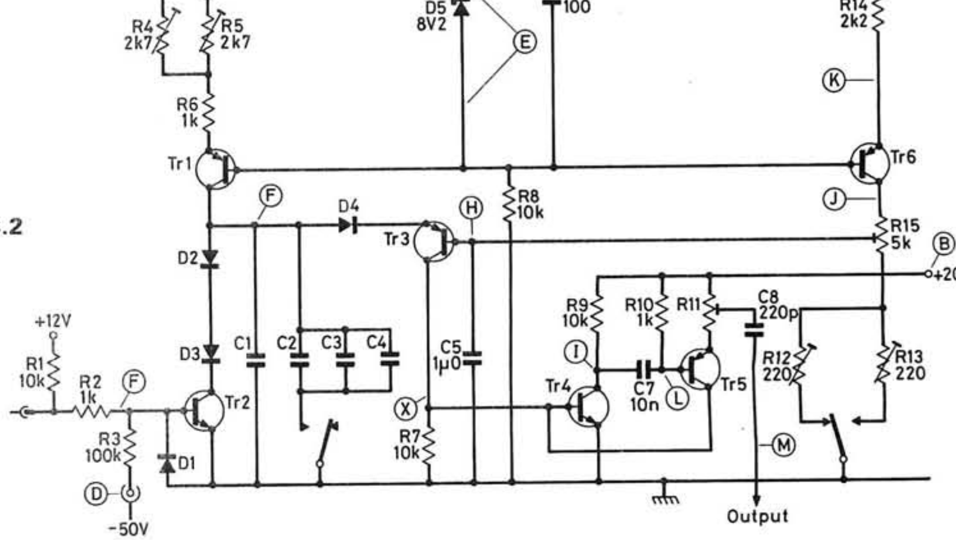


Fig. 8.2

www.americanradiohistory.com

the board opposite to the components. Then check to see that all components on the board are included in your sketch. When you are sure you haven't missed out any component or connection, you will have before you something which looks like a road map of Greater London. Re-draw it more clearly, using a more familiar orientation, and then you can begin the real work.

You will need time and patience to do this, but you will probably be surprised to find that it takes less time than you thought it would. Of course, if by careful observation of the fault symptoms, you can narrow the area of the fault down to a particular stage or stages, then you need only construct that part of the circuit. If you do go to all this trouble, don't throw away the circuit after you have remedied the fault, but file it for possible future reference.

Some faults will not be shown up in the voltage readings, it must be remembered. Short-circuits associated with r.f. or i.f. tuned circuits, faults in the signal demodulator D1 and associated components and non-oscillation of the local oscillator will probably not reveal themselves in these readings. You will need to use signal tracing and/or signal generating techniques to track down such faults. If you have these facilities, however, you would be well advised to use them first anyway, to localise the fault to a particular stage before estimating and checking the voltages around the fault circuit.

We have now dealt with a complete and familiar circuit. But suppose we are faced with a total "foreigner"—the radar set on Daddy's yacht for example! Even with no knowledge of how the circuit works, we can still use the techniques described in this series to check the voltages.

Fig. 8.2 is the circuit of the variable range marker of a radar set (Marconi "Raymarc"). A radar engineer would localise the fault to one stage by oscilloscope measurements, then use his voltmeter. With no oscilloscope and in complete ignorance of how the circuit works, we shall have to estimate the voltages of the whole circuit and verify them by measurement.

First we would eliminate "signals", e.g. by disabling the transmitter of the radar, leaving the circuit in its resting, or quiescent, condition. We will set all variable resistors to their mid-positions.

Zener diode D5 is conducting in its reverse biased mode, since its cathode is at +50V and its anode is returned to earth via R8. The base currents of Tr1 and Tr6 will not contribute much to any voltage across R8 so the Zener's open-circuit voltage would be high and the device will therefore Zener at 8·2V. Thus, the bases of Tr1 and Tr6 will be at +50 – 8·2 = **+41·8V**. Since they are *pnp* types with bases negative with respect to emitters (open-circuit voltages of 8·2V forward bias) they will conduct, resulting in their emitters being 0·6V more positive than their bases, i.e. +41·8 + 0·6 = **+42·4V.** The paths for their collector currents look obscure at this stage so we will leave their collector potentials for the moment.

The base potential of Tr2 is derived from potential divider R1/R2/R3 between +12V and –50V. The open-circuit base potential would therefore be derived as follows:

$$V_{R3} = \frac{100}{111} \times 62 = 56V$$

Therefore, potential at base (open-circuit) =

$-50 + 56 = +6V$

The emitter of Tr2 is earthed, so Tr2, being an *npn* type, is forward biased. There is no emitter resistor to limit this forward bias, however, as we have been used to seeing, so Tr2 will be conducting very heavily, as an "on" switch, hence its b–e potential will be about 0·8V and its c–e potential around the minimum of 0·1V (see Part 6). So Tr2's emitter will be **0V**, its base **+0·8V** and its collector **+0·1V.**

Transistor Tr2 c–e is therefore a virtual short-circuit and Tr1 collector current will flow through it and through diodes D2 and D3, developing 0·8V across each of the latter, since they are forward biased. So the potential at Tr1 collector is 0 + 0·1 + 0·8 + 0·8 = **+1·7V.**

Transistor Tr6 collector current flows through a fairly large resistor, R15, developing a voltage across it. The slider of R15, then, is certain to be more positive than the +1·7V at Tr1 collector. This means that Tr3 (*pnp*) is reverse biased and will not conduct, and neither will D4. Transistor Tr3 emitter is therefore **0V** (floating).

We have now discovered that there is nothing complex about Tr6 collector line—it is a resistance of

$R_x = R15 + \frac{1}{2}R12 = 5 + 0{\cdot}11 = 5{\cdot}11k\Omega$

Transistor Tr6 emitter current is

$$\frac{50 - 42{\cdot}4}{2{\cdot}2} = \frac{7{\cdot}6}{2{\cdot}2} = 3{\cdot}45mA$$

Therefore, $V_{Rx} = 3{\cdot}45 \times 5{\cdot}11 = 17{\cdot}6V$, so Tr6 collector is at **+17·6V** and Tr3 base is at approximately half this, i.e. +8·8V (slider of R15 at mid-position).

Transistor Tr5 base and emitter are both returned to the same potential, i.e. +20V, so it has no forward bias and does not conduct. No current will flow in R10 or R11, so both base and emitter will be at **+20V.**

No current flows through R7 because both Tr3 and Tr5 are non-conducting. So the top end of R7 is at 0V, and this means Tr3 collector, Tr4 base and Tr5 collector are also all at **0V**.

Transistor Tr4 emitter is earthed, so Tr4 has no forward bias and does not conduct. There is no current through R9 so Tr4 collector is at **+20V.**

Now we have estimated all the transistor electrode potentials, which are summarised in the table. It may seem strange that several transistors are non-conducting, but remember that we have deliberately induced "no-

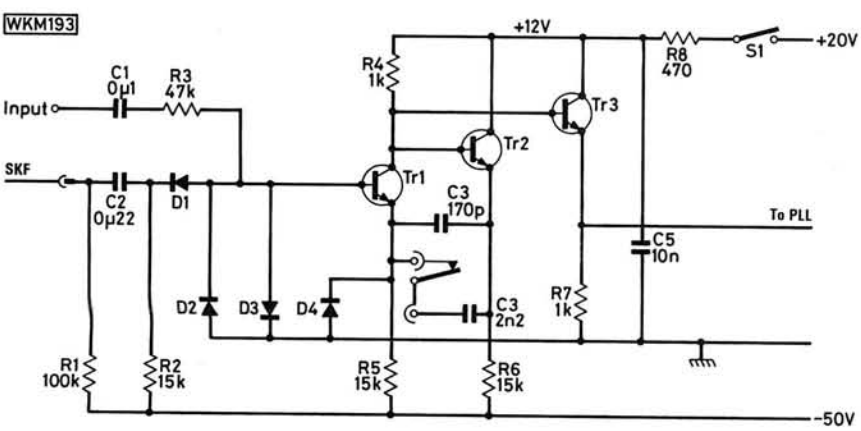


Fig. 8.3

continued on page 57▶▶▶

www.americanradiohistory.com

AVOIDING MIXER/OSCILLATOR TRACKING PROBLEMS

Eric G. DUNCAN B.Sc. Ph.D.

The alignment of a conventional superhet receiver poses problems for the amateur constructor due to the need for efficient tracking between the mixer and local oscillator circuits. These problems can now be avoided with the advent of the digital frequency display.

Consider the design of a communications superhet receiver with r.f., mixer and local oscillator stages. The alternative approach in this case is to track the front end r.f. and mixer stages and allow the local oscillator stage to be adjusted separately, with the aid of the digital frequency display. This strategy is superior to the conventional approach in a number of respects. The fact that the r.f. and mixer stages are tracked, instead of the mixer and oscillator stages, allows the use of identical coils and symmetrical printed circuit layouts. Consequently, excellent tracking can readily be obtained throughout each band, even without the alignment aid of a signal generator. Trimming capacitors are not essential but their inclusion facilitates accurate alignment.

RF and Mixer Stages

The circuit diagram of Fig. 1 illustrates high performance r.f. and mixer circuits. The individual stages are defined by the dashed lines; components shown within must be in separate screened compartments with power supplied via feed-through decoupling capacitors.

The simplest constructional approach is to use p.c.b. material for the cabinet and screens in a double-deck arrangement, the upper deck housing the circuits described in this article. Mount the twin gang variable capacitor C4/C10 on the lower side of the upper deck and connect to the tuned circuits by means of equal lengths of thin coaxial cable. The use of screened cable is essential to avoid feedback problems and their screens provide the only earth connections desirable between the r.f. and mixer stages.

The approach to superhet design advocated by the author allows any i.f. frequency to be chosen. In the case of the conventional superhet mixer and oscillator, coils are supplied as matched items for specific i.f. frequencies. Generally these are only available to the amateur for i.f. frequencies of between 455 to 470kHz and 1·6MHz—not the ideal frequencies to use in the design of communications receivers!

When the local oscillator is tuned separately the i.f. frequency is set by the parameters of the i.f. strip and the frequency employed can be 455kHz, 1·6MHz or 10·7MHz, without any alteration to the r.f. and mixer stages. The constructor can choose at will, although to avoid image problems, the higher frequencies would be the best choice. Incidentally when using a low i.f. frequency an objectionable image can be excluded by tuning the local

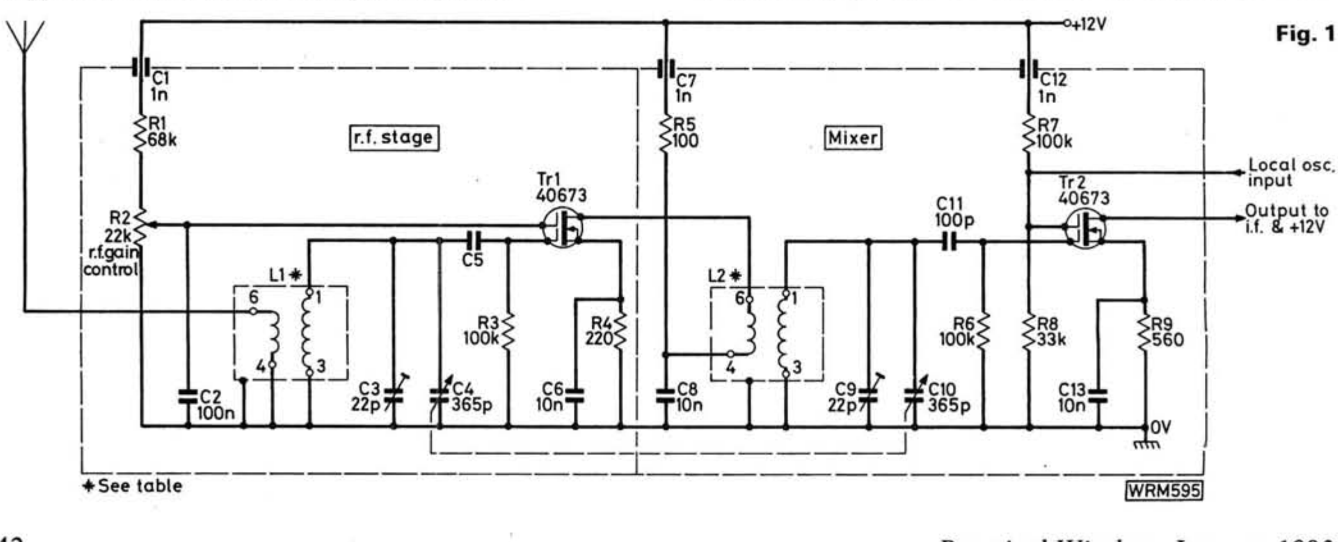


Fig. 1

www.americanradiohistory.com

oscillator to the opposite side of the desired frequency, a facility not offered by the conventional superhet.

Local Oscillator

There remains the question of the local oscillator design, bearing in mind that the latter has to drive both the mixer stage and the digital frequency display.

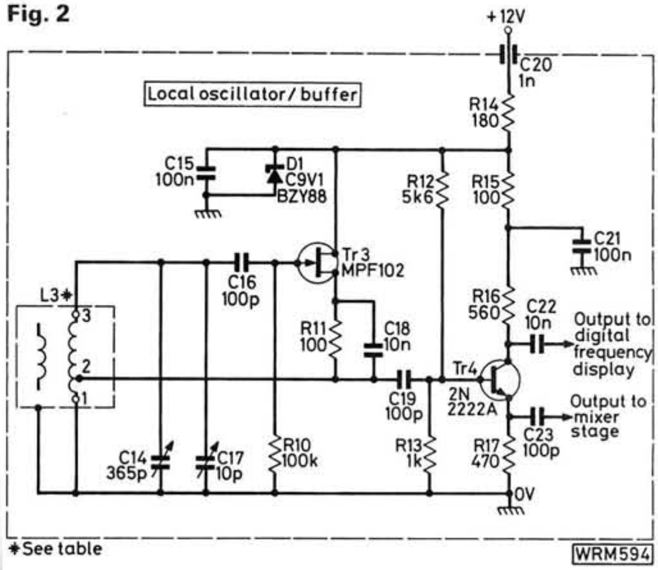
The circuit diagram of Fig. 2 illustrates an electron coupled oscillator and output buffer. The simple buffer stage is entirely adequate to prevent oscillator "pulling" and will drive digital frequency displays such as the Ambit DFM 7. This device is an ideal choice since it has offsets of 455kHz or 10·7MHz on s.w. and can also be used as a direct frequency counter providing a valuable aid in aligning a complicated receiver into which it is ultimately incorporated.

TABLE 1

	RF/MIXER L1/L2	LOCAL OSCILLATOR L3
MW	RW06A6408	YXB5 17065
SW1	154FN8A6438	KANK 3426
SW2	154FN8A6439	KANK 3337
SW3	KXNK 3767	KANK 3428

The oscillator module and its variable capacitors must be carefully screened in the manner previously described. It may prove necessary to connect the variable capacitors by means of screened cable to eliminate r.f. pick-up which can lead to serious oscillator instability at higher frequencies.

Fig. 2



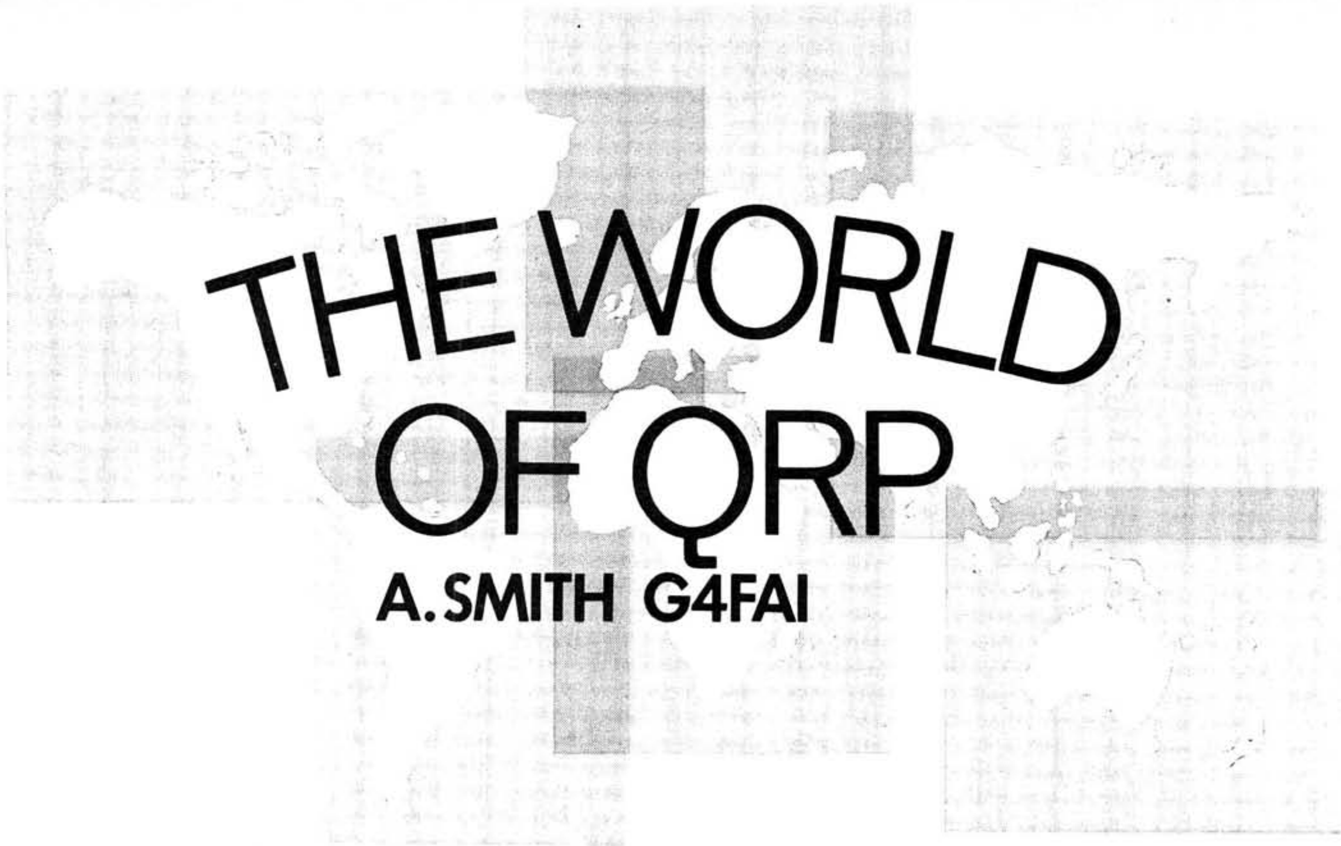
Multi-band Use

The circuits illustrated can easily be extended to multi-band operation using the recommended Toko coils. The symmetry of the printed circuit layout of the r.f. and mixer stages can be maintained for multi-band operation, provided each has a separate switch bank. A third switch bank would be used to control the local oscillator ranges. The Dialistat range of switches, available from Ambit International, are excellent in this application.

Constructors will find that the remaining stages of a communications receiver pose minor problems compared with those overcome by the procedures described in this article. ●

Next month in PW on sale 7thJAN
ANTENNA SPECIAL
Beginning 'ANTENNAS' a new series by F. C. JUDD
Plus features on antennas from v.l.f. to v.h.f.
ALSO
LMS REGENERATIVE RECEIVER
A real performer for the beginner

www.americanradiohistory.com



THE WORLD OF QRP

A. SMITH G4FAI

A newcomer to amateur radio glancing through most magazines concerned with the hobby could be excused for thinking that to get on the air it was necessary to have very sophisticated, high-powered and expensive equipment.

This is not the case and there is a world-wide movement within amateur radio dedicated to using inexpensive, sometimes very simple and often home-built, low-powered equipment. This is the world of QRP—a world of challenge, where patience is a necessity rather than a virtue!

What is QRP?

The code QRP is used by radio amateurs to refer to low power operation. This has been adapted from the International Q code, where QRP? means "Shall I reduce power?" and QRP means "Reduce power".

The G-QRP Club in this country defines QRP as low power radio communication using five watts input or less. The QRP Amateur Radio Club International, in the USA, defines it as five watts output although for many years they called 100 watts QRP and 5 watts was QRPp, extra low power! The important thing is that the power levels are lower than those normally used, thus providing a challenge to try harder, and to use your equipment more skilfully, than other operators.

Many QRP stations operate with c.w. (Morse code) because, in a situation where every aspect has to be optimised to be successful, c.w. is the most effective mode of communication in the crowded h.f. bands. Telephony has its place however and there are QRP stations who operate almost exclusively on the microphone.

Construction

The sophistication of modern amateur radio tends to give the impression that home construction must be a thing of the past for all but the most talented, and much of what is made today is usually ancillary equipment rather than the actual transmitters or receivers.

This is where the keen QRPer scores. There are many circuits and designs available for rigs capable of putting out a few watts of c.w. These circuits are not too difficult to make, don't make too much of a hole in the pocket, and give enormous satisfaction when they result in amateur contacts tens, hundreds or thousands of miles away. Of course all the ancillary equipment can be home-made as well. It is not necessary to use the heavy duty components specified for use with higher powers. There is plenty of scope for experiment, and circuitry can often be simplified.

G-QRP Club

The G-QRP Club is the largest QRP club in the world, although it was started in 1973 almost by accident. The Rev. George Dobbs G3RJV found he was working a number of other QRPers on 3·5MHz (40m). Whilst in contact with G2NJ he hit on the idea of bringing together the QRPers in the UK to exchange circuit ideas etc. He publicised the idea, about 30 people replied, and the club just grew from there. Membership is now world-wide and, at the time of writing, stands at over 1300.

The title for the club's journal—*SPRAT* (Small Powered Radio Amateur Transmission) was suggested as a joke but the name stuck. It is now a quarterly publication containing many circuits, technical hints and ideas for QRP projects, together with club news, award and contest information and other items of interest to QRP operators.

The club has a data sheet service, Morse training tapes, and awards scheme which culminates in a QRP Master's award, and a QSL bureau. A new venture, published in 1982, was a Circuit Handbook, which is literally "the best of *SPRAT*" and which is essential reading for all QRP enthusiasts.

On all amateur bands there are internationally known QRP frequencies and the club has regular activity periods each week, together with special activity weekends several

www.americanradiohistory.com

times a year, centred round these frequencies. A particularly successful event is the QRP Winter Sports which is held in the week after Christmas and which results in some fine contacts over quite remarkable distances. The high spot of the 1981 event was the performance of the Japanese station JA6VZB using five watts, who worked six European QRP stations in England, Scotland, Italy, Czechoslovakia, Sweden and Holland.

There were plenty of transatlantic contacts with both Canada and the USA. One station, member WB2RZU, in Long Island, worked GM3OXX in Edinburgh using only 500 milliwatts.

The club was particularly honoured to be asked by the Radio Society of Great Britain to provide the transmitting station for the RSGB h.f. Convention held near Oxford in June 1982. The main station was a Ten-Tec Argonaut 515, with five watts input, but home-constructed equipment was also used. The club mounted an exhibition of equipment made by members and there was considerable interest in the station and the exhibition throughout the convention.

World QRP Federation

A fairly recent development in QRP affairs has been the formation of the World QRP Federation, which was formed on the initiative of the G-QRP Club in September 1980 on the suggestion of Gus Taylor G8PG, Communications Manager of the club.

WQF has member organisations in all continents and in the short period it has been in existence it has revolutionised the world QRP scene. Regular contact has been maintained between all members so that major activities are publicised on a world-wide basis. Intercontinental two-way QRP communication is becoming more and more commonplace. Smaller and newer organisations are able to draw on the support and experience of the larger groups during their formative period and it is possible to get world agreement on matters of common interest, including the definition of QRP power levels, QRP frequencies for international working, and so on.

There is a considerable exchange of technical information and now there are international project years in the QRP field. The project for 1982 was for all member organisations to increase membership by at least 10 per cent and it looks as if that was more than achieved. This year's project will probably be a drive to increase the amount of home-construction and experimentation amongst QRP operators.

WQF is a remarkable achievement, demonstrating how groups of radio amateurs world-wide can work together in a common interest. In the process they are breaking down barriers and fostering international understanding and friendship. As Gus Taylor, now WQF Secretary, says, "this alone would be enough to justify the existence of WQF".

Table 1

World QRP Federation Members

Club Name	Country
ARI QRP Club	Italy
DL AGCW	West Germany
EA8 QRP DX Club	Canary Islands
G-QRP Club	United Kingdom
Grupo QRP Do Brasil	South America
Michigan QRP Club	USA
JARL QRP Club	Japan
QRP ARCI	USA
VK QRPp CW Club	Australia
Benelux QRP Club	Netherlands & Belgium
QRP Klub YU3EOP	Yugoslavia

Operating Pleasure

It would be misleading to suggest that QRP operating consistently results in long distance contacts. That is not its objective. QRP is always a challenge, whether the other station is near or far. Conditions are rarely ideal, although sometimes the signal report received from the other station is quite surprising, and the satisfactory completion of a contact is always a pleasure. There is usually something interesting about a QRP transmission to a higher-powered station, that adds to the QSO, but the best of all is when the other station is also QRP. There is an immediate common bond, and a willingness to be patient and to persevere when other stations would give up in difficult conditions. This leads to a need to develop good operating skills and the ability to get the best from the transmitter, receiver and antenna system. The friendliness, courtesy, high operating standards, the difficulties to be overcome, the triumphs and the disappointments all bring back something from the earlier days of amateur radio, and for many this is the attraction of QRP.

Although many QRP contacts are made through c.w. there are stations who use telephony as well. There are, perhaps, not so many home constructed transmitters for this mode, but there are available commercially several transceivers designed specifically for low-power working, or having the facility to reduce power to QRP levels. Eminent amongst the former is the Ten-Tec Argonaut, much beloved by its owners, and giving five watts input on both c.w. and s.s.b. from 3·5–30MHz.

The G-QRP Club has a s.s.b. net but probably the best example of what can be done here is to be found in the QRP sections of the various international contests each year, when some quite staggering scores are built up from contacts around the world.

Antennas

QRPers go to a lot of trouble to get an efficient transfer of power from the transmitter to the antenna. A beam would seem to be the obvious choice to ensure that all the transferred power went in the same direction. Yet, surprisingly, many QRP operators do not use beams at all, and the most popular antennas seem to be various arrangements of dipoles, ground-planes or long wires.

One operator who does use a beam, however, is Chris Page G4BUE, who spent many hours adjusting his four-element trap beam to get the best possible match on his favourite frequencies without the need for an s.w.r. bridge or a.t.u. in the feed line. He then dropped the input power of his Argonaut progressively from five watts to five milliwatts. At one watt he worked 51 countries, 500mW gave him 17, 150mW produced 7 and with 5mW he crossed the Atlantic on two occasions. Amongst all these were countries like Haiti, Iceland, Mauritania, Iran and Zimbabwe, which many operators rarely work with higher power!

The Argonaut 515 QRP transceiver

www.americanradiohistory.com

During a contest in May 1981 Chris lowered the power of his rig even further. He obtained four transatlantic reports on 21MHz with an output power of less than 1mW, and two of these were at 200 microwatts!

He obviously spent a great deal of time and trouble on these experiments but it is a remarkable demonstration of what can be done with extremely low power.

Looking Back

There is nothing new about QRP. The RSGB's *T and R Bulletin* reported on a "One Watt" competition in 1931 which showed that communication could be maintained over 800–1000 kilometres on the 7MHz (40m) band with reasonable consistency. The winner of the contest, incidentally, was G2OL of Ealing with a score of 165 points.

In June 1925 *QST*, journal of the American Radio Relay League, reported a number of low power contacts using powers ranging from 1·95W to 3mW. The star of the report was Edwin Miller 8KW, who, in 14 days worked 29 stations at distances between 483 and 1770km using an input of between 1·7W and 200mW with a one-valve transmitter. A particularly interesting transmission was that between G5SI in Shrewsbury and 1PL in the USA, a distance of 5311km using 1·95 watts input. The report commented, "the beauty of this work is not only the results, if any, are spectacular, but that the apparatus required is inexpensive, easy to assemble and adjust". The message is exactly the same today!

Table 2
G-QRP Weekly Activity Periods

Sunday	1100–1230GMT 1400–1530GMT	on all c.w. calling frequencies
Wednesday	2000 local time	3·560MHz

Table 3
International QRP Calling Frequencies

Band	c.w. MHz	s.s.b. MHz
3·5MHz (80m)	3·560	3·690
7MHz (40m)	7·030	7·090
14MHz (20m)	14·060	14·285
21MHz (15m)	21·060	21·285
28MHz (10m)	28·060	28·885

Reduce Your Power

QRP is worth a try, and there's no need to go for five watts straightaway. If you can reduce the power of your rig to, say, 20 watts, you will be quite surprised at what you can do. After that, keep reducing the power until you become a true QRPer! No more TVI, and, if a lot of other stations did the same, think how much quieter the bands would be!

The challenge is there. The sense of achievement has to be experienced to be believed. It need not be so demanding technically as some other aspects of amateur radio but it is just as satisfying, challenging and absorbing as any of them. Above all, it's fun!

Whether you are an experienced operator or a newcomer to the hobby, why not give it a try?

Information

Information about the G-QRP Club from Rev. G. Dobbs G3RJV, 17 Aspen Drive, Chelmsley Wood, Birmingham, B37 7QX. Please send a large s.a.e. ●

AN ACTIVE A.T.U.

▶▶▶*continued from page 38*

then rotating C2 anti-clockwise to peak it up again. The signal will then be louder than before—or weaker, in which case the process is simply reversed. It may sound complicated, but once you've tried it and seen how it works, nothing could be simpler.

Having got the hang of driving C1 and C2 for best results, the process can be repeated for a different switch setting of L1. Keep a log of the best settings for various frequencies. Once this is complete for the whole band you can go straight to the best settings for any frequency, but remember that a different log will be needed if a different antenna is used. Owing to the buffering effect of the amplifier, using a different receiver makes virtually no difference.

When using a regenerative receiver that relies on reaction to obtain good selectivity, it is important to work with the minimum of a.t.u. gain. Usually GAIN should be at LO and R8 advanced no more than necessary. Only when R8 has been advanced to maximum and still more gain is required, should S2 be set to HI. This will generally only be at the low frequency end of the band in daylight, when using a short antenna.

Exactly the same considerations apply when using the Active a.t.u. to boost the gain of any other s.w. receiver. With a conventional receiver with a.g.c. and good front-end selectivity, rather more latitude on the gain setting of the Active a.t.u. can be tolerated.

Whilst for s.w. work a large antenna is ideal, the Active a.t.u. will enable the bed-sitter and flat dweller to achieve surprisingly good results with no more than a wire round the picture rail. ●

kindly note!

ZX Computing in Radio, Supplement, December 1982

Distance & Bearing program, page ELEVEN
Incorporate the following changes
50 LET Y = N   310 INPUT E$
The listing on the *PW Radio Programs-1* cassette is correct.

Page THREE. D. Smee's callsign is G6EKX.

OSCAR — RS Orbits program, page FIVE.
The longitude and latitude values used in this program are for Poole, Dorset. Your own values must be used, and lines 1020 and 1030 should be changed as follows:—
LOAD "ORBITS"
LIST 1020
1020 LET QLO = your decimal long.
1030 LET QLA = your decimal lat.
RUN

1K Morse Tutor, Page FIFTEEN,
The inverse character details of line 1 have suffered in the printing and are as follows)>+ ;Ø48

An explanatory note on loading this program using machine code is available from the *PW* Editorial offices on receipt of an s.a.e.

Video output modification, Page SIXTEEN
Resistor R1 should be taken directly to the output socket and not as shown in the circuit diagram.

www.americanradiohistory.com

PRODUCTION LINES

ALAN MARTIN G8ZPW

Firm Footed RAM for the ZX81

Recently introduced by Ground Control is a new 16K RAM pack for the ZX81. Using a unique design of a high-quality injection moulded plastics case, this RAM pack overcomes all of the wobble and disconnection problems experienced with most other RAM units. It is claimed that with the unit attached, the ZX81 can be shaken and the RAM pack will neither be dislodged nor lose data.

An optional extra in the 16K RAM pack (S) is a keyboard sounder fitted inside the case to enable faster entry of programs by providing an audible feedback whenever a key is pressed. It also helps to reduce eye strain, especially when the computer is used in fast mode, by reducing the number of times it is necessary to look at the screen. It is hoped that soon a "Beep" program in machine code will be available with the (S) RAM pack.

The all-inclusive price for the 16K RAM pack is £19.95 and the (S) version £24·95. Both units are available from: *Ground Control, Alfreda Avenue, Hullbridge, Essex SS5 6LT. Tel: (0702) 230324.*

British 934MHz CB Transceivers

Ever since the Home Office allocated the Citizens' Band radio frequencies, on 2 November 1981, activity on the 934MHz band has remained virtually nil.

During the past year, I have reported that one manufacturer is working on a 934MHz transceiver design, and is hoping to have units available soon. However, latest information reveals that Bee Ware Ltd., of Harrogate, intend launching two transceivers covering 934MHz, one for mobile operation and the other a base station, at the end of November 1982.

The tranceivers' specifications will, of course, conform to the requirements of MPT. 1321, which briefly are: 20 channels at 50kHz spacing; modulation mode f.m. and 8W (±2dB) r.f. power out. The manufacturers estimate that the recommended retail price for the equipment will be approximately £200 for the mobile rig and £290 for the base station unit.

As soon as further product information and photographs are available, I will feature the units in *Production Lines.*

Bee Ware Ltd., Ripon Way, Ripon Road, Harrogate, North Yorkshire HG1 2AU.

Red Hot from Yaesu

At the beginning of November, I thought I had completed my copy for this issue of *PW*, when a package arrives on my desk containing a photograph and spec. sheet from Yaesu, via SMC Ltd., of their very latest h.f. bands transceiver, the FT-980.

The FT-980 covers the frequency range 150kHz to 30MHz (160m to 10m) with transmit capability only on the amateur bands within the range, on receive the rig provides full general coverage.

Being an all-mode transceiver, reception and emission features are: l.s.b., u.s.b., c.w., a.m., f.m. and f.s.k. (frequency shift keying) for r.t.t.y. Nominally r.f. power out is 100W.

Other features include: carrier suppression better than 40dB at 40MHz; unwanted sideband suppression better than 60dB at 14MHz with 1kHz mod.; spurious radiation better than −40dB; receiver frequency response (s.s.b.) 200–2800Hz at 6dB down; 3rd order i.m.d. products better than −40dB at 100W p.e.p.; frequency stability ±3 p.p.m. in the range 0–40°C; modulation, A3J balanced, A3 low level and F3 variable reactance; max. deviation (F3) ±5kHz; f.s.k. shift 170, 425 and 850Hz; mic. impedance 200–600Ω.

Sensitivity 0·25µV for better than 10dB S/N on s.s.b.; c.w.–N 0·16µV using optional filter XF8·9HC or 0·1µV with optional XF455·8; a.m.–W 1µV using optional XF8·9HA, and f.m. 0·4µV for better than 20dB S/N.

Selectivity defined at −6dB and −60dB points; s.s.b. 2·6kHz and 4kHz; c.w.–N 300Hz and 600Hz; c.w.–W 600Hz and 1·2kHz; a.m.–W 6kHz and 12kHz; a.m.–N 2·6kHz and 8kHz; f.s.k. 2·6kHz and 4kHz; f.m. 12kHz and 24kHz (with optional filters).

Comprehensive i.f. bandwidth and audio notch filter adjustment is provided, via a dual-concentric control, as standard.

Finally, image rejection ratio better than 70dB; i.f. rejection ratio better than 70dB; a.f. output 3W into 4Ω: a.f. output impedance 4–16Ω; power consumption, receive 72VA, transmit 530VA at 100W r.f. power out; powered by a.c. mains, connection is provided for a 12V d.c. supply.

Measuring 370 × 157 × 326mm, weight is 17kg and an interface unit for remote control via an NEC PC-8001 microcomputer is provided.

The FT-980 is estimated to cost in the region of £1100 and will, when stocks arrive, be available from: *South Midlands Communications Ltd., S. M. House, Osborne Road, Totton, Southampton, SO4 4DN. Tel: (0703 86) 7333.*

www.americanradiohistory.com

AIR TEST
USER REPORTS ON SETS AND SUNDRIES

This month, we look at a collection of add-ons and accessories which have recently come on the market.

DAIWA AF-606K
All-mode Active Filter

This little unit makes a very useful addition to a communications receiver lacking narrow bandwidth filters, especially for c.w. operation, as well as providing a tunable audio notch to deal with interfering carriers or c.w. when listening on 'phone.

The unit measures 62 × 150 × 150mm and requires an external d.c. supply of 12–15V at 200mA. The MODE switch offers the following options:

NOTCH: A 20dB notch, with a bandwidth adjustable (rear-panel preset) from 50-600Hz tunable over the range 0·3-3·0kHz.

SSB: Bottom limit set by a high-pass filter with a 500Hz −6dB point and 12dB per octave roll-off. Upper limit selectable from 2·5kHz, 2·0kHz and 1·5kHz (−10dB) with roll-off of 12, 24 and 36dB per octave respectively.

CW: The pièce-de-résistance, a phase-locked loop filter with an input range tunable from 0·5 to 1·2kHz, and a lock range of 70Hz.

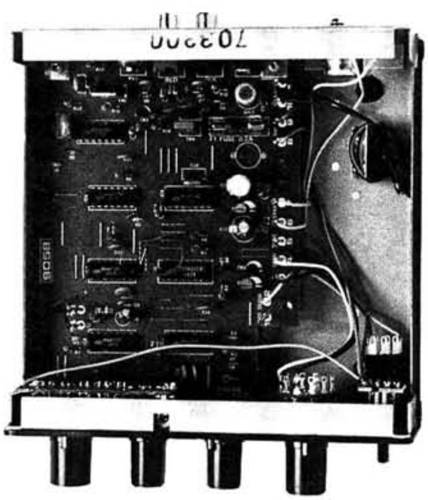
When the tone frequency of the received c.w. signal and the free-running frequency of the p.l.l. tone decoder are the same, a locked signal output is generated which flashes the LOCK l.e.d. and keys an audio oscillator to reproduce the c.w. signal free of interference caused by noise or fading.

All the controls mentioned (except for notch bandwidth) are on the front panel, along with the ON/OFF switch, which bypasses the unit for audio in the OFF position, and a 'phone jack. Other items on the rear panel are p.l.l. audio oscillator pitch and volume controls, plus the d.c. supply jack and phono sockets for audio input and external 8Ω loudspeaker (an internal speaker is fitted too), with a maximum output level of 1·7W. The audio input level required is a nominal 2V (0·5W in 8Ω) with a minimum of 1V for reliable p.l.l. operation, and a maximum of 4V. The unit uses a total of seven i.c.s (three of them quad op. amps) and one transistor.

Performance

On the bench, the unit met all its specifications except that the CW bandwidths were in fact 115, 90 and 85Hz respectively. The notch had a depth of at least 20dB when the WIDTH was set to minimum, giving a −3dB bandwidth of around 240Hz. This was a bit too narrow for easy tuning on the air. Going for a slightly wider bandwidth made operation less touchy and also increased the notch depth. Incidentally, the notch stays on in all positions of the MODE switch.

In the months I've had the unit on test, it's proved very useful. The combination of notch and variable bandwidth is great at sorting out a weak c.w. signal from a pile-up. The p.l.l. function requires slightly more signal input than you might otherwise use in a quiet shack—if the level is too low it tends to drop out on some Morse code elements. Tuning in this mode is very sharp, and I personally felt a bit "detached" from the incoming signal.



The instruction leaflet gives a full specification, connecting and operating instructions and a circuit diagram. A complete set of connectors is provided with the unit.

My only moan is the calibration of the three tuning controls. Each scale is graduated differently, and the PLL and CW BANDPASS controls follow a different law even though their frequency spans are identical.

The AF-606K is priced at £56·50 including VAT (plus £2·00 carriage) from **Lowe Electronics, Chesterfield Road, Matlock, Derbyshire, DE4 5LE, Telephone 0629 2817** to whom we offer our thanks for the loan of the review unit.

Geoff Arnold

DAIWA DK-210
Electronic Keyer

The DK-210 uses 4000-series c.m.o.s. to provide the options of SEMI-AUTO (electronic equivalent of a "bug" key), or full AUTO mode with iambic (dash/dot memory) facility, both with inbuilt sidetone.

The unit measures 62 × 150 × 150mm and can operate either on an internal 9V battery (type 6-F22/PP3) or from an external d.c. supply of 9–15V at 200mA.

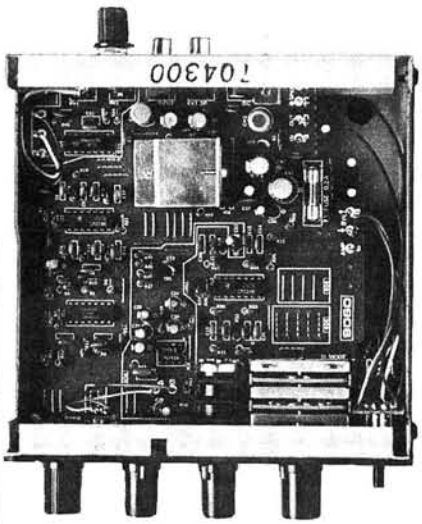
Operating speed is adjustable between approximately 8 and 50 w.p.m., and a WEIGHT control allows the dots and dashes to be lengthened relative to the spaces. Two keying outputs are provided (phono sockets), so that the DK-210 can control "direct" keying transmitters up to +300V 100mA, or "grid-block" keying transmitters up to −100V 10mA. The sidetone level to the internal loudspeaker can be adjusted by the front-panel VOLUME control. Its pitch is variable between 0·5 and 3kHz by means of a rear-panel preset potentiometer.

A "Speed" indicator using an l.e.d. readout shows the speed of code transmission in words per minute. There is an internal preset control to calibrate this indicator, but it wasn't possible to get an overall accuracy better than about 5 per cent across the range on the test sample.

The keyer works well and seems to have no particular idiosyncrasies. At the top end of the speed range, the

www.americanradiohistory.com

WEIGHT control will merge the dots or dashes into a continuous "mark" signal if turned up too far, but that's not unusual. The instruction leaflet provided gives comprehensive connection and



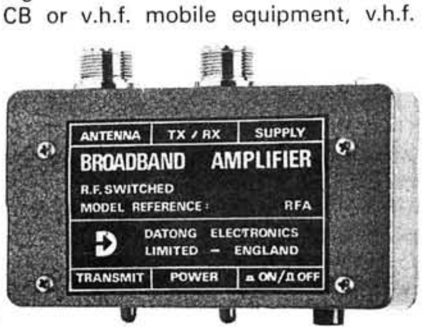
operating data, plus a circuit diagram. A full set of connectors comes with the unit.

The DK-210 is priced at £41·99 including VAT (plus £2·25 carriage) from **Lowe Electronics,** to whom we offer our thanks for the loan of the review unit.

Geoff Arnold

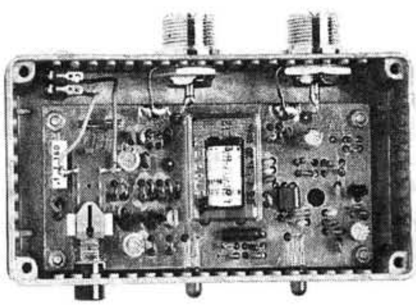
DATONG RFA Broadband Preamplifier

The Datong Model RFA broadband preamplifier provides a nominal 9dB gain over the range 5–200MHz, making it attractive for use with amateur, CB or v.h.f. mobile equipment, v.h.f. scanners, or for long-distance v.h.f. TV or f.m. broadcast reception. An r.f.-activated bypass relay gives safe automatic operation with transceivers up to 30W carrier or 60W s.s.b. Hang-time of the r.f. switching can be selected for best operation on f.m. or s.s.b.



Heavy negative feedback around a very low-noise transistor gives an ability to handle unusually large signals without overload. The third-order intercept point is typically +20dBm and the noise figure typically better than 3dB.

The unit is fitted into a die-cast box measuring 31 × 113 × 62mm, having "UHF" SO239 input and output connectors, 3·5mm jack for the external 10/14V 40mA d.c. supply, push-button ON/OFF switch, and two l.e.d. indicators showing "power on" and "transmit". If the ON/OFF switch is left in the ON position, the unit can be switched by applying or removing the 12V nominal supply. It can therefore be fitted near the antenna and remotely controlled, though it is not suitable for external mounting. When the unit is OFF, the input and output connectors are directly connected by the relay. Total weight is 250g.



The review sample was tested on a rather ancient and "deaf" v.h.f. communications receiver, giving quite a worthwhile boost to performance, and also with an h.f. amateur bands transceiver. The extra gain was successful in lifting US f.m. repeaters around 29·6MHz out of the mush and turning them into readable signals. On the bench, gain was measured at 9dB with a ripple of less than 0·5dB up to just over 170MHz. At 190MHz gain was down by 0·5dB and at 200MHz by 1dB.

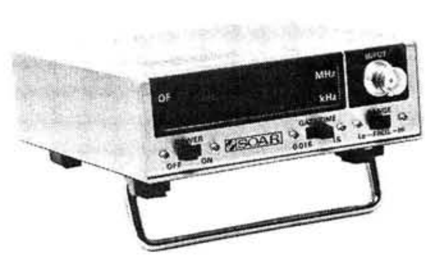
The Datong Model RFA is available price £33·92 including VAT, from **Datong Electronics Limited, Spence Mills, Bramley, Leeds, LS13 3HE, Telephone 0532 552461,** to whom we offer our thanks for the loan of the review unit, or from Datong stockists.

Geoff Arnold

SOAR FC–845 Digital Frequency Counter

Following on the heels of the FC–841 (reviewed in our August 1981 issue) comes this new instrument covering 5Hz to 160MHz. There are two frequency ranges—5Hz to 2MHz and 1MHz to 160MHz, and two gate times 0·01s and 1s, giving a resolution of 1Hz below 2MHz and 100Hz up to 160MHz.

A 4½-digit, 7-segment l.e.d. display is used, so that for most accurate measurement of frequencies above 20kHz, you need to take two successive readings. The same principle was used in the FC–841, but for the benefit of those who haven't come across it before, it works like this. You want to measure the frequency of a transmitter operating on the 14MHz (20m) band, picking off a sample of the output in some way. Key down, and with the FC–845 switched to the HI frequency range and 0·01s gate time, the display reads "14.04". Go to the 1s gate time and the display now reads ".0375". The "375" replaces the final "4" of the first reading, and the frequency is 14·0375MHz. An "overflow" indicator would have been flashing when you were taking the second reading, to remind you that you had, in effect, "lost" some digits off the left-hand end of the display. A couple of l.e.d.s show you which frequency range you're on, and these flash if the batteries are getting low. The decimal point on the display flashes in time with the counter gate.

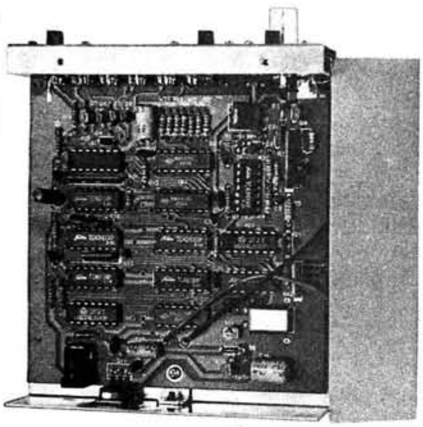


Power is either from internal batteries (six R6/HP7 cells) or an external 7·5V d.c. supply at about 130mA maximum. A word of warning when using an external supply—the rear-panel input connector is a coaxial type, recessed inside the metal case. The sleeve of the connector is the positive, and the counter case is negative.

www.americanradiohistory.com

Should you use one of the long-reach plugs with a 14·3mm sleeve (as I did) the result is a "splat" and an unhappy p.s.u. if the plug waggles and touches the case. The maker's manual specifies a 9·5mm sleeve (short-reach) plug, and you should take heed!

The input connector is a BNC, the input impedance being approximately 150kΩ/35pF on the LO range and 2·5kΩ/15pF on the HI range. Sensitivity is specified as 35–50 mV on the LO range and 30–50mV on the HI range, needing more input towards the band edges in each case. These figures were all bettered very comfortably indeed on the bench, and the FC–845 also showed itself very tolerant of modulation, either a.m. or f.m., on the signal to be measured.



Accuracy, like that of the FC–841, was quite remarkable. The makers specify ±50p.p.m. from 0–40°C, and importers Holdings of Blackburn reckon ±3p.p.m. at room temperature. Checked against an ovened 1MHz standard over 24 hours in a room varying from 15° to 21°C, the readout varied by only 2Hz. The readout is not all that bright, and you'll need to find a shady corner, away from sunlight or a bench lamp.

The unit measures 36 × 111 × 125mm excluding controls, feet and tilt stand, and weighs 420g excluding batteries.

The Soar FC–845 with batteries and input lead costs £65·00 including VAT (post and packing £1·50), and a suitable mains p.s.u. is available for £5·50. Further details from **Holdings Photo-Audio Centre, Mincing Lane, Darwen Street, Blackburn, BB2 2AF, Telephone 0254 59595,** to whom we offer our thanks for the loan of the review sample.

Geoff Arnold

AEA MBA-RO CW/RTTY Reader

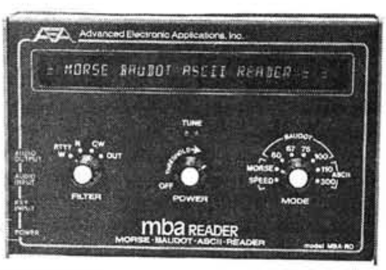
The MBA-RO, manufactured by Advanced Electronic Applications Inc., is one of the most recent arrivals among the ranks of devices for decoding and displaying telegraph signals in Morse, Baudot or ASCII codes. It uses a 32-character alphanumeric vacuum fluorescent display, with blue 14-segment characters 7·4mm high. The characters proceed from right to left across the screen during copy. A microprocessor plus 17 other i.c.s are used in the unit.

In the Morse mode, the MBA-RO will automatically track over a speed range 3–99w.p.m. either audio signals from a receiver output or else the output of a straight, "bug" or electronic key (for sending practice or monitoring). In the audio input circuit an 800Hz filter with 100Hz bandwidth gives added protection against interference, but this can be switched out if necessary. The speed of the Morse code signals fed into the unit can be indicated on the two right-hand characters of the display, this being a "by-product" of the speed tracking system, which measures the length of each dot and dash element, ignoring inter-character spaces, and updates only between words.

Both the audio and key inputs are on 3·5mm jacks, and a similar jack, labelled AUDIO OUTPUT and connected in parallel with the AUDIO INPUT, gives an easily accessible connection for monitor headphones.

In the Baudot mode, speeds of 60, 67, 75 and 100 w.p.m. can be selected, corresponding to Baud Rates of 45, 50, 56 and 75. Filters are provided for narrow shift (800Hz "mark", 970Hz "space"), commonly used for amateur operation, and wide shift (800Hz "mark", 1225Hz "space"), used commercially. In the ASCII mode, 110 and 300 Baud signals can be copied.

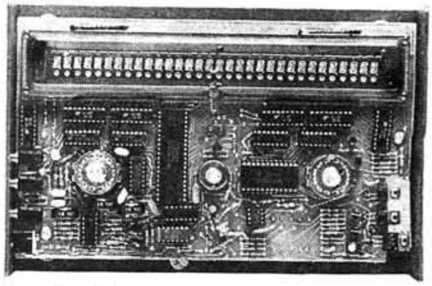
Tuning in all modes is aided by two



l.e.d. indicators. The THRESHOLD control on the reader is first adjusted so that both l.e.d.s are extinguished with no incoming signal. Then, the receiver tuning and audio level should be adjusted until both l.e.d.s flash in time with the signal for Morse, or so that one is continuously lit and the other flashes in time with the signal for RTTY modes.

Obviously, with 100Hz-wide filters, careful tuning and a stable receiver are called for, and some operating practice is needed for good results, particularly on RTTY. Incidentally, other RTTY shifts can be accommodated by setting the FILTER switch to the CW position and using the "mark" signal only, with reduced noise immunity.

No indication of the input signal level required is given in the manual, other than a comment that connecting the unit across a loudspeaker output may mean that the audio level to the speaker has to have attenuation introduced to give a comfortable listen-



ing level. I found that a nominal 400mV output from a receiver tape-recorder jack was not quite enough to give 100 per cent copy. Connecting the unit to a headphone output with 'phones in parallel required a deafening level for consistent decoding, and is not really a usable method.

The review unit was tested on the h.f. and v.h.f. bands with satisfactory results on all modes. It doesn't take too kindly to a sloppy fist on c.w., but then what automatic decoder does? It's a very stern critic if you practice your Morse by plugging in a key and sending to it! As well as the normal alphabet and numerals, it recognises 7 accented letters, 11 punctuation marks and 7 procedure signals among its Morse character set, and copes with 13 additional Teletype characters on RTTY.

The MBA-RO has all its components mounted on a single p.c.b. housed in a substantial two-part metal case measuring 48 × 224 × 150mm. It weighs around 0·9kg. Power requirements are 13V (±3V) at 500mA d.c. The instruction manual tells you how to

www.americanradiohistory.com

WATERS & STANTON ELECTRONICS

18/20 MAIN ROAD, HOCKLEY, ESSEX. TEL (0702) 206835

CALL IN AT OUR SUPER STORE LARGEST STOCKS IN SOUTH EAST

SEND CHEQUE OR P.O. BY RETURN DESPATCH

TELEPHONE YOUR CREDIT CARD NO. SAME DAY DESPATCH

PART EXCHANGE WELCOME. NOW STOCKING DRAGON COMPUTERS

TRIO – Official UK Dealers

NEW FROM TRIO
TS 430S HF TRANSCEIVER

SSB-CW-AM-FM

Price T.B.A.

It really is a fantastic performer!

TS830S	160-10m transceiver	£632.00	(£4.50)
VFO 230	Digital VFO	£215.00	(£4.50)
AT230	All band ATU	£119.00	(£1.50)
TS530	160-10 metre transceiver	£534.00	(£4.50)
VFO 240	External VFO	£92.50	(£4.50)
PS30	AC power supply for TS180S	£88.50	(£4.50)
TS130S	8 band 200W mobile transceiver	£492.00	(£4.50)
TS130V	8 band 20W mobile transceiver	£397.00	(£4.50)
TL120	200W pep linear	£145.00	(£4.50)
MB100	Mobile mount	£17.25	(£1.00)
VFO 120	External VFO	£85.00	(£4.50)
SP120	External speaker unit	£23.00	(£1.25)
AT130	100w antenna tuner	£79.00	(£1.50)
MC50	Deluxe desk microphone	£25.75	(£1.50)
MC35S	Fist mic. 50K impedance	£13.80	(£1.00)
MC30S	Fist mic. 500ohm impedance	£13.80	(£1.00)
LF30A	HF low pass filter	£17.90	(£1.00)
TS780E	2m/70cm all-mode duobander	£748.00	(£4.50)
TR9000	2m multimode mobile	£374.00	(£4.50)
B09	Base plinth for TR9000	£34.95	(£4.50)
TR7800	2m FM synthesised mobile 25W	£284.00	(£4.50)
TR2300	2m FM synthesised portable	£135.00	(£4.50)
TR2500	2m FM handheld transceiver	£207.00	(£2.00)
R1000	Gen. Cov. Receiver	£297.00	(£4.50)

ICOM – the full range stocked

IC720A DELUXE HF TRANSCEIVER

£883

IC730	HF mobile transceiver 8 band	£689.00	(n.c.)
IC720A	HF transceiver and gen. cov. receiver	£879.00	(n.c.)
PS15	Power supply for 720A	£99.00	(£3.00)
IC251E	2m multimode base station	£499.00	(n.c.)
IC25E	2m synthesised compact 25w mobile	£259.00	(n.c.)
IC290E	2m multimode mobile	£366.00	(n.c.)
IC2E	2m FM synthesised handheld	£159.00	(n.c.)
ICL1/2/3	Soft cases	£3.50	(£0.50)
ICHM9	Speaker Microphone	£12.00	(£0.75)
ICBC30	230v A.C. Base charger & hod	£39.00	(£1.50)
IBC25	230v A.C. Trickle Charger	£4.25	(£0.75)
ICCP1	Car Charging Lead	£3.20	(£0.50)
ICBP2	6v. nicad pack for IC2E	£22.00	(£1.00)
ICBP3	9v. nicad pack for IC2E	£17.70	£1.00
ICBP4	Empty case for 6 × AA nicads	£5.80	(£0.75)
ICPB5	11.5v nicad pack for IC2E	£30.50	(£1.00)
ICDC1	12v Adaptor Pack for IC2E	£8.40	(£0.75)
ICML1	10w booster	£49.00	(£1.00)

KILL TVI DEAD
HP4A
with braid breaker
IT REALLY WORKS

£5.95

FDK – Sole UK Distributors

2M ALL-MODE AMAZING VALUE!

£289

M700AX	2m FM 25w 12½/25kHz trans.	£169.00	(n.c.)
M.750E	2m FM/SSB/CW 144-146 trans.	£289.00	(n.c.)
Expander	70cm transceiver	£219.00	(n.c.)
PS750	230v AC 6amp psu	£66.00	(£2.50)
T1200	2m/FM synthesised handheld transceiver	£149.00	(n.c.)
P11	2m FM 6 channel portable	£109.00	(n.c.)
Palm IV	70cm FM 6 channel portable	£125.00	(n.c.)
TB1	1750Hz tone burst	£10.00	(n.c.)
TM56B	2m FM monitor	£89.00	(n.c.)
CC2	Case for Palm II/IV	£5.75	(£0.50)
BC2	230V AC battery charger	£4.50	(£0.50)
Xtals	for Palm II and Palm IV	£3.00	(£0.15)

FDK 2M FM 25W Look at the price!
BRITAINS NUMBER ONE SELLER!

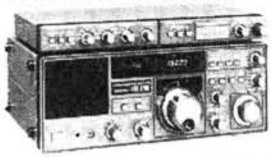
£169
SPECIAL WINTER DEAL

M700AX

YAESU – Good stocks. Good prices & on the spot service.

LATEST FRG 7700 IN STOCK

£329
plus FREE ATU with all orders placed before 31st January



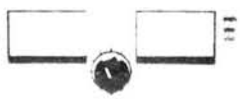
FT102	160-10m 9 band trans. FM	£725.00	(n.c.)
FT101ZD	160-10m	£569.00	(n.c.)
FT707	80-10m 8 band trans. 10w	£569.00	(n.c.)
FP707	230v AC PSU	£125.00	(£2.50)
FC707	160-10m atu	£85.00	(£1.50)
FV707DM	Digital vfo for FT707	£203.00	(n.c.)
MMB2	Mobile mount	£16.10	(£1.50)
FL2100Z	160-10m 1200 watt linear	£425.00	(n.c.)
FT902DM	160-10m 9 band receiver	£885.00	(n.c.)
FC902	All band ATU	£135.00	(£1.50)
FT208	2M FM synthesised handheld	£209.00	(n.c.)
FT708	70cm FM synthesised transceiver	£219.00	(n.c.)
NC9C	Compack trickle charger	£8.00	(£0.75)
FT480R	2m 10w SSB/CW/FM transceiver	£365.00	(n.c.)
FT290R	2m portable synthesised multimode	£249.00	(n.c.)
NC11C	240v trickle charger	£8.00	(£0.75)
FRG7	General coverage receiver	£189.00	(n.c.)
FRG7700	1981 version of FRG7000	£329.00	(n.c.)
FRT7700	Antenna tuning unit	£37.85	(£1.00)

SEND S.A.E. FOR 16 PAGE FULL CATALOGUE

WINTER BARGAINS

YW-3 SWR METERS 3-150MHz
The best we know at the price!

£11.95
p&p 75p



DATONG MORSE TUTOR D70

Self contained electronic morse sender £56.00 post free

NEW!
2M SSB PORTABLE
ONLY £89!

144.25 to 144.35MHz.
Any 100KHz segment possible.
¼ watt output power.
Ideal for driving amp.
SSB/CW with built in key.
Noise blanker.
Superb performance.
Rubber duck whip included.
Ext. mic and case extra.

AZDEN – Sole UK distributors

The amazing PCS3000 with remote control head – SAE for brochure.

NEW LOW PRICE!
£189
2M 25W

We've bought the price of the PCS3000 down by £40. Now here's your chance to make a real saving on this advanced transceiver. Send for details.

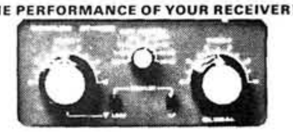
AZDEN PCS300

The ultimate in handhelds!
For full spec.
Send for brochure **£189**

GLOBAL AT1000 ATU

IMPROVE THE PERFORMANCE OF YOUR RECEIVER!

SWL ATU
£32
p&p £1.75



Purpose designed for R1000, R600, FRG7 and FRG7700 etc.

Prices correct at time of going to press. Carriage charges in brackets.

18-20 MAIN ROAD, HOCKLEY, ESSEX.
Open Mon-Sat 9-5.30 E.C. Wed 1.0 pm.

BARCLAYCARD VISA

FASTEST MAIL ORDER SERVICE IN THE BUSINESS!

Buy it with Access

www.americanradiohistory.com

AUTHORISED ICOM® DEALER

YOUR OFFICIAL SOMMERKAMP IMPORTER

FDK

WELZ BRIDGES IN STOCK

LOOK SPECIAL PRICES

HF | VHF

FT902DM	FT307	FT480R	FT290R	FT207R
2 year warranty All options fitted RRP £959 **P.O.A.**	Similar to FT107 but with all options RRP £1050 **P.O.A.**	Mobile base 2 metre multimode RRP £379 **£349**	Mobile/portable improved front end with free charger **£239**	Hand portable complete. All for **£169**

FT102 ALL OPTIONS £779

2m AMPLIFIERS

FL 2050	(100W)	£125
FL 2010	(10W) Specially for use with FT290	£65

STOP PRESS

4dB colinear, only **£17.50**

We stock genuine Sommerkamp quality accessories

NT30 12V3A regulated P/S **£23. NT60** 12V3A regulated P/S **£30. YS2000** SWR bridge & power meter, reads 200W output from **YS2000** SWR bridge & power meter 1.8-150MHz **£54.**

RECEIVERS

FRG 7700	(With memories fitted)	£389
FRG 7		£199
SX200N		£259
Bearcat 220FB. SPECIAL OFFER		£199

VHF EQUIPMENT

FT 290R	2m all mode portable transceiver (inc charger).	£239
FT 480R	2m all mode mobile/base station	£369
FT 780	70cms version	£439
Sommerkamp SC 1 base station console for 480 & 780		£125
FT 208RE	2m Hand portable transceiver	£209
FT 708RE	70cms version of above	£219
FT207	SPECIAL OFFER	£159
FT 230R	**NEW** 25W 2m FM mobile	£229
TS 280	**NEW VERSION** 144-148 12½/25 kHz. Reverse repeater, 50 Watts output	£229
FT 725	FM mobile. SPECIAL OFFER	£199

ICOM

IC BC30	230V AC Base Charger and Hod	£39.00
IC BC25	230V AC Trickle Charger	£4.25
IC CP1	Car Charging Lead	£3.20
IC BP2	6V Nicad Pack for IC2E	£22.00
IC BP3	9V Nicad Pack for IC2E	£17.70
IC BP4	Empty Case for 6×AA Nicads	£5.80
IC BP5	11.5V Nicad Pack for IC2E	£30.50
IC DC1	12V Adaptor Pack for IC2E	£8.40
IC ML1	10W Booster	£49.00
IC730	HF Mobile Transceiver 8 Band	£586.00
IC720A	HF Transceiver & Gen. Cov. Receiver	£883.00
PS15	Power Supply for 720A	£99.00
IC251E	2M Multimode Base Station	£499.00
IC25E	2M Synthesised Compact 25W Mobile	£259.00
IC290E	2M Multimode Mobile	£366.00
IC2E	2M FM Synthesised Handheld	£169.00
IC L1/2/3	Soft Cases	£3.50
IC HM9	Speaker/Microphone	£12.00

HF EQUIPMENT

FT 7B & YC 7B		£459
FP 12	(Matching p.s.u.)	£85
FT 767	(=FT 707) mobile HF, with scanning mic and CW filter	£629
FT 277ZD	(=FT101ZD) Sommerkamp unit with **everything** fitted (AM or FM, you choose)	£679
FT 1	The ultimate in HF transceivers. Supplied with **all** extras fitted	P.O.A.
FL 277ZD	HF Amplifier 2kW	£439
External speakers, VFOs etc are all available		P.O.A.

FT790 SOON IN STOCK **FT90R 70cms P.O.A.**

We also carry a range of products from other manufacturers such as JAYBEAM, MICROWAVE MODULES, L.A.R., DATONG, CUSHCRAFT etc.

A selection of marine and commercial equipment is also available.

BARCLAYCARD VISA

ALL PRICES MAY CHANGE OWING TO CURRENCY EXCHANGE FLUCTUATIONS.
All prices include VAT. HP terms available. Part Exchange. Access and Barclaycard welcome.
Goods normally despatched by return of post.

Buy it with Access

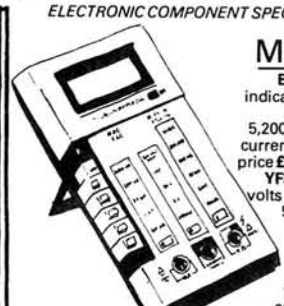
GEMINI COMMUNICATIONS

41 Sutton Road, Wigan Road, Bolton. G4GHE 800 yds from Junc. 5 M61. Easy Parking. **Tel: (0204) 652233**

9.30-5.30 Mon-Sat. Closed Wed. p.m.

PROGRESSIVE RADIO

ELECTRONIC COMPONENT SPECIALISTS



MULTIMETER OFFERS

BTC601 3½ digit 0.5" LCD display, low battery indicator, Input impedance 10m/100pf, overload protection on all ranges. Ranges; DC volts, 5,200mv-1000v, AC volts, 5,200mv-750v, AC/DC current 200 micro-2 amp, resistance 200r-20meg. price **£32.00 inclusive of VAT and postage.**

YF330A multimeter; 20,000 ohms per volt, DC volts 0.3v-1.2KV in 8 ranges, AC volts 6v-1.2Kv in 5 ranges, DC current 0.06ma to 12 amps in 5 ranges, resistance to 50 meg in 4 ranges including a XI range, has movement protection, size 170 × 116 × 59mm with extra large easy read scale price reduced from £21.75 to only **£15.00 inclusive of VAT and postage.**

ALL ORDERS DESPATCHED BY RETURN POST.

93 DALE STREET, LIVERPOOL L2 2JD

Main Agents For:
YAESU, FDK, STANDARD, BANTEX, ICOM, JAYBEAM, MICROWAVE MODULES, TSGB PUBLICATIONS, ETC.

HALBAR AERIALS

2MTR		Carr.
Straight 5 Yagi	10.70	2.00
Folding version	13.00	1.75
Twin Vertical (Omni)	14.95	10.50
Quad 4 11dBi gain	16.95	10.50
Quad 6 14dBi gain	24.50	10.50
70cms		
Linear 5 Yagi 10dBi	8.50	1.50
Log Periodic 14dBi	15.00	2.50
Twin Vertical (Omni)	8.50	1.50

Send for full list of Rigs & Accessories **0234 854133**

BEDFORD AUDIO-COMM

76 BEDFORD RD., KEMPSTON, BEDS.

CREDIT SALE, ACCESS, BARCLAYCARD, CREDIT CHARGE. Allow 7 days for delivery.

AT LAST!! – A REALLY FINE RECEIVER FROM ICOM

SSB, CW, AM, RTTY AND FM
WITH SUPERB PERFORMANCE

ICR70

PRICE £469

– Call or write for more details.

ICOM **THANET ELECTRONICS LTD.** **143 RECULVER ROAD, HERNE BAY, KENT. Tel: 02273 63859 Telex: 965179**

www.americanradiohistory.com

connect up, check out and operate the unit, and includes a full circuit diagram.

The AEA MBA-RO is priced at £175 including VAT (post, packing and insurance £2.50) and is available from the importers, **ICS Electronics Ltd., PO Box 2, Arundel, West Sussex BN18 0NX, telephone 024 365 590,** to whom we offer our thanks for the loan of the review unit.

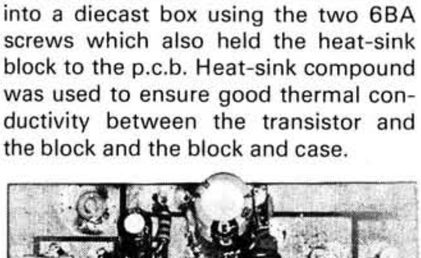
Geoff Arnold

SPECTRUM TPA-2A 144MHz Linear Amplifier

The Spectrum Communications 144MHz 25W linear amplifier offers the amateur a good quality p.a. at a reasonable price. The amplifier is available ready built or in kit form and the latter was tried as the subject of this Air Test.

The kit is complete except for a suitable case and input and output sockets. Construction is typical of v.h.f. techniques, all components being soldered onto pads on the top of the p.c.b. with the heat-sink block bolted to the underside. Components were of good quality and no difficulty was encountered with the construction.

The completed board was bolted into a diecast box using the two 6BA screws which also held the heat-sink block to the p.c.b. Heat-sink compound was used to ensure good thermal conductivity between the transistor and the block and the block and case.



The instructions were easily understood and included alignment procedures. Spectrum Communications offer an alignment service for those constructors who do not have the necessary test gear and the current charge for this is £2.50.

Alignment proved simple once the standing current had been correctly set up. This entails lifting one end of the choke forming the collector load and measuring the current flowing with no input signal present. To adjust the current to lie within specified limits it is necessary to change one of the bias resistors. A preset would have made this easier but would have increased the cost of the kit of course.

With the bias set to give a standing current at the top end of the specified range the amplifier gave an output of 12·5W at 144MHz, 12W at 145MHz and 9·5W at 146MHz when driven from a Standard C58 with a nominal output of 1W. At these power levels the current drawn was 2A with the supply voltage set to 12·8V. The diecast box did not get too warm during prolonged testing into a dummy load and the transistor body also remained cool enough to touch (with the r.f. input removed of course). The amplifier did not significantly add to the i.m.d. products.

This kit, which is just one in Spectrum Communications' range covering pre-amps, toneburst, piptone and keytone modules, a range of modems and of course receive converters, offers a low-cost means of boosting the output power of 144MHz hand-helds such as the IC-2E and portables such as the Standard C58 and Yaesu FT290R.

The TPA-2A 25W linear amplifier costs £13.89 in kit form or £19.89 assembled (inc. VAT and p&p) from **Spectrum Communications, 10 High East Street, Dorchester, Dorset, DT1 1HS, Tel: Dorchester 62250** who we would like to thank for the review kit.

Dick Ganderton

Cambridge Superkit

This kit is designed for both beginners and the hobbyist to demonstrate practically the basis of digital electronics. The very well written instruction manual is backed up with the components needed to complete all the experiments. The kit is very compact and would fit into either a pocket or handbag and comes inside a plastics folder.

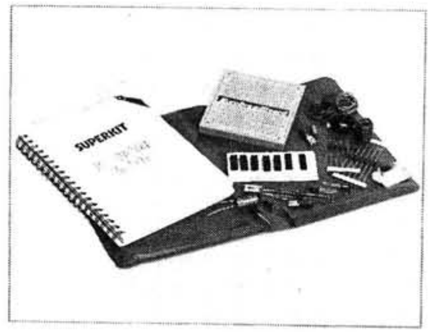
As the kit requires no soldering (all the circuits are constructed on EuroBreadBoard) it is very suitable for beginners. It also means that the projects can be constructed whilst on journeys, etc. As you work your way through the instruction manual it explains each topic and then asks questions to check you have understood the subject (the answers are provided in Chapter 7). There is even a Beginners' Appendix for those who have not done any electronics before.

Each section of the course teaches you about fault-finding in the circuits, it also contains other useful information such as how to improvise, soldering and about different i.c. families.

The instruction booklet suggests that you work through the course steadily, if you have trouble understanding a section read a little further into the manual then return to the difficult section, it should become clearer. If you are not a complete beginner then you can skip some of the simpler circuits, thus enabling each person to study and learn at their own speed.

The kit consists of 16 resistors, 3 electrolytic capacitors, 4 l.e.d.s, 7 integrated circuits, 1 four-pole two-way d.i.l. switch, EuroBreadBoard, 4 pieces of insulated solid core wire and battery connectors. The $4\frac{1}{2}$V battery needed is not supplied with the kit.

Other tools necessary are wire cutters/strippers, a pair of ordinary pliers and also a pair of tweezers often prove useful.



The Superkit proved most interesting to use as each section is very carefully explained to avoid confusion. All the questions asked at the end of each section seemed designed to help the learning process and not dishearten the student. The circuit experiments are easy to construct and provide very good learning blocks on which to build and increase your knowledge in Digital Electronics.

The Superkit is priced at £19.90 including post and packing and is available from **Cambridge Learning Ltd., Rivermill Lodge, St. Ives, Huntingdon, Cambridgeshire, PE17 4EP,** to whom we offer our thanks for the review kit.

Elaine Howard

www.americanradiohistory.com

IC of the month

Brian DANCE M Sc

Ferranti Electronics ZNA 234

Without instrumentation it is not that easy to set up a modern colour TV receiver to produce the best possible picture. Pattern generators of varying complexity have been marketed to facilitate this process but the recently introduced Ferranti Electronics ZNA 234 i.c. device enables a far simpler pattern generator to be constructed.

The ZNA 234

The ZNA 234 is a 16-pin dual-in-line monolithic device which can provide all of the waveforms necessary to produce cross-hatch, greyscale and dot test patterns from separate outputs, to facilitate receiver adjustments. The device can be used in circuits to provide test patterns suitable for use with receivers using either the standard European 625-line (CCIR) systems or the American 525-line (EIA) system. This article concentrates on its use for European 625-line applications.

Circuit requirements for the use of the device are quite simple; a 2·5MHz crystal resonator (2·52MHz for 525-line applications) is required, together with a few small resistors and capacitors. A 5V d.c. power supply is also needed, stabilised to within the normal t.t.l. limits of 4·75V to 5·25V and capable of providing the typical supply current of 135mA.

The ZNA 234 can easily be used to construct a small test unit which is very suitable for both the home experimenter and professional TV serviceman. It provides the mixed synchronisation and mixed video blanking timing signals which are required for the production of a screen display. The mixed outputs can be fed as a video signal directly into the video stage of the TV receiver under test, but the test signals can also be modulated onto a v.h.f. or u.h.f. signal, which is then fed to the normal antenna socket of the receiver.

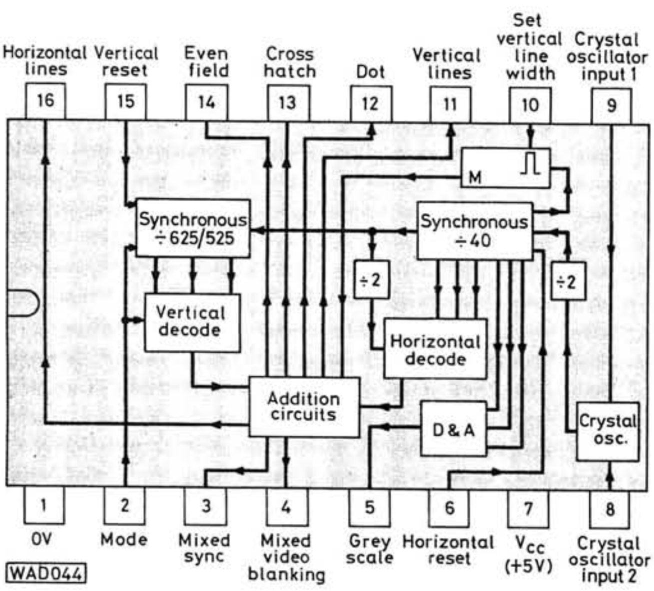


Fig. 1: Internal block diagram of the ZNA 234

Internal Circuit

The internal circuitry of the ZNA 234 is very complex, and is shown in block form, with its external pin connections, in Fig. 1. The +5V d.c. supply is fed to pin 7; to avoid permanent damage the absolute maximum voltage at this pin is +7V. Pin 2 is coupled to pin 7 for 625-line operation, or to the zero volt line at pin 1 for 525-line operation.

The ZNA 234 may be used for 625-line operation in the basic type of circuit shown in Fig. 2. Switch S1 selects the particular type of pattern required and feeds this signal either via a simple buffer stage to the receiver video circuit, or to a suitable modulator, producing a signal which can be fed into the TV antenna input.

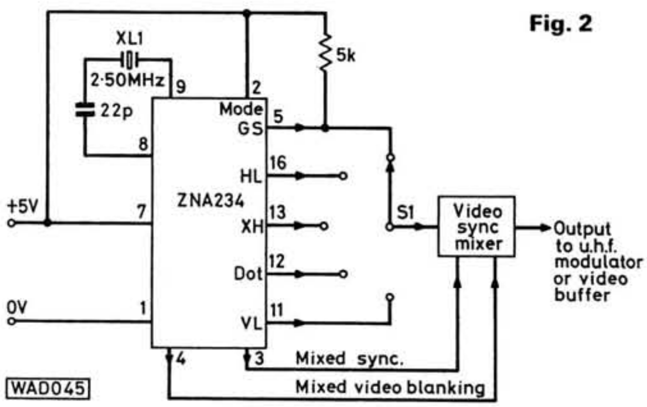


Fig. 2

Outputs

The horizontal line output at pin 16 consists of pulses of a duration equal to that of one picture line, occurring every 16 lines as shown in Fig. 3. This produces horizontal lines with a width of two lines on the screen, owing to interlacing of the image. This waveform produces 18 (15 for 525-line systems) visible horizontal lines, the other two in the pattern occurring during field blanking.

Vertical line output at pin 11 contains a series of pulses of nominal width 300ns, which occur at about 3µs intervals. These pulses occur in the same position in every line period, so a series of vertical lines is produced on the screen. Of the 20 vertical lines in the pulse repetition pattern, 16 are visible on the screen and the other four occur during line blanking times in both the 625- and the 525-line modes of operation.

Horizontal and vertical outputs are also fed to an internal AND gate so as to produce the dot output waveform at

www.americanradiohistory.com

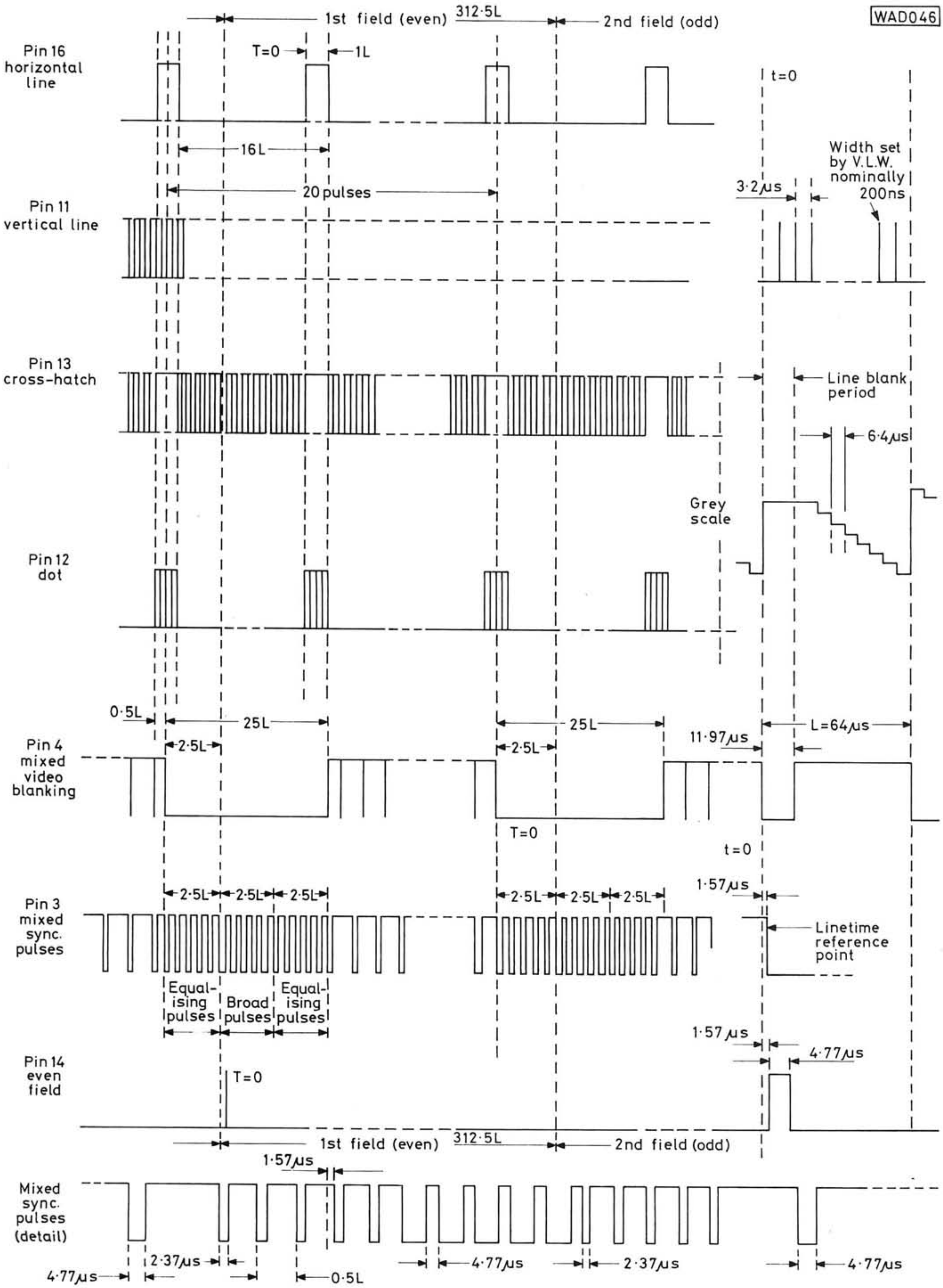
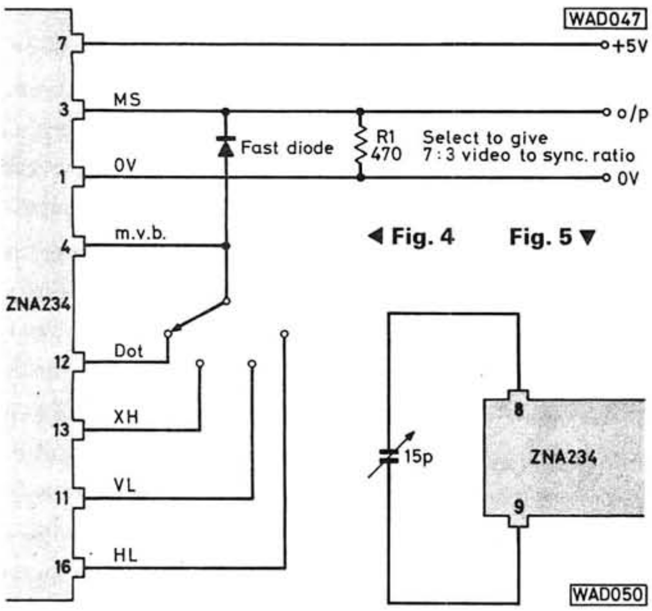


Fig. 3: Waveforms from the ZNA 234 in 625-line mode

www.americanradiohistory.com



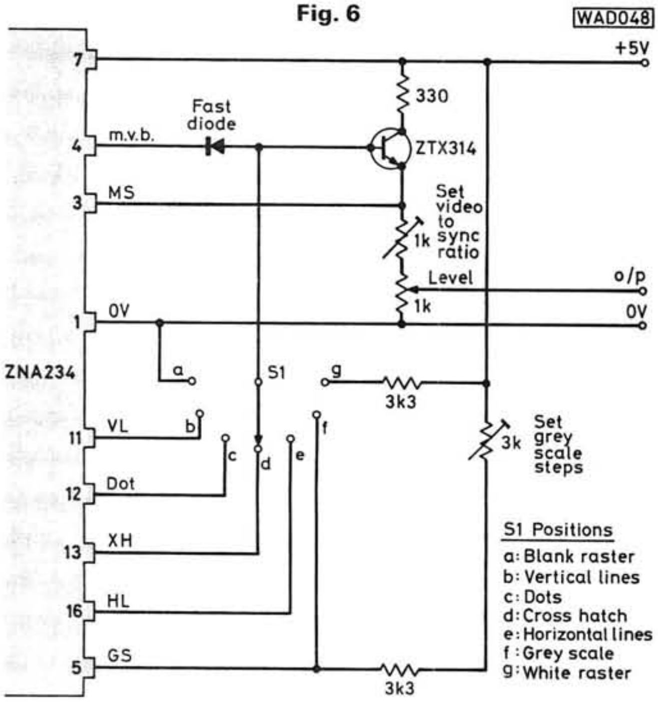
◀ **Fig. 4** **Fig. 5** ▼

pin 12; it can be seen in Fig. 3 that the waveform at pin 12 is "high" only when the waveform at both pins 11 and 16 are also high.

Similarly, the horizontal and vertical outputs are also fed to an internal OR gate, so as to produce the cross-hatch waveform pattern at pin 13. The cross-hatch squares on a TV receiver with a 20in screen are approximately 25 × 17mm, corresponding to a 1·4:1 aspect ratio, assuming the 625-line system is being used.

It may be noted that the outputs at pins 3, 4, 11, 12, 13, 14 and 16 have internal 3·3kΩ resistors up to the +5V line. If desired, extra resistors of value not less than 1kΩ may be connected in parallel with these internal components to increase the edge speeds and hence the current which the outputs can supply.

Fig. 6



The greyscale output at pin 5 is formed by feeding signals from the "divide by 40" counter (see Fig. 1) to a digital-to-analogue converter. The latter is effectively a switched current sink which provides eight equal current steps of approximately 60μA per step. This output may be employed with an external resistor of 5kΩ to the +5V line, as shown in Fig. 2, so that eight voltage steps are produced at the greyscale output, of approximately 0·3V per step. The output has a saturation level of about +2V and requires an emitter follower buffer stage to match it into the video/synchronisation mixer block.

Video Sync Mixer

The circuit of Fig. 2 shows a video sync mixer merely as a circuit block. Ferranti Electronics suggest that the circuitry of Fig. 4 is probably the simplest possible technique for the video synchronisation mixer unit, but this does have the disadvantage that the greyscale output cannot be employed. The reason it cannot be used with the Fig. 4 system is that the d.c. output level of the greyscale output at pin 5 is different from that of the other video outputs.

The circuit of Fig. 6 is only a little more complex than that of Fig. 4 and does provide for the use of the greyscale output. Ferranti Electronics have, however, emphasised that these simple circuits, which have been found to work well in practice, are suggested as starting points only. Much more convenience in operation may be effected by constructors who are willing to design output circuits which are more satisfactory for their own application.

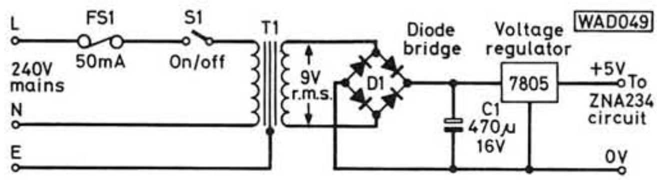


Fig. 7

Power Supply

It is generally most convenient to employ one of the industry standard 7805 types of i.c. regulator to provide the +5V d.c. supply required by the ZNA 234. An input from a small mains p.s.u., such as that shown in Fig. 7, is usually most convenient. The secondary voltage output from the transformer T1 is not at all critical, since it is only necessary to produce a voltage in the range 7V to 15V across the 7805. A transformer with a secondary output of 8 to 9V r.m.s. is convenient and the use of a transformer with a higher secondary voltage will merely increase the thermal dissipation in the 7805 device.

The writer has employed four series-connected nickel-cadmium cells to produce a suitable voltage for operating the ZNA 234. However, if this type of power supply is used, the cells should not be too small, as they have to supply a current of the order of 135mA. Unfortunately, high-capacity nickel-cadmium cells are quite expensive and have the additional disadvantage that, in the event of an accidental short circuit, a very large current can flow—perhaps even 100A! Cells of a nominal capacity of about 1·2Ah may be considered as a reasonable compromise for this application, but will require occasional recharging, even if the equipment is not used, since they lose an appreciable fraction of their charge in a month, especially if the temperature is not low. The use of such cells brings the advantage of complete portability.

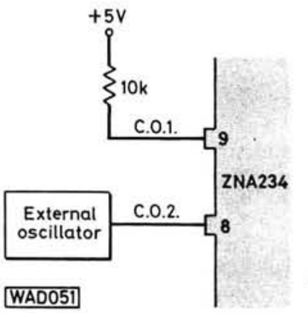
Further Comments

If high stability is not required, the crystal and its series capacitor may be replaced with a 15pF variable trimmer capacitor as shown in Fig. 5.

www.americanradiohistory.com

Alternatively, an external oscillator may be employed to drive pin 8 of the ZNA 234, provided that its pulse width is between 150 and 250ns. In this case pin 9 should be connected via a 10kΩ resistor to the +5V line, as shown in Fig. 8. A crystal is not required.

The width of the vertical lines can be varied somewhat if this should be required. When pin 10 is left unconnected, the line width is about 300ns, but if a *CR* time constant circuit is connected, as shown in Fig. 9, the pulse width may be varied from about 100ns to 1μs. A wider pulse is produced by increasing R_V or C_V in Fig. 9.



◄ Fig. 8

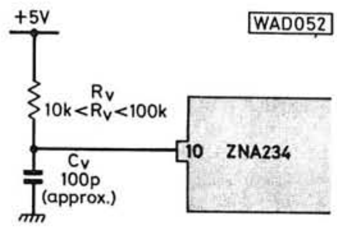


Fig. 9 ▲

It should be noted that if pin 10 is not used, any stray external capacitance connected to this pin, such as a longish lead or the track on a p.c.b., will affect the circuit operation. Ferranti Electronics therefore recommend that if pin 10 is to be left open circuit, no connection at all should be made to it.

If the horizontal and vertical reset connections at pins 6 and 15 are not required for use, they should be connected to the 0V line at pin 1. ●

ARE THE VOLTAGES CORRECT? – 8

►►►continued from page 41

signal" conditions, and it is the "signals" that cause these transistors to conduct, as with Tr6 and Tr7 in the example Fig. 8.1.

Here are a couple of problems for you to puzzle over. Full solutions will be given in next month's issue.

No. 1: In the example of Fig. 8.2, a 20 000Ω/V meter was used on its 20V range to carry out measurements to verify the estimations. Transistor Tr3 emitter measured +1·2V and Tr4 collector measured +19·5V. Are these readings reasonable, or do they indicate a faulty component?

Transistor	Voltages with respect to earth (V)		
	e	b	c
Tr1	+42·4	+41·8	+1·7
Tr2	0	+0·8	+0·1
Tr3	0	+8·8	0
Tr4	0	0	+20·0
Tr5	+20·0	+20·0	0
Tr6	+42·4	+41·8	+17·6

No. 2: Estimate all transistor electrode potentials with respect to earth of the circuit of Fig. 8.3 (from Marconi "Raymarc" radar). "Signals" are eliminated by breaking the circuit at C1 and at SKF. PLL could be opened to prevent circuits on the other p.c.b.s from interfering with calculations. All diodes and transistors are silicon types. Switch S1 should be closed. (Hint: start with Tr1).

Ohmmeter Testing of Semiconductors

It has been brought to my attention that my use of the phrase "direct ohms range" in connection with the testing of transistors and diodes (Parts 5 & 6) is inappropriate when applied to certain types of multimeter. The ohms range which one would naturally assume to be the "direct ohms range" in many cases is **not** the safest to use for such testing.

Hopefully, the meter manufacturer's operating instructions should indicate which is the safest range, but if not it can be determined by experiment with the aid of another (borrowed?) multimeter, as follows:

Connect your ohmmeter direct to the other meter switched to its d.c. voltage range and measure the output voltage on each of your ohmmeter's ranges. Don't forget, the "+" terminal of your ohmmeter should be connected to the "–" terminal of the other meter. Next, switch the other meter to its current range to measure the current which flows from your ohmmeter on each of its ohms ranges. Consider only those ranges indicating the **lowest voltage**: of these, the one which delivers the **lowest current** is the safest to use.

If you still doubt the safety of your semiconductors when under test by your meter, try using a resistor (say 5kΩ) in series with the meter—it is the **ratio** of reverse to forward resistance which matters, not the actual values of resistance measured.

I must apologise to readers for assuming that they would all possess the traditional (and expensive) type of meter. As I have pointed out elsewhere in this series, it is not necessary to own such a meter provided allowances are made.

www.americanradiohistory.com

on the air

Amateur Bands

by Eric Dowdeswell G4AR

Reports to: Eric Dowdeswell G4AR
Silver Firs, Leatherhead Road,
Ashtead, Surrey KT21 2TW.
Logs by bands in alphabetical order.

The pattern of listening on the amateur bands has undergone quite a significant change over the last couple of decades. Before that a list of good DX heard represented many hours of concentrated searching and digging around the bands, all of which was invaluable experience against the day when the s.w.l. got a licence.

In the meantime many new and highly sophisticated receivers have come on to the market which has made the task a lot easier. The newcomer can send in a log of DX heard that looks more like a miniature DX callbook! Has this clever fellow really heard all this tantalising stuff, I ask myself. Regrettably, not always. There are now so many "nets" existing on the DX bands where rare stations congregate on one frequency at a specific time, that the s.w.l. has merely to sit on the frequency and list the calls he hears mentioned.

He may think, in all good faith, that he has really heard a particular DX station and since the callsign has been bandied about on the frequency it is all too easy for the imagination to take over. The current practice among some amateurs on the DX bands to make a "list" has brought a similar element of doubt into many so-called "QSOs" that they have had with DX stations.

Making a list does sound something like a bookmaker making his book but in this case the odds are all in favour of the punter. The DX operator is, or should be, in control of his operations when he comes on the air. If he is not then all is chaos as everyone calls at once, except for the clever ones who know when to call successfully. If the DX op. is inexperienced he will find that one station who is putting in a good signal to him will take control and ask those interested in working the DX to just give their calls which he lists. Eventually, and before the DX fades out, the control station will ask the first station on the list to go ahead and call the DX and exchange reports, while everyone else keeps quiet. What a hope!

The whole procedure is a fiddle, however, because the DX op. can hear the control station quite well and thus knows the calls on the list. Often, of course, the third party can't even hear the DX let alone exchange reports, so the control station may not be averse to helping out here, thus enlarging his ego in the process! Many control stations do a good job of course but the fact remains that most of these "QSOs" would never have been made in the course of normal DX-chasing.

In the meantime, as I mentioned before, the listener is just sitting there logging the DX, often with that element of doubt in identification, but most do make a sincere effort to ensure that they have heard the station direct and copied the callsign. There seems little point in doing anything else. Receiving hundreds of logs every year it is very easy for me to spot the bad apples among the good.

Finally, if, as a listener, you must send a QSL card to a DX station then try to send it direct with reply postage and include some information that may be of some use to the distant op. He is probably working into Europe every day and doesn't need your card to confirm that fact. Compare his signal with those of others in his area around the same time, and you might get a reply. You can send the card via a bureau of course or to the DX station's QSL manager, but by the time you get a reply you will probably have got your own ticket!

General

First must come details of the fund-raising efforts by the Worked All Britain Awards group involving mobile stations activating WAB squares, which last year raised over £200 for the RAIBC. This year the "spoils" will be shared between the RAIBC and leukaemia research. The weekend of December 11/12 is the time with a hoped-for 2000 contacts mobile/fixed. Sponsors for the event are wanted, typical rates last year running between 1p and 5p per 20 contacts, so if you feel you'd like to help contact **Dave Brooks** G4IAR, 28 Avon Vale Road, Loughborough, Leics LE11 2AA with your offer. WAB nets will operate on 7060, 3760 and 1930kHz. Do it now!

December 19 is the BBC's 50th anniversary of the official start of the Empire Service, now more familiar as the World Service, following the original pioneering efforts of Gerald Marcuse G2NM. Between December 1 and 31 the BBC's Ariel Radio Group will be operating a number of stations on the h.f. bands and on 144MHz (2m), mainly on s.s.b., with special QSL cards to follow.

The stations will be GB2BBC, GB3BBC and GB8BBC in Central London, GB4BBC at Caversham, near Reading, and G3BBC in West London. More from **K. H. J. Rainbow,** Hon. Sec. on 01-580 4468 ext. 5328.

Congrats to newly-licensed **Philip Harris** of Bewdley, Worcs now G6MSR but aiming for his G4, with plenty of code practice. His target is the h.f. bands on a tight budget, using a resurrected war-time No. 19 set with a lot of added gadgets, but I reckon a good i.f. filter is the prime requirement.

Another letter from **Ean Retief** ZS6UD with news of happenings in the South Atlantic, like **Peter Cook** ZD9BW now on with antennas 244m a.s.l., and **Lorna Lavarello** now ZD9YL, with request for cards via W4FRU or ZS2DK which is also the same for **Andy** ZD9BV. Lorna is just 18 years of age and a permanent resident. Seems radio restrictions in ZS-land have been largely dropped of late with new modes on the h.f. bands previously only allowed on u.h.f. The hoped-for higher power did not materialise because of worries about possible TVI/BCI, so 150W limit remains.

After noting a couple of instances where this column had brought readers together after a long time **Brian Collinge** 5N4BPC has written from Enugu. Following an article in *Radcom* Brian wrote to the author A. S. Chester as they had lived virtually next door to each other until 1939, then meeting again one day in 1946. Not the end of Brian's strange encounters, however. He QSO'd 9J2KO to find they were the same age and went to the same school in the mid-30's!

According to **Gordon Hunter** GM3ULP of the Clyde Valley DX Group the Four Points of Scotland Expedition in August was a very big success with thousands of contacts on the 7MHz (40m), 14MHz (20m) and 144MHz bands. Several certificates are now available to amateurs and s.w.l.s for expedition stations heard or worked. Details from Gordon at 12 Airbles Drive, Motherwell, Strathclyde, Scotland. QSLs are being handled through the RSGB Bureaux or direct with s.a.e.

DX Time

Good news from **Andy Durrant** of Colchester who has got over his bout of sickness and is joyfully back at work. The AR88 and 20m-long wire caught M1J, H44DX, EA8AFB, and VP8LP at Goose Green, obviously very popular in many logs, all on 14MHz, with 28MHz coming up with ZS51V, S79MC and 5Y4CM, otherwise 5Z4CM, with cards to Box 30514, Nairobi.

Regular contributor to the column a long time ago **Bernard Hughes** of Kidderminster, Worcs now writes in again to say he has collected an XYL and moved QTH to nearly 91m a.s.l. which is a vast improvement, with fields all round. Problem, seemingly, is what antenna to put up first! Poor chap! With the wife interested in amateur radio it looks like an

www.americanradiohistory.com

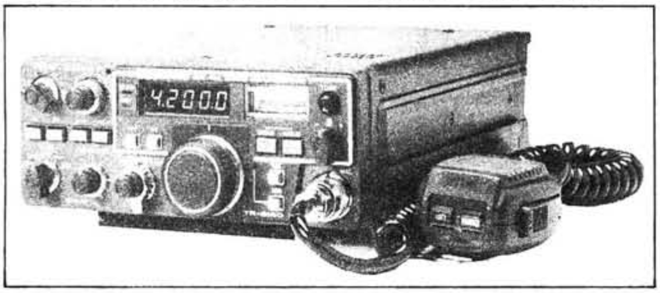
CALL **Western** FOR YOUR YAESU AND TRIO REQUIREMENTS

A selection from the range . . . LOWEST PRICES . . . FINE SERVICE

YAESU WAS INTRODUCED TO THE UK BY 'WESTERN'.

BUY WHERE EXPERIENCE COUNTS!

NEW! TR-9130
2m. ALL-MODE TRANSCEIVER



NEW! FT-102
HF ALL-MODE TRANSCEIVER

Not only . . . ***but also . . .*** ***the . . .***

NEW! TS-930S

Save at 'Western'!

TS-930S, £990. **You save £88**

TR-9130, £360. **You save £35**

FT-102, £690. **You save £35**

YAESU PRICE LIST. 2 YR WARRANTY. FREE DELIVERY.

Prices include Carr/VAT

HF EQUIPMENT

Cat. No.			£
1265	FT-1	150Khz-30Mhz TCVR	1240.00
1222	FT-101Z	Transceiver	539.00
1223	FT-101ZD	Transceiver	599.00
1224	FT-101Z/AM	101Z plus AM unit	555.00
1225	FT-101ZD/AM	101ZD plus AM unit, digital	619.00
1226	FT-101/FM	101Z plus FM unit	570.00
1227	FT-101ZD/FM	101ZD plus FM unit	635.00
1263	FV-101	Remote VFO	109.00
1274	Fan B	Fan for FT-101	13.00
1275	DC Unit	DC/DC PSU for FT-101	40.00
1230	FT-107	Solid state broad band	699.00
1231	FP-107	PSU for FT-107	99.00
1232	DMS-107	Memory for FT-107	89.00
1264	FV-107	VFO for FT-107	95.00
1265	SP-107	Speaker	28.00
1266	FC-107	ATU	106.00
1268	FT-902DM	SSB/AM/FM TCVR	850.00
1244	SP 901	Spkr for 101Z/902	30.00
1267	SP-901P	Phone patch/spkr	55.20
1247	FV-901DM	Remote VFO for 901	250.00
1245	FC-902	ATU for 101Z/902	130.00
1269	FTV-901R	T.VTR plus 2M unit	270.00
1270	430TV	70cm Unit for above	170.00
1271	144TV	2M Unit for FTV-901R	95.00
1272	YO-901P	Monitor scope/pan ad	315.00
1239	FT-707	Mobile TCVR	549.00
1238	FP-707	AC PSU	119.00
1237	FC-707	ATU for FT-707	82.00
1273	MR-7	Rack for FT-707	15.00
1203	MMB-2	Mobile mount for '707'	16.00
1246	FL-2100Z	HF 1200W linear	399.00
1206	FRG-7	Receiver	189.00
1248	FRG-7700	Receiver	315.00
1255	FRV-7700A	Conv 118/130 130/140 140/150Mhz	69.75
1257	FRV-7700D	Conv 118/130 140/150 70/80Mhz	72.45
1254	FRT-7700	Antenna tuner	37.00

VHF Equipment

1233	FT-227RB	2M FM 10W TCVR	179.00
1234	FT-290R	2M Multi-mode	235.00
1202	CSC-1	Case for FT-290R	3.90
1210	MMB-11	Mounting bracket 290	22.00
1211	NC-11C	Charger for FT-290R	8.00
1595	C Nicads	Set of 8 for FT-290R	21.20
1348	FL-2010	10W linear for FT-290R	62.00
1252	FT-208R	2M Hand held	199.00
1251	FT-708R	70cm Hand held	209.00
1236	FT-480R	2M All mode	360.00
1243	FT-780R	70cm Multi-mode	435.00
1220	FP-80A	AC PSU, 4.5A	59.00
1200	NC-1	Desk charger	19.00
1204	NC-2	Charger	39.00
1201	PA-1	DC Unit	19.00
1205	FP-4	AC PSU 4A, 13.8v	42.00
1258	NC-7	Base trickle charger	26.00
1253	NC-8	Base fast/trickle charger	42.00
1260	FBA-2	Battery sleeve for NC-7, NC-8	3.00
1262	NC-9C	Compact trickle charger	8.00
1349	FNB-2	Spare battery pack	17.00
1350	FL-2050	Linear amp FT-480R etc	120.00
1351	YM-24A	Spkr/Mic, FT-208/708	16.00
1241	FT-720RU	70cm FM mobile transceiver	264.00
1242	FT-720RV	2m FM mobile transceiver	239.00
1263	FT-230R	2m FM mobile transceiver	229.00

HEADPHONES, MICS, Etc.

1208	YE-7A	Hand mic., 600 ohm	6.90
1213	QTR-24D	Quartz 24hr clock	27.00
1215	YM-36	Noise cancelling mic	13.00
1214	YM-35	Hand, scanning	13.00
1352	YM-37	Hand mic	6.90
1353	YM-38	Desk scanning	24.00
1221	YD-148	Desk mic	20.00
1216	YH-55	Headphones	10.00
1217	E72-L	Remote cable for FT-720	19.50
1218	S72	Switching box, FT-720	52.00

TRIO-KENWOOD PRICE LIST. 2 YR WARRANTY. FREE DELIVERY.

"Carriage Free"

Cat. No.		Item	Inc VAT £
1301	ST-1	Base stand/charger for TR-2400	42.94
1302	MB-2	Mobile mount for TR-2300/VB-2300	16.50
1303	SC-3	Soft vinyl case for TR-2400	10.95
1305	BO-9	Base plinth for TR-9000/TR-9500	35.00
1307	PS-20	DC PSU for TR-9000	47.95
1308	PB-24k	Spare battery pack for TR-2400	16.00
1309	MC-30S	Hand microphone; 500 ohm	12.95
1310	PS-30	DC PSU for TS-120S/130S/180S	89.00
1312	MC-50	Desk microphone; 500 ohm/50k	26.45
1315	YK-88CN	270Hz CW filter for TS-130S/830S	30.00
1316	YK-88SN	1.8kHz SSB filter for TS-130S/830S	24.50
1317	MB-100	Mobile mount for TS-130S	16.50
1318	SP-100	Matching speaker for R-1000	25.00
1319	SP-120	Matching speaker for TS-130S etc.	23.00
1321	AT-130	Antenna tuner to match TS-130S	79.00
1322	TS-130S	Solid state HF transceiver	515.00
1323	DFC-230	Dig. rem. frequ. controller	175.00
1324	TS-180S	Solid state TCVR, 160-10m	669.00
1325	AT-230	Antenna tuner to match TS-830S	119.00
1326	TS-530S	All-band HF TCVR, digital	529.00
1327	SP-230	Speaker to match TS-530S/830S	35.00
1330	TS-830S	All-band HF TCVR, digital	679.00
1332	R-1000	Gen. cov. receiver, digital	295.00
1333	DCK-1	DC operating kit for R-1000	8.26
1334	TR-2300	2m FM portable TCVR, synth.	164.95
1337	TR-2400	2m FM hand portable transceiver	195.00
1338	TR-7625	2m FM 25W TCVR + memory	215.00
1341	TR-9500	70cm FM/SSB/CW mobile TCVR	440.00
1343	TR-8400	70cm FM mobile TCVR, synth.	289.00
1344	DS-2	DC-DC converter	39.00
1345	SMC-24	Speaker/microphone for TR-2400	15.95

SSB POWER METER
GIVES STEADY READING ON SPEECH.

The PM-2000A is an accurate means of measuring your peak envelope output of power on SSB. The unit has been inspected by the home office and found suitable for its purpose. SWR measurements can also be made, but the PM 2000 does what all other SWR meters cannot do; i.e. tell you your peak output power as required in your licence. **PRICE £56.35**

PM-2000A 1.5-30MHz, 2Kw. PM-2001. 50-150MHz £46

Western Electronics (UK) Ltd

FAIRFIELD ESTATE, LOUTH, LINCS LN11 0JH
Tel: Louth (0507) 604955 Telex: 56121 WEST G

www.americanradiohistory.com

DRAE MORSE TUTOR

- Single letters
- Letters and numbers
- Repeat last character
- Group of 5 random letters.
- Continuous morse
- Practice oscillator
- Complete with mains power supply.

£46.90

PRICES OF THE COMPLETE RANGE

VHF Wavemeter	**£24.95**	
4 Amp 13·8V PSU	**£27.95**	+ £1.50 carr.
6 Amp 13·8V PSU	**£44.95**	+ £2.50 carr.
12 Amp 13·8V PSU	**£69.00**	+ £2.50 carr.
24 Amp 13·8V PSU	**£99.00**	+ £3.50 carr.
Morse Tutor	**£46.90**	+ £1.00 carr.
12 Amp PSU Module	**£18.00**	+ £1.50 carr.
24 Amp 16·5V Transformer	**£25.00**	+ £2.50 carr.
12 Amp 17·0V Transformer	**£15.00**	+ £2.00 carr.
24V to 12V 6 Amp Converter	**£39.95**	+ £1.50 carr.

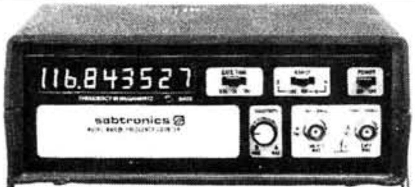
ALL PRICES INCLUDE VAT ACCESS WELCOME

Delivery normally from stock but please allow up to 28 days for delivery.

Davtrend Limited

89 Kimbolton Road, Portsmouth, Hants. Ports (0705) 816237

LOW COST PROFESSIONAL TEST INSTRUMENTS



sabtronics

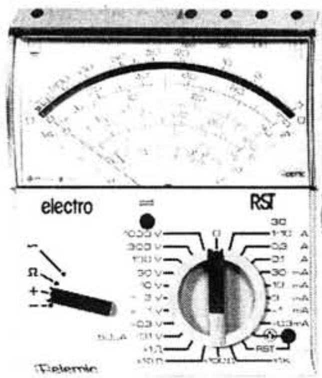
FREQUENCY METERS

100MHz, 600MHz, and 1GHz Models from £67

Elemic

Hand Held Analogue and Digital Multimeters

16 Models from £18.75



- ★ FREQUENCY METERS
- ★ ANALOGUE MULTIMETERS
- ★ DIGITAL MULTIMETERS
- ★ FUNCTION GENERATOR
- ★ OSCILLOSCOPES
- ★ POWER SUPPLIES
- ★ LOGIC PROBE
- ★ SCOPE PROBES

Write or phone for illustrated test instrument catalogue and price list

Black Star Ltd.
9A, Crown Street
St. Ives, Huntingdon
Cambs. PE17 4EB
Tel: (0480) 62440 Telex 32339

Black Star

LAR LEEDS AMATEUR RADIO 27 Cookridge Street, Leeds LS2 3AG. Tel. 452657 THE PROFESSIONALS

. . . the sign of fine communications (CREDIT BROKER) REQUEST WRITTEN QUOTATION

TRIO & ICOM EQUIPMENT

TRIO

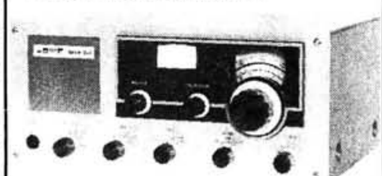
TR9130 2 Meter Multimode **£395.00**
TR7730 2 Meter FM **£247.94**
TR2500 2 Meter FM Hand Held **£207.00**

ICOM

IC25E 2 Meter FM Mobile **£239.00**
IC4E 70cm Hand Held **£199.00**
IC2E 2 Meter FM Hand-Held **£159.00**

All prices include VAT. Carriage £5.00
Goods by return

SRX30D Now includes FM



£215 inc. VAT Carr. £5

SX200N

£264 inc. VAT Carr. £5

BARCLAYCARD VISA

Access

LAR Budget

POST NOW PLEASE SEND 60p FOR OUR CATALOGUE & PRICE LIST

LEEDS AMATEUR RADIO MAIL ORDER & SERVICE DEPT.
60 GREEN ROAD, MEANWOOD LEEDS LS6 4JP. TEL. 782224
I authorise you to debit my Barclaycard/Access/LAR
Creditcharge Account with the amount of £..............................

I enclose cheque for £..............................
to purchase ....
Name ....
Address .... Signature ....

www.americanradiohistory.com

RAE or two could not be far away. The Drake receiver has been re-activated with a bit of wire dangling from the gutter yet logging A71AA, JX1CY and UM8PAC on 7MHz, and then AH8A in US Samoa, AH3AC on Johnson Is, FH8CB on Mayotte Is, FR0FLO on Reunion, J5HTL in Guinea-Bissau, not to mention V3TV in Belize and 5V7HL in Togo, for the 21MHz band. Why bother with a proper antenna!

In Saltburn-by-Sea, Cleveland, **Pat Cullen** is still getting bits and pieces together for his a.t.u. but doesn't seem to have done all that bad with HC1KF, HK5ASB, J88AJ, TA2KS, VP8ANT, VP8QP, VS5GA, ZX9A, ZD7CM, 4D9RG, 6W8DB and 6Y5AK all on 14MHz. A close look on 21MHz revealed CP8CB, C6AEY, DU1EFZ, HS1ALP, HR1SO, PJ8DFS, VQ9CI, VS5TH, VS6CT, VU9GI, YB0WR, 4D9RG, 8P6QM and 9V1VP.

Viv Doidge of Callington, Cornwall, keeps a close ear on the 28MHz, 21MHz and 14MHz bands with his FRG-7700 plus a.t.u. and a long wire although 7MHz and 3·5MHz (80m) came good at times. For instance 3·5MHz produced D44RB, ZL3AGO and ZL4AP while 7MHz put up C31YF, ZL4TG, 5T5TO, 8P6OR and 9L1PP. On 28MHz it was S79WHN, SV5FD on Rhodes, 6Y5EE and 9Y50JW, with 21MHz coming up with C53EK, J3AH, TR8JD, TU2HN. XT2BG, 9X5MH and 9Y4SR plus FP8HL, 5R8DL and JW5BX. Moving to 14MHz it was KH6AT, 5T5RR, 9L1MP, 9N1MM in Katmandu, C6ANU, KG4W, SU1ER, TU2JL, VP9GQ, 4S7WP and 5Y41TU.

I don't know where he gets the time or energy from but **Dave Coggins** (Knutsford, Cheshire) is now in the process of building himself a small observatory! He also managed to construct the *PW* t.r.f. receiver in the September '81 issue, copying several VKs, ZL and a KL7. On the main rig, a Yaesu FRG-7700 and 7700 a.t.u. fed from a two-element delta loop beam on 28MHz and a long wire on the rest of the bands, he logged JA6XMM on 3·5MHz, then HL1EJ, VK7AZ, ZD7BW, rare ZL4PO/C on Chatham Island, ZP6EM, 6Y51C and 8P6OR. The 28MHz band produced DU1RD, FH0FLO, VP8QC and 5H3BH. All the above on s.s.b. On c.w. on 1·8MHz only a couple of UAs were found but on the new 10MHz band it was a string of VKs.

Up in Whitehaven, Cumbria, **Paul Williams** has a Realistic DX100L and a long wire, with an a.t.u. in the offing. The l.f. bands are out due to local QRN but it does seem that I have talked him into having a go at the RAE in due course. All Paul's log this month is for c.w. operation so obviously it will be straight to the G4+3! On 21MHz he found just J41NA (where is that?) and 4S9AFI but many more on 14MHz with C30OH, CO1ML, FM7WD (QSL POB 879, Fort de France), FY7CG, HK0ZT, HP3ML, LU3ECJ/X (QSL POB 6, post code 9410, Ushuaia City, Tierra del Fuego), TI2PZ, VP2MM, XT2BG (CSL F2BS), 6Y5SG, 8P6J (QSL N6TR) and 9Y4VU.

Brian Patchett in Sheffield, which seems to be isolated from the rest of the amateur radio world, has found a suitable RAE course in nearby Rotherham after contacting a local G4 who turned out to be an instructor at the R'ham tech college! Now Brian gets a lift home after each session. You deserve the break OM after all your efforts. Seems the G4 is also sec. of the Sheffield ARC so let's hear from you OM. Brian's Grundig Satellit 1400 caught AX3KS in VK, FK8EK, FY7CH, TU2DP, VP9IX, ZL4JO and 6W8DY all on 14MHz and J41AN (again, could this be a special SV call for the recent games?), S79WH, VP5WJR, VQ0I on Chagos, 5H3DF, 5Y4ITU and 9J2VO.

With a DX100L and a short wire antenna **R. J. Squires** in Porthcawl, Mid Glam, stuck to 14MHz and came up with VP9GQ, VP8's APW, DF, GW and LP, then J3PQ and VP2VA. For many the 28MHz band has been opening up again, like **Archie Magrath** near Ramsgate in Kent, who logged VP2MDX, FY7BB and VQ9CI up there. On 21MHz M1V was heard and said QSL via M1Y! Then there were JW7FD, TR8JD and KG6RN.

So very happy indeed to hear from **Bill Rendell** of Feock, near Truro, in deepest Cornwall, who had not reported in for some time. He refers to the resurgence on 28MHz as being like the past peak of the sunspot cycle with much DX "umpteen dB over S9". The much-modified HRO, a.t.u., long wire and folded dipoles rewarded Bill with ZL4AV on 3·5MHz, VK9NS, VP8LP and ZD7AL (QSL Box 25, St Helena) on the 14MHz band. On 21MHz it was VP8ANT and 9X5SL. Then on 28MHz A92P, J6LLE, VP5RAC, VP9PG (QSL WB4MTE), plus YC2BFZ who wants cards to POB 45, Kudus, Java. Among other goodies on 28MHz were Z22JV, and 6W8AR with QSLs to DJ3AS or WB4LFM, depending upon where you live.

Jim Dunnett (Prestatyn) is now able to type the code at around 32 w.p.m. without too many errors. Nice! You should do well enough on Oct 30 at 12 w.p.m. OM. The 28MHz band is alive again but not much doing on 10MHz, with nil on 24MHz, not even a "G" since we got the band says Jim. His SRX30 found the following on 28, all on c.w.: FG7BE, J45OX, J40AA (QSL N2OO), OX3LK, VU9RYL (Asian Games), XT2AW (QSL KN1DPS), ZC4ZD who was G3JKS on his hols, Z21EM and 4X6DI. Likewise c.w. on 21 revealed DU6HM, FB8YJ on Kerguelen, FP0JA, FR0FLO, FR0GGL/G not G-land but the Glorieuses Islands seemingly, J28DP and M1C, TU2IE, VP8ANT via POB 146, Cambridge, VU9IOC, ZD9BZ, 5N8ARY, 5X5FS, 8P6MJ and 9V1VB with only one of interest on s.s.b. being P29MF. More c.w., on 14MHz this time with FY7YE, SV1NA/SV5, SV5QX/YL (where's that?), VP9DR, 9Q5VT and 9V1VP, with KL7Y and TR8DX on s.s.b., the latter saying QSL to BP231, Libreville.

Apart from some VK's on 7MHz c.w. the only other worthwhile was 5N8ARY but we're not finished yet with Jim for he also fiddles with RTTY where, on 14MHz, he "saw" FC9UC, YV5ANE, 4D7RLC, 9M2GA, with JF3JIQ, PY2EUZ and WB2CJL on 21, ending with CN8AT, 5B4CV and 5N7HKR on 28.

Now needing only the code cert before getting on the air **John Hayes** in London N9 worked on three bands to log C53AR, S79HW, YB2BLI (QSL POB27, Yogyr) and Z21GN on 28MHz, XZ9B (QSL JA8IXM), YB4AEB (QSL POB92, Jambi), 5N22ATT on 21MHz followed by JW1JW, VP2KK, VP8AEG, 8P6OL (QSL VE3AMJ) and 8R1RBF (QSL POB170932, Georgetown), all with his FRG-7700, FRT-7700 a.t.u. and long wire aided by a Datong FL2 audio filter.

After almost getting shipwrecked in the Firth of Forth trying to board the USS *America* to see if there were any hams aboard, our gallant RNARS member **Anne Edmondson** (alias BRS47285) had little time for DXing it seems. Her determination resulted in QSOs with no less than 15 s.w.l.s and licensed bods with more unseen. Back on dry land she also caught ON1XX/OH0 and IS0RZW on 3·5MHz s.s.b., with several JYs, LU6DWA and 9Y4VU on 14MHz, on her DX200.

Club Round-up

Aberdeen ARS Club room is at 35 Thistle Lane, Edinburgh at 7.30 every Friday, with lectures, raffles, instruction, junk sales and the like. Ring Stan GM4BKV on A'deen 691716 for latest info on the club's activities.

Acton, Brentford & Chiswick ARC G3IIU G3CCD takes his Icom 720A transceiver along to the Chiswick Town Hall, High Road, Chiswick, London W4 on Tuesday Dec 21 for a demo at 7.30. New members and visitors equally welcome. This from W. G. Dyer (wonder what his first names are?), 188 Gunnersbury Avenue, London W3.

Braintree & District ARS G4JXG G6BRH A nice welcome please for Lorraine Carter who has taken over the publicity sec's job. QTH is 33 Gurton Road, Coggeshall, Essex, from where Lorraine will try to answer questions about the club.

Carlisle & District ARS Every Monday at 7.30, White Quay Inn, Durdar, Carlisle. That's all I have, so try Paul Boyd G8RJA, 13 Stackbraes Road, Longtown, Cumbria who must know more, being the sec.

Chesham & District RS Every Wednesday at the Stable Loft, Bury Farm, Pednor Road, Chesham at . . . don't know, but imagine 7.30 can't be far out. Lots of infilling info from J. Alldridge G6LKS. 15 Whichcote Gardens, Chesham, Bucks, but Chesham 786935 will establish communication.

www.americanradiohistory.com

Doncaster Metropolitan Institute of Higher Education ARC G3UER It's no good, they'll have to get a shorter title! Newly-elected sec Brian Coupe G8GTG lives at 9 School Lane, Auckley, Doncaster, or D'caster 770663 and tells of RAE course, code classes, special lectures and outings, every Monday at 8 at the Gertrude Bell Hall, Church Street, Armthorpe, D'caster.

Echelford ARS G3UES The Hall, St Martins Court, Kingston Crescent, Ashford, Middx is where it all happens on the second Monday and last Thursday at 7.30 with everyone welcome on the club nets, Sunday 1000 clock time on 1930kHz or so and Weds 2000 on 144·575MHz f.m. On Dec 13 RSGB Regional Rep Pat Walker G8HMG talks about his task as an RR and will then answer questions. On Dec 30 Brian Coleman G4NNS will be very popular with his subject being microcomputers in AR! Excellent club newsletter keeps members abreast of club doings. Suggest you write or ring sec Anton Matthews G3VFB, 13a King Street, Twickenham, Middx, 01-892 2229.

Edgware & District RS G3ASR Meetings at 145 Orange Hill Road, Burnt Oak, Edgware, Middx second and fourth Thursdays at 8pm. Junk sale on Dec 9 with special event, a DF hunt with the Harrow mob, on Dec 12. Slow code from G3ASR on both 144MHz (2m) and Top Band and at meetings. Howard Drury G4HMD, 11 Batchworth Lane, Northwood, Middx, or N'wood 22776.

Farnborough & District RS Get together at the Railway Enthusiasts Club in Access Road, off Hawley Lane, F'boro which is quite near the M3 bridge it seems. Second and fourth Weds at 7.30 when on Dec 8 the Chairman will hold forth, while Dec 22 sees the Christmas social when the XYLs and YLs get a chance to see just what goes on at the club. Ivor Ireland G4BJQ, 118 Mychett Road, Mychett, near Camberley, Surrey, or F'boro 543036.

Glenrothes & District ARC GM4GRC From 26 members taking last RAE some 20 passed and three had Part 1 referrals. Not bad eh? Classes for RAE and code continue at Balwearie School in Kirkcaldy. Contact sec Gavin Lucas GM4EJI at the club at Provosts Land, Leslie, Fife, Scotland.

Goole Radio & Electronics Society. Welcome to another new group, meeting with a full programme of events on Tuesdays at 7.30 at Goole Junior Chamber, Boothferry Road, Goole, all in the club newsletter, from Richard Sugden G8IOH, 8 Kings Road, Swinefleet, Goole, N. Humberside. Nota bene Dec 7 and G4NLG talking on SSTV, Dec 14 is computer evening, Dec 21 all the Christmas festivities, back to normal on the 29th with a Christmas lecture. Should tell you now of natter-nite on Jan 4 and a talk on Interference on the 11th.

Halifax & District ARS This go-ahead club has produced a very useful fixture card for the wallet, running into September next year! Normally meetings of a formal nature take place on the third Tuesday at 7.30 with committee meetings and natter nites on the first Tuesdays, all at the Claremount Liberal Club, Belgrave Avenue, Claremount Road, Halifax. Dec 21 sees Dave G6COG chatting on Crime Prevention. Wonder if he is a very big COG in the wheel! You might like to know that on Jan 18 it's all about a RAYNET project, an emergency planning unit. So, it's PRO Phil Hey G4JHS, 79 Windermere Road, Bradford, W. Yorks for more info.

Ipswich RC G4IRC GB2IRC Usual impeccable news magazine *QUA* says all outside events this season have been very well attended. Back to the clubhouse which is in the Rose and Crown, 77 Norwich Road, Ipswich, Suffolk and detached from the bars, meetings second and last Wednesdays at 8. A questionnaire seeks to establish what members do, AR-wise, and what they'd like to do, so that the club's programmes may be adjusted accordingly. A useful feature of *QUA* is a listing of events of local clubs. To come is a talk on AR in the USA by G5EEP on Dec 8, but the club is closed on the 22nd but open again on the 29th with G6CRN on Classic Chassis Bashing! Hon Sec Jack Tootill G4IFF, 76 Fircroft Road, Ipswich waits to tell you more, or on (0473) 44047 if you prefer.

Leeds & District ARS G8WYR G4LAD Every Monday night at the Old Hall Golf Club, Woodhall Lane, Pudsey, Leeds. The almost 100 per cent pass rate in the last RAE has sparked off a Morse code class. Alex Alexander G6CJI, 22 Lichfield Road, Dewsbury, W. Yorks.

Lothians RS GM3HAM For those who may not know, the new venue is Drummond High School, Edinburgh on second and fourth Thurs at 7.30. RAE class at same QTH, same time, Wednesdays, but although it has been going since September may not be too late to join in. Ask E. Evans GM6JAG of 4 Burdiehouse Street, Edinburgh EH17 8EY or try 031-664 5403.

Maltby & District ARS Brand new and meeting Fridays at 7 in the Methodist Church Hall, Blyth Road, Maltby, and that's all I know. But Ian Abel G3ZHI, 52 Hollytree Avenue, Maltby, Rotherham, Yorks., will help out. He is on (0709) 814911.

Marconi RS Don't forget this new group formed at the Marconi company's HQ. Invites from local clubs to join in events, etc., greatly appreciated, says sec R. B. Purdy, The Grove, Warren Lane, Stanmore, Middx, and at 01-954 2311.

North Bristol ARC G4GCT At the Self-Help Enterprise, Braemar Crescent, Northville, Bristol every Friday at 7. A reminder a bit early of the AGM on Jan 28. Ted Bidmead G4EUV, 4 Pine Grove, Northville, Bristol.

North Wakefield RC Meets at Carr Gate Working Men's Club at 7.45 on Thursdays, says sec Steve Thompson G6ELC, 3 Harlington Court, Morley (0532) 536633. Dec 9 is club Christmas dinner at the Dam Inn and imagine members know where that is, I don't! Until the New Year meetings will be informal natter-nites. A late note says Jan 6 will welcome G4DXA chatting on Interference, and get your names down now for the visit on the 13th to the Wakefield Power Station.

Radio Amateurs Technical Engineering Club A new one on me but seemingly has grown from formation a year and half ago to over 500 members in UK, Europe, N. and S. America, and Australia. It does qualify for this feature because it meets every Monday at 8 at the British Legion, Moor Lane, Woodford, Cheshire, with all welcome. *RATEC NEWS* is quite an effort with some 40 pages of technical construction articles of immense interest to any amateur, edited by G3VFP. Details of membership, etc., from Technical Editor N. Spear G6JQA, 58 Cheadle Road, Cheadle Hulme, Cheshire, or call 061-485 3506.

St. Helens & District ARC G4LCK G6LCK Every Thursday Conservative Rooms, Boundary Road, St. H from 7.45 with refreshments for the weary for a small charge. More from PRO Alan Manchester G6FJU, 67 King Edward Road, Dentons Green, St. Helens, Merseyside, also St. H 56889.

Salop ARS G3SRT Thursdays at the Albert Hotel, Smithfield Road, Shrewsbury at 8. Unusual chat by Don G3UQH on Dec 9 is on calibrating instruments for a.c., d.c. and r.f. measurements, then on the 16th it's Edwin G6AKE on maritime telecoms. Break on Dec 23 when Father Christmas joins a snack and natter-nite. Note for diary, Annual Dinner Dance Jan 21. If he's still in office after the AGM then Edwin Arnold G6AKE, 30 Leamore Crescent, Belle Vue, Shrewsbury is your man for enquiries, or S'bury 66969.

South Dorset RS It is the Wyke Regis Army Bridging Camp, Weymouth, at 7.30 on first Tuesdays. There is a club quiz on Dec 7 and a film show on Jan 4. More details available from sec G3ZGP R. Cridland on Upwey 2893, or Andrew Prior G6HEL, 3 Greenways, Dewlish, Dorchester, Dorset.

Southdown ARS G3WQK First Mondays at 7.30. The Chaseley Home for Disabled ex-Servicemen, Southcliff, Eastbourne, Sussex. A very interesting delta loop antenna features in the club newsletter, by G4FB. For more details you'll have to contact sec J. S. Pitt G6BGT, 73 Seaside Road, Eastbourne, also E'bourne 640727.

Stevenage & District ARS G3SAD G8SAD A bit of upheaval here as the club moves into new premises at "T.S. Andromeda," Shephall View, Bedwell, Stevenage, Herts, where it is first and third Tuesdays at 8. So it's Dec 7 and 21, and January 4 and 18, with details of the events taking place on those evenings from Les Mather G8OKI, 63 Woodhall Lane, Welwyn Garden City, Herts. Code classes are standard procedure before meetings according to the beautifully printed new newsletter. No need to worry about sea-sickness getting aboard

www.americanradiohistory.com

TS Andromeda, it is the Sea Cadet's HQ on the opposite side of the Fairlands Valley Lake, with maps for those who need them.

Stratford-upon-Avon & District ARC Second and fourth Mondays at 7.30 at the Control Tower, Bearley Radio Station, Bearley, near Stratford, with a talk-in on S22. It should be a chat on c.w. on Dec 13, but you can give it a miss on the 27th, needless to say. You should know now of the construction evening on Jan 10 and of the visit to BBC Pebble Mill on Jan 24. Lucky people! So far events are programmed into July next so David Boocock G8OVC can acquaint you with the details on S-upon-A 750584.

Swale ARC Recent AGM made some changes like new venue at Nina's, 43 High Street, Sittingbourne, Kent (cor!) and it's now every Monday evening at 7.30. Spring programme of events expected very soon as things settle down a bit. Latest news from Brian Hancock G4NPM, Leahurst, Augustine Road, Minster, Sheerness, also Minster 873147.

The Radio Society of Harrow G3EFX Friday meetings at the Harrow Arts Centre, High Road, Harrow Weald, Middx at 8, with club able to use bar and light refreshments facilities, so you can go there straight from the salt mine. DF hunt on Dec 12 on Top Band and maybe on 144MHz also, contact for this event is Chris G4JNZ on 01-868 2159. Imagine it's too late to tell you of the early Christmas dinner on Dec 2 but OK for the talk on Orienteering on the 10th, and another chat on Dec 17 at present subject-less. Add to this the informal and practical evenings, club projects and code classes which Chris Friel G4AUF, 17 Clitheroe Avenue, Harrow, Middx is waiting to tell you about.

Thornbury & District ARC The club has a new home at the White Horse at Groves End on the A38, and for those who worry about such things, it is possible to reach the club room without going through the bars. News of a "light-hearted" 144MHz contest between the Bristol Channel clubs on Christmas Eve, lasting for a couple of hours. Can any contest be described thus! Unfortunately the club meets very early in the month so we've missed the Dec date but on Jan 5 a talk deals with making p.c.b.s and Feb 2 is all about RAYNET. In the absence of an Hon Sec the Hon Chairman Alan Jones G8AZT will answer your queries about the club. He's at 9 Queens Walk, Thornbury, near Bristol.

Thornton Cleveleys ARS G4ATH G6GMW Attractive new format to newly-named club magazine *TCARS Journal* an event overshadowed by death of club president Charles Mark Denny G6DN active in amateur radio in 1911. Club boasts of Pete G4BVW, his XYL Ruth G6KOD, plus sons Alan G6KOE and Robert G6KOF with Ruth likely to get her G4 'ere long. All about the club from George Metcalfe G6VS, 4 Partridge Avenue, Cleveleys FY5 2HJ or much quicker on Cleveleys 823541. In case you'd like to cut along anyway it's the Leisure Centre, Victoria Road East, Thornton C, Blackpool, every Friday night but a new and more convenient venue is on the cards.

Torbay ARS G3NJA G8NJA HQ at Bath Lane, rear of 94 Belgrave Road, Torquay, every Friday at 7.30 for informal get-togethers, and business meetings and lectures on the last Saturday, at the same QTH. Members rather pleased that repeater GB3TR is now working successfully. Drop a line to Les Mays G2CWR, Atlantis, Clennon Avenue, Paignton, Devon.

Vale of White Horse ARS First Tuesday of the month is devoted to lectures and the like with third Tuesdays for ragchewing and anything informal. The RAE course has some 15 candidates hard at it, not all club members although it is hoped they will join in due course. The Dec event is the regular Social evening while in Jan there is a talk on repeaters. Much more detailed info from Alan Lovegreen G4FLX, 16 Church Lane, Wallingford, Oxon, otherwise (0491) 37482.

Verulam ARC Normally the fourth Tuesday at 7.30 at the Charles Morris Memorial Hall, Tyttenhanger Green, near St Albans, Herts. More informally, at the RAFA HQ, New Kent Road, St Albans on the second Tuesday. Needless to say visitors and potential members are most welcome at either QTH. Now, NOTE, the club's AGM will be held on the THIRD Tuesday, December 21, at the RAFA HQ. Details of the club's activities from Peter Hildebrand G3VJO, Hobbits, 31 Crouch Hall Gardens, Redbourn, St Albans, or R'bourn 2761.

Wimbledon & District RS New sec Geoff Mellett G4MVS says club forgathers on the second and last Fridays at St John Ambulance HQ, 124 Kingston Road, Wimbledon, London SW19 at 8. Tea and biscuits are served at around 9. Nice! You might like to call into the Monday 9pm net on 144·875MHz. Geoff lives at 26 Paget Avenue, Sutton, Surrey, or call 01-644 8249.

Yeovil ARC G3CMH G8YEO Every Thursday at Building 101, Houndstone Camp, Yeovil, at 7.30. Some very attractive lectures on the way like An Investigation into Chordal Hop by G3MYM on Dec 9 and a.t.u.s by ditto on the 23rd. In between he also chairs a general discussion on AR on the 16th. Club projects include projects on chordal hop and "D" region absorption. Club membership now stands at a healthy 82. Sec is Don McLean G3NOF, 9 Cedar Grove, Yeovil, also (0935) 24956.

It is time to send you all my warmest greetings for Christmas and may it be a happy one for each and every reader of *PW*. It has been exciting to see the rapidly increasing number of ladies, some of whom have not only got their tickets but have taken a very active part in club activities, where they perform some very onerous duties behind the scenes. The OM with a YL or XYL also genuinely interested in AR is a very lucky man indeed! Happy Christmas!

Medium Wave Broadcast Band DX

by Charles Molloy G8BUS

Reports to: Charles Molloy G8BUS
132 Segars Lane, Southport PR8 3JG.

It occurred to me recently, after changing the Vega 204 in my caravanette for a DX160, that I was following the same path that many of us go down when we start off in the hobby. We move from a simple, easy-to-operate receiver to more complicated, more sophisticated equipment. The Vega has four controls whose use is obvious. Tuning, wavechange, tone, combined volume control and on/off switch. The DX160 has seven knobs and four switches and the function of some of them is not at all obvious. Further up the ladder, my BRT400 sports ten knobs and six switches on the front panel. It might be useful then to have a look at some of the additional controls on our new receiver to see what they are and how best we can make use of them.

At the Controls

We will start with our old friend, the receiver block diagram (Fig. 1), which I have drawn in a different way this time. The left-hand box represents that part of the receiver which deals with the signal before demodulation and includes the r.f., mixer(s) and i.f. stages. The centre box represents the detector, where audio frequencies (modulation) are extracted from the carrier, which is now discarded. The

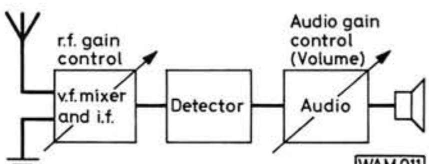


Fig. 1

right-hand box is the audio section where speech and music are amplified before being applied to the loudspeaker. The arrow through the audio box means that the gain can be adjusted and this is the job done by the volume control. Audio gain is another name for volume control.

The DX160 has an r.f. gain control. What does it do? It adjusts the gain (amplification) in that part of the receiver represented by the left hand block in Fig. 1. I remember being puzzled when I added an r.f. stage to my first receiver. Why two controls for receiver gain? Isn't one enough? Many DXers set the r.f. gain to

www.americanradiohistory.com

max and use the audio gain alone, a practice encouraged by some receiver handbooks and one which seems to say, well we don't really need the r.f. gain control anyway.

RF Gain Control

Tune round the band, with the r.f. gain at max and the audio gain set to give a comfortable signal at the loudspeaker. Find a fairly strong signal accompanied by interference and splash, which should not be difficult on the medium waves. Try backing off (reducing) the r.f. gain and see what happens. Overloading, if there is any, will be reduced and may be eliminated. If your strong signal has weaker QRM as a background then turn down the r.f. gain and compensate by turning up the audio gain. The QRM may disappear leaving a weaker but cleaner wanted station. You can in a similar fashion reduce adjacent channel interference if it is not too strong and the station you want to listen to is not too weak. I often use the receiver with the audio gain at max and the r.f. gain acting as the volume control.

The r.f. gain control is very useful not only on the medium waves but on some of the busy short wave bands as well. Above all, get the feel of this control. Find out what the adjustment of r.f. gain will and will not do for you. Next time we will have a look at r.f. attenuators and the receiver's own automatic gain control, usually abbreviated to a.g.c.

Loop Matching Amplifier

Martin Messias G4JCN has been experimenting with a loop differential matching amplifier (d.m.a.) which he built from the circuit which appeared in this column in the September 1980 issue. He first connected the d.m.a. in the conventional manner across the main winding of the loop, dispensing with the coupling winding. "I now had the problem of overloading with consequent spreading of strong signals onto adjacent channels, and I noticed that even with short leads the presence of the d.m.a. slightly modified the tuning range of the loop. I have since removed the d.m.a. from across the main winding and reinstated the coupling winding, and connected the d.m.a. between the output of the coupling winding and the receiver as shown in my diagram (Fig. 2). The result is highly sharp tuning *Q*—also overloading is considerably reduced and the (loop's) tuning range is in no way affected."

The object of both the coupling winding and the d.m.a. is to try to isolate the loop's main winding from the damping effects of the receiver and the leads to it. It is clear from Martin's experiments that the d.m.a. on its own is not wholly successful in achieving this and the double isolation obtained by using coupling winding and d.m.a. in series is more successful. Paradoxically, the original idea of the d.m.a. was as a replacement for the coupling winding as it was felt that the latter when used alone in a conventional loop, would introduce losses. Martin's experience with overloading seems to bear this out. The amount of coupling between main and coupling windings would, I think, be important when isolation between the two is being considered and this may vary from loop to loop, depending on the method of construction. Has anyone else been experimenting with a d.m.a? Many thanks to Martin for passing on the results of his tests.

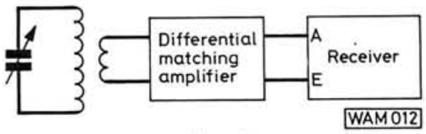


Fig. 2

Sticker from Deutschlandfunk (supplied by Richard Hunt)

Absent Friends

I recently had an interesting letter from an Egyptian doctor living in Nigeria. As might be expected he is a regular listener to Radio Cairo and he was enquiring about the general decline in reception that had taken place over a period of time. It was not his receiver as a number of his friends were having the same trouble.

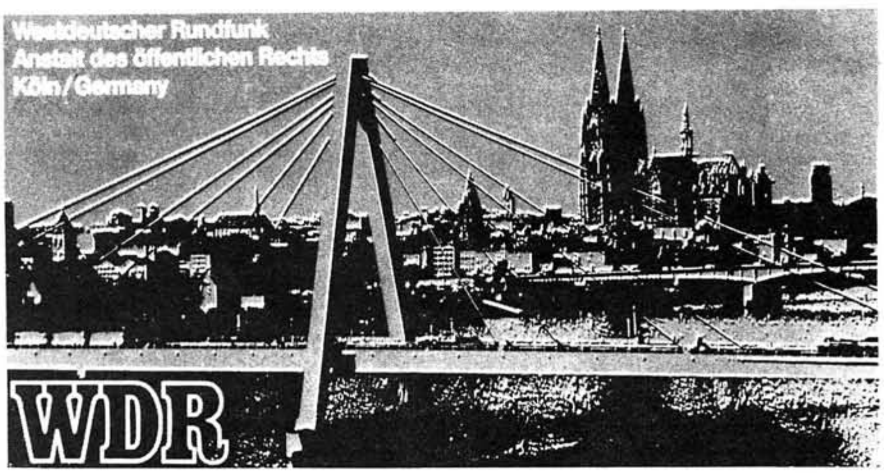
Although this problem is from the short waves it brings to mind a curious situation that I have been aware of for a number of years on the medium waves. It is the gradual disappearance of DX that at one time was conspicuous. La Voz del Rio Cauco in Cali Colombia on 820kHz comes to mind. At one time it was reported regularly in the UK and could almost be used as a pointer to propagation on that path. Now it is seldom heard. I could make a list of DX on the North American path, headed by CJCB in Sydney Nova Scotia on 1270kHz, which used to be heard frequently. It is hard to think of an explanation and probably there isn't a single one. I wonder though if we DXers are responsible for some of it. Regular reception reports from an unexpected direction may prompt the overhaul of directional antennas and the suppression of an unexpected lobe in that direction.

Readers' Letters

The lack of published information about commercial stations in Eire is commented on by **J. Howard** of St Helens. These stations come in well here in the NW of the country. The answer, I suppose, is that they are illegal, surprising as this may seem, for they can hardly be operating in a clandestine manner in that country.

Radio Wyvern, which covers Hereford and Worcester, is testing on 1530kHz and 954kHz writes **John Dennis Court** from Birmingham. He also sent me some information about the end of summertime. For most of Europe this occurred on September 26 and the effect on DXing in the UK was that European QRM subsided an hour earlier for the four week period until we too went onto wintertime. This occurs every year of course and it does give the DXer a chance to have a preview of winter DX on the band.

Reader **G. M. Christie** of Stromness in Orkney refers to my item about using an



QSL Card from West Germany (supplied by Richard Hunt)

www.americanradiohistory.com

external antenna with a receiver not fitted with antenna sockets (September issue). He spends his working life at sea on the m.v. *Pole Star* which belongs to the Lighthouse Service and he says his receiving environment is about 99 per cent within the "tin box" type of enclosure referred to by me. His answer is a 15m vertical antenna fed by a lead of about the same length to a home-made a.t.u. and thence to a seven-turn coil of wire. "It sits between the carrying handle, when folded back, and the back cover of the receiver—right behind the ferrite rod. Sliding this coil, which is earthed, to a position giving optimum reading on the "S" meter, provides the signal required. Twiddling the variable capacitors on the a.t.u. peaks everything up beautifully". The receiver is an Elizabethan Pathfinder which now provides excellent reception of IBA Radios Clyde on 1152kHz, Tay Perth on 1584, Tay Dundee on 1161 and Forth on 1548kHz.

Short Wave Broadcast Bands

by Charles Molloy G8BUS

Reports: as for medium wave DX, but please keep separate.

A major problem facing listeners to the international broadcast bands is the lack of up-to-date information about programmes and frequencies. It does exist. It can be found in station programme schedules which are supplied free to listeners who write for it; in DX programmes which have to be listened to if you know when and where; in the bulletins of DX clubs which of course are normally read by members only. What is required is a publication aimed at the short wave programme listener, who may not be interested in DXing but who would like to know what is on the air at any time of the day and where to find it.

An international magazine called *Voices* appeared during 1980 in an attempt to meet this need. Unfortunately it failed owing to lack of advertising support. It is sometimes suggested that I should, in this column, try to fill the gap but a quick look at the size of the task will show that it is not feasible in the space available. To my knowledge there are some ninety countries broadcasting regularly in English on the short waves. Even if one left out some of the more exotic such as Nepal, together with others that are not likely to be heard at programme value in the UK, there would still be a sizeable list to compile and update.

Broadcasting Seasons

The four "seasons" on the short waves start in March, May, September and November. Changes in propagation brought about by variations in the length of day in different parts of the world as the year progresses, lead to a move around the spectrum at the start of each season. This is followed by a period of adjustment when some of the less powerful broadcasters search for a spot where they may be heard.

Programme times can change. Many stations stick to UTC (GMT) throughout the year which means that their programmes are an hour later by the clock, in summer. Others, Portugal for example, take account of summertime as observed in their country. The AWR broadcast from Sines on Sundays is on the air at 0830 UTC in summer but changes to 0930 at the end of September when Portugal, but not the UK, goes back to wintertime.

International Listening Guide

A West German DXer, **Bernd Friedewald,** has come up with an answer with his 24-page, A5-sized booklet called *International Listening Guide*. The *ILG* comes out four times a year and the English version will tell you what countries are broadcasting in English at any hour of the day or night. The frequencies used are listed as well.

The main listing is called The External Services in English. Starting at 0000 UTC it goes through the 24 hour period using abbreviations for days of the week, summer or winter, target area, programme structure, relay stations. In addition to the main listing there is an At a Glance section, a listing of DX programmes, a page on Home Services in English, two covering frequencies used in the general services of AFRTS, Radio Australia, BBC London, UN Radio, R Moscow, VOA. A final section covers World News and Commentaries at any hour of the day.

Front cover of *Tropical Bands Survey*

The only criticism I have of the *ILG* is the two week delay in receiving it at the start of each season but as some of the information is not known much in advance, the delay is perhaps understandable. The *ILG* is obtainable from Bernd Friedewald, Merianstr 2, D-3588 Homberg, West Germany for £2 per annum. UK banknotes are acceptable.

Tropical Bands in Winter

The Tropical Bands 2·3MHz to 2·5MHz (120m), 3·2MHz to 3·4MHz (90m) and 4·75MHz to 5·06MHz (60m) are, as the name suggests, used for domestic broadcasting in tropical parts of the world. The high level of static makes the medium waves unattractive while large areas in sparsely populated areas can be covered by comparatively low power transmitters.

Propagation on all these bands is, superficially, similar to that on the medium waves. Stations can be heard in their target area day or night, but reception outside that target area depends on a path of darkness between transmitter and receiver. So if you want to DX on the tropical bands wait until it is dark.

At first sight it might appear that DXing on the tropical bands would be a winter only occupation. Not so. Summer is thought by many to be the best time for Latin American DX but of course you have to stay up until the small hours to hear it. Africa is there at any time of the year, the best time being around sunset and sunrise in the UK.

Asiatic DX

It is in winter that you will hear Asiatic DX since it is at that time of year that there is the required path of darkness. There are two listening periods. The first is in the afternoon when you should hear some DX before stations sign off for the night. Your target area is several time zones ahead so our afternoon is their bedtime. Start about an hour and a half before sunset. The sun is low in the sky here and most of the path eastwards will be in darkness. Look for Indonesia on 3·975MHz (Surabaya), 4·719MHz (Ujung Pandang), 4·764MHz (Medan), for Singapore on 5·052MHz before it signs off at 1600, for India on 3·205MHz (Lucknow), 4·76MHz (Simla), for Papua New Guinea on 4·89MHz (Port Moresby), Australia on 4·92MHz (Brisbane), China on 2·46MHz (Yunnan) 3·94MHz (Hubei), 4·865MHz (Gansu). The second reception period is at sign-on

www.americanradiohistory.com

time which starts at 2100UTC in China, 2200 in Indonesia, and from 2300 to midnight in India.

These stations are only a small selection of DX regularly heard each winter. *Tropical Bands Survey* is an up-to-date listing of stations, published annually in English by the Danish Short Wave Clubs International, DK-2670-Greve Strand, Denmark. It is available to non-members for 25DKr or 9 International Reply Coupons, which are obtainable from main post offices in the UK.

The Indonesian enthusiast is catered for by the 10-page booklet *DXing Indonesia* which is available free of charge from Media Network, Radio Netherlands, PO Box 222, Hilversum, Holland. Incidentally, the 6th edition of the Media Network Booklist is now out and can be obtained free of charge from the same address.

Readers' Letters

Readers will be interested to learn that **Paul Hardy's** search for a Sony ICF 5900 (October issue) has been successful. Paul is delighted with his new receiver which has already pulled in Radio WRNO on 11·965MHz, Radio Cuba in English on 11·93MHz, Radio RSA on 5·98MHz and Greece in English on 11·645MHz, all in the small hours between 0045 and 0200. 11MHz (25m) is an interesting band which is worth checking at any hour of the day and night.

Front cover of the *International Listening Guide*

"I thought you might be interested in DXing conditions at the bottom of Africa" writes sixteen-year-old **Vincent Stevens** from Bellville who is interested in Pacific stations. He mentions hearing the Solomon Islands on 9·545 at 0630UTC, VLW9 in Wanneroo Western Australia on 9·61 at 1230 and VNG, the time signal station at Lyndhurst Australia, on 7·5MHz at 1530. The latter comes in quite well in the UK during the afternoon in winter. "A good catch for DXers around the World might be Capital Radio Transkei which broadcasts with 50kW on 3·93, 7·145, 9·765 and 11·75MHz" concludes Vincent.

"Greeting from beautiful British Columbia from an ex-Londoner" writes **John White** who goes on to say. "I picked up *PW* August 82 from a Vancouver magazine store the other day only to find you had arbitrarily moved the RCI antenna farm from Sackville to Moncton." Must have been thinking of CBA on 1070kHz which made that move several years ago! John goes on to mention the well-known *Whites Radio Log* (no relation). The publication rights have been acquired by D. L. Gabree who is currently working on a 1983 edition, "with a complete up-date of all US and Canadian frequencies by location and call letters for AM, FM and TV with expanded and up-dated short wave section". The new edition will be available from D. L. Gabree, #211-155 West 13th Street, North Vancouver, B.C. Canada V7M 1N5 for $3·95 (Canadian) post paid.

Finally, *Waveguide,* the weekly BBC programme, is now broadcast on the World Service at 0915 on Mondays and 1735 on Wednesdays.

VHF Bands

by Ron Ham BRS15744

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

As 1982 draws to a close and we get ready for 1983, we can look back on a satisfactory year for all interests in amateur and broadcast radio, which, for the DXer, included openings on all bands from 28MHz (10m) to 10GHz (3cm). For the newcomer there has been the valuable experience of anomalous propagation caused by auroral, sporadic-E and tropospheric disturbances.

Solar

Cmdr Henry Hatfield, Sevenoaks, recorded a very large burst of solar radio noise on 136MHz at 1447 on September 19, and like me, recorded a minor noise storm, at both 136 and 143MHz, on the 27th and 28th and a few tiny bursts on the 29th and 30th and October 2. When possible, **Ted Waring,** Bristol, observed the sun with his optical equipment and counted 32 sunspots on September 22, 40 on the 29th, 8 on October 6 and 21 on the 10th. No doubt it was some form of activity associated with these sunspots, that caused the ionospheric disturbances, reported by the BBC World Service, during the early hours of September 22 and October 8 and the auroral manifestations in late September.

Aurora

Between 0656 and 0716 on September 22, **David Newman** G4GLT, Leicester, heard auroral signals from the 50MHz (6m) beacon GB3SIX with his beam pointing toward the north-east. At 0733 **Andrew "Jim" Lyon** G8LPY, Worthing, heard GM3WCS making several auroral contacts but was unable to raise him because Jim's TS700G, running "barefoot" was beaten to the QSOs by "bigger guns". At 1805 on the 26th, with my beam pointing north, I logged strong auroral reflected signals from 11 east-european broadcast stations between 48 and 68MHz.

The 28MHz Band

"Conditions are beginning to improve on 28MHz now" writes **Susan Beech** RS50969, Dollar, Scotland, who found October 4, "a good day for the Ws". "My favourite band" writes **Norman Jennings** from Rye in Sussex and a bit further along the coast in Dover, **George Coulter** heard signals from 9K2BE Kuwait on September 29 and J3AH Grenada on October 1. During the RSGB 21/28MHz Phone contest on October 10 the Bournemouth Radio Society's station, operated by G4GTH, G4LFM and G4NXG, made around 365 contacts and scored over 27 000 points. "The contacts were coming thick and fast" said **Elaine Howard** G4LFM who was at the operating desk when they made 150 QSOs on 28MHz in 90 minutes. On the same day, St Dunstaner, **Bill Shea** G4AUJ, Brampton, using an FT–107, 2100Z linear and TA33J rotatable beam at 13m a.g.l., found the band wide open and worked stations in Ws 1, 2, 3, 4, 5, 8, 9 and 0 and many VEs, most at 58 and 59 plus. It is good to hear the DX on 28MHz again, I logged a few JAs on October 12, several VEs on the 9th and 12th and many Ws on the 4th, 5th, 9th and 12th.

28MHz Beacons

Both **John Coulter,** Winchester and David Newman reported hearing the beacon PY2AMI send "PWR 10W—AMERICANA–SAO PAULO–PSE QSL INFO 73". Like David, John heard

www.americanradiohistory.com

EAST LONDON HAM STORE

H. LEXTON LIMITED

191 FRANCIS ROAD LEYTON E.10
TEL 01-558 0854 TELEX 8953609 LEXTON G

DRESSLER AMPLIFIERS

These are high power 240V linears using 4C x 150 or 4C x 250 or 4C x 350 Eimac Tubes NOT using the grounded Grid system.
Fully protected, no thermal damage to PA finals possible.

DRESSLER AMPLIFIERS

D70 70cm 200wfm 400 PEP	£495.00
D200c 2mtr 125wfm 200w PEP	£285.00
D200 2mtr 300wfm 600w PEP	£495.00
D200S 2mtr 400wfm 1KW PEP	£600.00

GASFET DRESSLER PRE–AMPS

VV2	
VV2GAAS 150W	£40.00
VV200GAAS 750W	£69.00
VV2000GAAS 1KW	£79.00
VV2RPS S0259	Non switching £22.00
VV2RPS N Type	£24.00
VV7RPS S0259	£22.00
VV7RPS N Type	£24.00

Powered by the linear or with separate interface.
0.7 - 0.9dB signal to noise
0.2dB insertion loss

3SK97 GASFET Available separately £4.50

GASFET MASTHEAD PREAMPS

WE WOULD LIKE TO WISH A MERRY CHRISTMAS
AND A PROSPEROUS NEW YEAR TO ALL OUR CUSTOMERS

ICOM

IC740 HF 100W	£699
IC720RHF 100W G/C	£899
IC730 HF 100W	£586.00
IC2KL Linear	£829.00
IC2KLPS P.S.U	£211.00
PS15 P.S.U.	£ 99.00
PS20 P.S.U	£130.00
AT500 A.T.U	£299.00
RX70 Receiver	£469.00
PS15 P.S.U	£99.00

ICOM

IC2E 2mtr fm portable	£159.00
IC4E 70cm fm portable	£ 99.00
IC25G 2mtr 25w fm	£235.00
IC290 2mtr 10w fm/ssb	£366.00
IC251 2mtr 10w fmkw/ssb/base	£495.00
IC451 70cm 10w fmkw/ssb/base	£630.00
IC490 70cm fm/ssb mobile	£445.00
ICSP3 Speaker	£ 29.00
ICSM5 Mic	£ 29.00

ICOM

Accessories	
ICLC/1/2/3 case	£ 4.25
ICWM9 SP/Mic	£ 12.00
ICBP2 6V pack	£ 29.50
ICBP3 9V pack	£ 20.00
ICBP4 empty pack	£ 6.95
ICBP5 12V pack	£ 39.50
ICCP1 charging lead	£ 3.75
ICDC1 12V car pack	£ 9.75
LC8 leather case	£ 18.98
BC30 Base Charger	£ 45.00

TRIO/KENWOOD

TS930 General Coverage RX/TX	£995.00
TS830 100W HF	£650.00
TS530 100W HF	£475.00
TS130 100W HF	£495.00
TS130 25W 2mtr FM/SSB	£390.00
TS7850 40W 2mtr FM	£300.00
TS7800 25W 2mtr FM	£245.60
TR2500 2mtr Portable	£200.00
TR7730 2mtr FM	£245.00
AT230	£110.00
SP230	£ 34.00
DM801 GDO	£ 60.00
R600 Receiver AM/SSB	£190.00

YAESU

FT-one gen. coverage TX/RX	£1295.00
FT102 150W 10mtr-160mtr	£690.00
FT707 100W 5-10mtr	P.O.A.
FP707 20A P.S.U.	P.O.A.
FC707 A.T.V.	P.O.A.
FT107M 9 band 100W	P.O.A.
FP107 P.S.U.	P.O.A.
FT101ZD 160-10mtr	
FT9020M 160-10mtr AM/FM	P.O.A.
SP901 Speaker	£ 30.00
FC902 A.T.U	£135.00
FL2100Z 1.2KW PEP linear	£425.00
FC102 Speaker	P.O.A.
FC102 A.T.U	P.O.A.
FV102 V.F.O.	P.O.A.

Morse Readers

MBA electronic morse/RTTY reader	£170.00
Microdot/morse/RTTY printer/	
VDU/Key Board all one peice	£650.00

YAESU

FT290R with mods	FM/SSB	£245.00
FT480R 2mtr mobile	FM/SSB	£365.00
FT780R 70cm 7.6swift	Shift	£400.00
FT780R 70cm 1.6 swift	Shift	£440.00
FT208 2mtr portable	FM	£195.00
FT708 70cm portable	FM	£205.00
FT230 2mtr FM mobile		£220.00
FRG7700 receiver	AM/FM/SSB	£295.00
FRG7700 memory		£ 80.00

FRV7700A 118-150	£ 60.00
FRV7700B 50-60/118-150	£ 75.00
FRV7700C 140-170	£ 65.00
FRV7700D 70-80/118-150	£ 72.00
FRT7700 Aerial Tuner	£ 37.00
FRA7700 Active Antenna	£ 36.00
FF5 Filter	£ 9.95
MMB11 FT290 Car Mount	£ 22.00
NC11C Charger	£ 8.00
NC8 Base Charger	
FT208/208 108	£ 44.00

MORSE READERS

+ Tasco Telereader	
CW/RTTY	£250

DIAWA

RM940 Mic	Infrared	£ 45.00
CN620A	1KW SWR	£ 52.81
CN1001	Auto A.T.U.	£156.00
CN2002	2KW Auto A.T.U.	£228.00
CN518	2.5KW A.T.U.	£175.00
AF406 Active Filter		
AF606 P.L.L. Active Filter		£ 56.00
DR7500X		£95.00
DR7500R		£100.00
DR7600X		£135.00
DR7500R		£145.00

DATONG

D70 Morse Tutor	£ 56.35	D75 Manual clipper	£ 56.35
PC1 Gen. cov converter	£137.00	RFC Speach clipper	£ 29.90
FL1 Agile filter	£ 79.35	AD270 Indoor active ant	£ 47.15
FL2 Active filter	£ 89.70	AD370 Outdoor active ant	£ 64.40
FL3 Agile filter & notch	£129.37	RFA Wide band AMP	£ 33.92
ASP Auto clipper	£ 82.80		

WELTZ

SP200 1.8-160MMZ 20-200-1KW	£ 59.00
SP300 1.8-500MMZ 20-200-1KW	£ 79.00
SP400 130-500MMZ 5-20-150	£ 59.00
SP250 1.6-60MMZ 20-200-2K	£ 43.00
SP15 1.08-160MMZ 5-20-200	£ 29.95
CT150 150/400W Dummy Load	£ 31.00
AC38 3.5. 30MMZ A.T.U	£ 59.00
SP10X 108-150MMZ 20-20n	£ 19.95

DURING DECEMBER OUR PREMISES WILL BE OPEN SUNDAY FROM 10-3

MORSE KEYS

Morse keys Swedish brass key	£49.00
Himound HK706	£ 11.00
Himound MK706	£ 20.00
Himound HK7022	£ 22.50
Kenpro squeeze key 100 electronic key	£ 57.00
Dawa DK210 Electronic keyer	£41.00

POWER SUPPLIES

The Lexton	
7ampMax 12amp	£ 49.95
20ampMax 22amp	£ 79.95

Fully protected against overvolts, over current S/C protected & RF protected

Trade enquiries invited and own name can be provided

SONY

ICF2001 receiver	£140.00

Microwave modules

MML 144/30 1-3w drive	£ 9.95
MML 144/100 L.S. 1-3w drive	£159.95
MML 144/100 S10Wdrive	£139.95
MMC 435/600 ATV converter	£ 27.90
MM2001 RTTY receiver	£189.00
MM4000 RTTY tranceiver	£269.00
MM1000KB key board + transceiver	£299.00
MMT28/144	£109.95
MMD050 frequency counter	£ 75.00

+ ALL MODELS STOCKED

TONO

2M - 50W Linear amp. 1-3Win -	£ 62
2M - 70W Linear amp. 10Win	£ 90
2M - 100W Linear amp. 10Win -	£115
θ 500 - CW/RTTY Terminal -	£299.00

SCANNING RECEIVER

Scanning Receiver SX200N	£249.00

ROTATORS

Kenpro KR 250	£ 44.95
Hirshmann HR 250	£ 50.00
Kenpro KR400RC	£100.00
Kenpro elevation rotator	£85.00

TONNA

144 4ELE **£12.00** 432/440 21 ELE	£19.00
144 9ELE **£16.00** 432/435 21 ELE A.T.V.	£27.00
144 9ELE crossed 30.0 144/435 9 19ELE	£31.00
144 9ELE portable 30.0144 19ELEX	£30.00
144 16ELE **£33.00** 1296 23ELE	£27.00
144 13ELE portable **£29.00** Phasing Harnes	
430/440 19ELE crossed telescopic masts	
435 19ELE	£19.00

TET

HB33T	£189.00	HB35C	P.O.A.
HB34T	£202.00	SQ22144	£ 55.00
HB35T	P.O.A.	SQ22OX144X4	£ 90.00
		SO007 70cm	P.O.A.

See the new standard C5800 Multimode 25W SSB/FM/CW 2Mtr £359.00

JAYBEAM

TB3 HF 3 band	£181.70	5XY2M	£24.70
VR3 band vertical	£ 46.00	8XY2M	£31.00
C52M colinear	£ 47.72	10XY2M	£40.80
5Y2M 5ELEYAGI	£ 12.00	Q4/2M	£25.80
8Y2M 8ELEYAGI	£ 15.50	Q6/2M	£33.90
10Y2M10ELEYAGI	£ 33.00	Q8/2M	£39.00
PBM1010EPARABEAM	£39.50	MBM548/70cm	£31.00
PBM1414EPARABEAM	£48.00	MBM88/70cm	£42.50
		8XY 70cm	£36.80
		12XY 70cm	£46.00

HOXIN

GP5 2mtr colinear 6.4DB	£33.00	DX1 discone TX-TX	£34.00
		HF5DX 80-40-20-15-10 mtr Vertical	£84.00

ALL ACCESSORIES AVAILABLE – PLUGS SKTS CO-AX 2MTR COLINEAR £31.50, 70CM COLINEAR £31.50

Access

PRICES INCLUDE VAT AT THE PRESENT RATE OF 15%
OPEN MON–FRIDAY 9:00–5.30. SATURDAY 10:00–3:00. INSTANT HP FACILITY AVAILABLE
EASY ACCESS M2–M11–M1 NORTH CIRCULAR ROAD–EASY PARKING

BARCLAYCARD
VISA

www.americanradiohistory.com

WOOD & DOUGLAS

WHY NOT TRY ONE OF OUR WELL PROVEN KITS AS PART OF YOUR CHRISTMAS ACTIVITIES?

PROJECT	CODE	ASSEMBLED	KIT
70cms EQUIPMENT			
Transceiver Kits and Accessories			
FM Transmitter (0.5W)	70FM05T4	**38.10**	23.10
FM Receiver	70FM05R5	**68.25**	48.25
Synthesiser (2 pcb's)	70SY25B	**84.95**	60.25
Synthesiser Transmit Amp	A-X3U-06F	**27.60**	17.40
Synthesiser Modulator	MOD 1	**8.10**	4.75
Bandpass Filter	BPF 433	**6.10**	3.25
PIN RF Switch	PSI 433	**9.10**	7.75
Converter (2M or 10M i.f.)	70RX2/2	**27.10**	20.10
FM Package 2 (Synthesised)	70PAC2	**163.00**	128.00
TV Products			
Receive Converter (Ch 36)	TVUP2	**26.95**	19.60
Pattern Generator	TVPG1	**39.95**	32.53
TV Modulator	TVM1	**8.10**	5.30
3W Transmitter (boxed)	ATV-1	**87.00**	—
3W Transceiver (boxed)	ATV-2	**119.00**	—
Power Amplifiers (FM/CW Use)			
50mW to 500mW	70FM1	**14.65**	8.85
500mW to 3W	70FM3	**19.65**	13.25
500mW to 10W	70FM10	**30.70**	22.10
3W to 10W	70FM3/10	**19.75**	14.20
10W to 45W	70FM45	**58.75**	45.20
Combined Power Amp/Pre-Amp	70PA/FM10	**48.70**	34.65
Linears			
500mW to 3W	70LIN3/LT	**25.75**	18.60
3W to 10W (Compat. ATV1/2)	70LIN3/10E	**39.10**	28.95
Pre-Amplifiers			
Bipolar Miniature (13dB gain)	70PA2	**7.90**	5.95
MOSFET Miniature (14dB gain)	70PA3	**8.25**	6.80
RF Switched (30W Max)	70PA2/S	**21.10**	14.75
2M EQUIPMENT			
Transceiver Kits and Accessories			
FM Transmitter (1.5W)	144FM2T	**36.40**	22.25
FM Receiver	144FM2R	**64.35**	45.76
Synthesiser (2 pcb's)	144SY25B	**78.25**	59.95
Synth Mult/Amp (1.5W o/p)	SY2T	**26.85**	19.40
Bandpass Filter	BPF 144	**6.10**	3.25
PIN RF Switch	PSI 144	**9.10**	7.75
Synthesised FM Package (1.5W)	144PAC	**138.00**	105.00
Power Amplifiers/Linears			
1.5W to 10W FM (No Changeover)	144FM10A	**18.95**	13.95
1.5W to 10W FM (Auto-Changeover)	144FM10B	**33.35**	25.95
1.5W to 10W SSB/FM (O/P c/o)	144LIN10A	**26.80**	19.87
1.5W to 10W SSB/FM (Auto c/o)	144LIN10B	**35.60**	26.95
Pre-Amplifiers			
Low Noise, Miniature	144PA3	**8.10**	6.95
Low Noise, Improved Performance	144PA4	**10.95**	7.95
Low Noise, RF Switched	144PA4/S	**18.95**	14.40
SYNTHESISER ACCESSORIES			
Display Decoder/Driver	DISP1/2	**22.60**	16.10
GENERAL ACCESSORIES			
Toneburst	TB2	**6.20**	3.85
Piptone	PT3	**6.90**	3.95
Kaytone	PTK3	**6.80**	4.25
Relayed Kaytone	PTK4R	**9.95**	7.75
Regulator	REG1	**6.80**	4.25
Solid State Supply Switch	SSR1	**5.80**	3.60
Microphone Pre-Amplifier	MPA1	**5.40**	2.95
Reflectometer	SWR1	**6.35**	5.35
CW Filter	CWF1	**6.40**	4.75
TVI Filter (Boxed)	HPF1	**5.95**	—
MICROWAVE PROJECTS			
Microwave Drive Source	MD05T	**29.50**	20.40
Bandpass Filter	BPF 384	**5.10**	3.25
4M EQUIPMENT			
FM Transmitter (1.5W)	4FM2T	**34.75**	21.20
FM Receiver	4FM2R	**61.65**	43.15
Pre-Amplifier	4PA4	**10.95**	7.95
Pre-Amplifier, RF Switched	4PA4/S	**18.95**	14.40
6M EQUIPMENT			
Converter (2M)	6RX2	**27.60**	19.95

Enquiries by post should contain a SAE. Please restrict telephone technical enquiries between 6 pm and 9 pm in the evening on either 0256 24611 or 07356 5324. Access and Barclaycard orders can be taken on 07356 5324.

MAIN AGENTS J. Birkett, LINCOLN 0522-20767
Darwen Electronics, LANCS 0254-771497
Amateur Radio Exchange, ACTON 01-992 5765
Wood & Douglas (Scandia) HB, SWEDEN 040-94-89-55

Prices include VAT at the current rate. Please add 75p postage and handling to the total order. ATV-1 and ATV-2 orders should include £2.00 for postage and insurance. Please allow 28 days for delivery if not stock at time of ordering.

9 HILLCREST, TADLEY
BASINGSTOKE, HANTS RG26 6JB

COMMUNICATION CENTRE OF THE NORTH

The largest range of communications equipment available in the North. Full range of receivers, transceivers, antennas, power supplies, meters. Ali tubing – wall brackets etc.

We are the only official TRIO stockists in the North West. Full range of equipment on display. Guaranteed after sales service.

We can offer a full range of receiver from the SR9 2m **£46.00** to the Drake R7 at **£989** and the NRD515 at **£985.00** + Antenna Tuning Units – Audio Filters – Indoor and Outdoor Antennas – Cable – Plugs etc.

RECEIVERS

TRIO R2000 Solid State Receiver due shortly. **TRIO R600** Solid State Receiver 150KHz to 30MHz **£235.00. Yaesu FRG7** Solid State Receiver **£199.00. Yaesu FRG7700** Solid State Receiver **£329.00.**

For the caller a wide range of Aluminium Tubing, Clamps, etc. at competitive prices, i.e. 12′ × 2″ Ali Tubing **£9.00.**
+ VHF – Aircraft Band Converters and Receivers.

Part Exchanges welcome. Second hand lists daily.
Send S.A.E. for details of any equipment.
HP terms. Access/Barclaycard facilities.
Open 6 days a week. 24 Hour Mail Order Service.

Phone 0942-676790.

STEPHENS JAMES LTD.
47 WARRINGTON ROAD,
LEIGH, LANCS. WN7 3EA.

Information for Trio R1000 owners

We don't have to tell you how good the receiver is – neither do we have to tell you its missing one essential feature – FM! But no longer. Amcomm have specially designed a unit to complete your listening pleasure. Its small and can be installed with minimum time and effort. It comes with simple and concise instructions which can be understood by the most non-technical of users.

The FM1000 is available now post free at £15.99 including VAT from Amcomm.

AMCOMM

Amcomm Services,
194, Northolt Road, South Harrow,
Middlesex HA0 2EN.
Telephone: 01-864 1166, 01-422 9585.
Telex: 24263.

SHOWROOM OPEN TUESDAY TO SATURDAY 10.00–6.00.

www.americanradiohistory.com

a new beacon signal on 28·265MHz sending PY2EXD5W and assumes that the last figure and letter of the callsign refers to its transmitter power. **W. G. Kelly,** Belfast, one of our readers since the 1930s, now using a Bearcat 220FB receiver, also heard this signal and suggests that it is some form of experimental station. Between 0827 and 0913 on October 3, David Newman logged the New Zealand beacon ZL2MHF and along with Susan Beech, **Dave Coggins,** John Coulter, Henry Hatfield, Ted Waring and I, contributed to the list of beacons heard given in Fig. 1.

The 50MHz (6m) Band

Around 1300 on October 2, **G. M. Pheasant** G4BPY, heard the beacon signals from ZS6LN 50·099MHz and ZS6PW 50·030MHz and **Steve Richardson** G4JCC, Hayling Island, worked ZS6LN, cross-band 28/50MHz. Between 2002 and 2011 David Newman heard ZS6RAC calling CQ in Morse on 50·100MHz, but was unable to raise him on 28MHz. During a minor opening between 1532 and 1714 on October 6, David heard the beacon signals from ZS6LN and ZS6PW intermittently and writes, "There was a major 50MHz opening to South Africa on October 10 which lasted for just over 5 hours, from 1158, when the beacon ZS6PW was first heard, until 1707 when the beacon ZS3E 50·075MHz was last heard". Around 1400, David heard the 6W s.s.b. signal from ZS6LN at 599 from Pietersburg and later worked him cross-band along with stations near Luderitz Namibia, Pretoria, Johannesburg and Randburg. Steve Richardson also received strong signals from ZS3E and ZS6PW and made cross-band QSOs with ZR6ABF, ZR6AIG and ZS6LN, and between 1230 and 1410 on the 11th, he heard signals from the Gibraltar beacon ZB2VHF.

Microwaves

On September 14, **John Tye** G4BYV, Dereham, Norfolk, worked DB5KS on 3·456GHz, at 464km, which he thinks is a new DX record (congratulations anyway John) and writes, "most of the credit must go to Rolf DB5KS who uses home-made gear with 6W of s.s.b. and 2 MGF1400 GaAs f.e.t.s in his receiver". John's signal was also heard by DD3KL.

During a recent expedition to Trundle Hill, the old wartime radar site near Chichester, **Ron Allen** G2DSP (Fig. 2) tested out his new home-brew microwave gear and 144MHz (2m) talk-back equipment with **Terry Allen** G4ETU (Fig. 3). Both Ron and Terry are members of the Chichester and District Amateur Radio Club and are well known for their microwave work from this site.

Fig. 2: Ron Allen on Trundle Hill

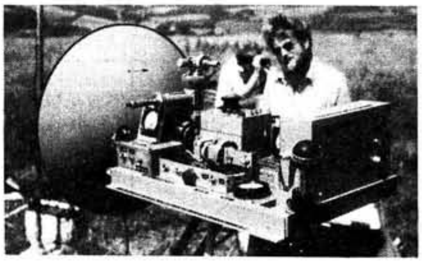


Fig. 3: Terry Allen with Ron's home-brew gear

RTTY

Over the past 2 years, **Peter Lincoln** BRS42979, Aldershot, using Eddystone 1570/3 and Tandy DX300 receivers and a Microwave Modules MM2000 RTTY converter, has received RTTY signals from over 70 countries, with 20 confirmed, including his best DX, CE3 and ZL2. Peter uses a 5-band vertical antenna for the h.f. bands and his shack records are kept on a Sharp MZ-80K computer, linked to a MZ80FB floppy disc drive and a MZ80P3 printer.

Between September 12 and October 10, Norman Jennings copied signals from FP8DF, JA9TX, UK3MAE, 4D2RLC and 9M2DW on 14MHz (20m), K0OAM, N4SR and YV1AQE on 21MHz (15m) WB8BDE on 28MHz (10m) and G4LJG on 144MHz (2m), which are the "pick of the bunch" from his RTTY log. Among the signals of special interest were I8AA and UT5RP who, on 14MHz on October 6, were sending 2 or 3 pages of DX news. During the period of this issue's report, September 19 to October 18, I logged signals from RTTY stations in 11 countries, C3, DL, EA, F, OE, OK, OZ, UA, VE, VK and Y3 on 14MHz and a very strong signal at 1402 on October 12, from 4N7NS on 28MHz. The best QSO I copied during the period was at 0928 on the 17th between DJ1UR and VK5XO.

Tropospheric

The atmospheric pressure, measured at my QTH, remained below 30·0in (1015mb) from September 19 to midday on the 30th when it crept just above 30·0 until 0800 on October 4. It fell to 29·6 (1002) on the 5th and remained below 29·8 (1009), reaching a low of 29·1 (985) on the 14th, until the end of this report on the 18th. In no way did this low pressure help v.h.f. propagation; however, on September 13, before the high pressure system moved away, Susan Beech heard EI1DK on 144MHz and signals through the repeaters in Belfast GB3NI R5, Cumbria GB3AS R1 and Moel-Y-Parc GB3MP R6.

Band II

Throughout the evening of September 14, **Simon Hamer,** Presteigne, heard very strong signals from broadcast stations in Belgium BRT-2 Egem, Genk and Schoten and RTB-3 Liège, Holland NOS 2/4 Wesselstein and NOS-1 Smilde and Germany NDR Aurich and Hamburg, SDR Heidelberg and Waldenburg and WDR Langenburg and Teutoborgenwald, plus AFN Stuttgart and BFBS Bielefeld and Langenburg in Band II. "Our new 'local', Radio Wyvern made a good start last Monday" writes Simon on October 10 and also reports hearing another new ILR station, Wiltshire Radio, on 96·4MHz. From Cheltenham, **John Williams** reports "almost perfect" reception from Radio Cymru on 96·8MHz, which he thinks is from Wenvoe, and hearing Radio Wyvern.

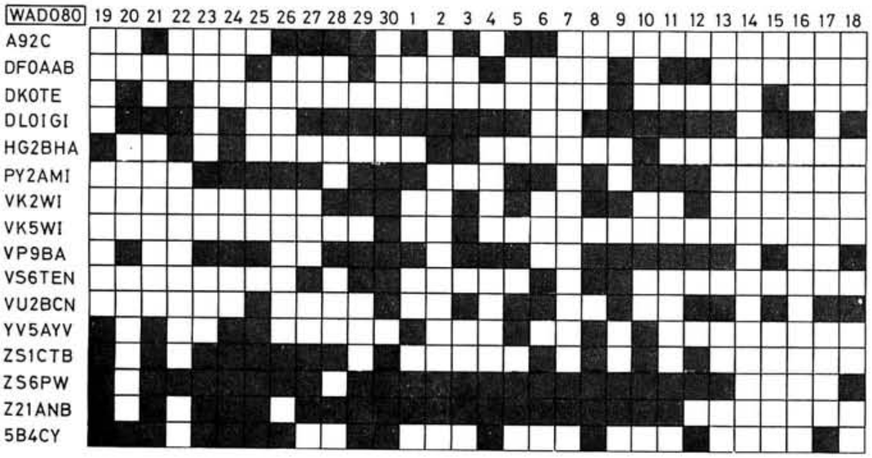


Fig. 1: Distribution of beacon signals

www.americanradiohistory.com

Radio Astronomy

In Lisburn, Northern Ireland, **Colin Clements** has built a "DICKE" type radio telescope, operating at 435MHz, using a Microwave Modules MMC/435/600 converter, installed with the antenna switching unit in a weather-proof box at the antenna (Fig. 4). The i.f. of 600MHz is fed by a 50Ω coaxial cable to the main receiver (Fig. 5) which comprises an RBM A633 TV tuner and A583 i.f. unit. The antenna (Fig. 4), a cylindrical paraboloid, is fixed to a meridian-transit mounting and Colin plans to make this, subject to weather, fully steerable by the new year. As well as studying radio noise from celestial sources, Colin is very interested in radio emissions from aurora and the "active" sun. Readers interested in this subject should write to Colin, enclosing an s.a.e., at 28 Edenvale Gardens, Lisburn, BT28 ZUT, Northern Ireland.


Fig. 4: Radio astronomy antenna built by Colin Clements

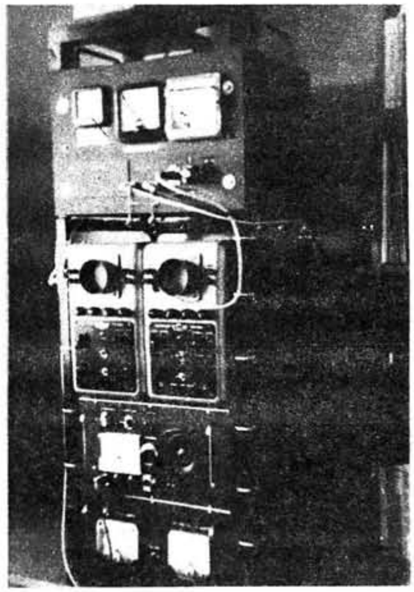


Fig. 5: 435MHz radio astronomy receiver built by Colin Clements

St Dunstaners in Brighton

About 20 members of the St Dunstan's Amateur Radio Society, gathered at Ian Fraser House, Ovingdean, on October 16/17 for one of their Radio Weekends. Members were operating with their special callsign, GB4STD and worked stations in Australia, Moscow and New Jersey on the h.f. bands with a Trio 130S and TA33 beam and local stations on 144MHz with an IC240 and colinear antenna. Around 1700 on the 16th, club secretary **Ted John** G3SEJ and guests from *Practical Wireless* listened to a QSO on 7MHz (40m) between GB2FMG, with YL operator Gwen and GB4PDS, both taking part in the JOTA weekend.

The Saturday afternoon guest speaker was Elaine Howard G4LFM, who spoke about her training as a ship's Radio Officer and how she and the 20 or so others who completed the 3-year course reached a minimum c.w. proficiency of over 20 w.p.m.

Elaine stressed that the major part of the RO's work is safety of life at sea and explained how the letters SOS in c.w. and the word MAYDAY on the RT were given absolute priority, and that a ship may steam for many days away from its normal course to answer a distress call. During the course, Elaine studied electronics and radar and was required to trace deliberately-induced faults on emergency, main station and radar equipment.

On Sunday morning, **Tony Bailey** G3WPO, **Roy Bannister** G4GPX and **Joyce Bannister** and **Manuel Cruz** G4IQG, the UK representative for blind amateurs in Spain, joined the meeting and Tony demonstrated an audio s.w.r. bridge and talking frequency counter. Later, Ted John told me that he was impressed by the clarity of the speech and the accuracy of the "WPO" talking counter.

Among the members present were **Ray Hazan** who works in the PRO office and uses an American Vesa Braille machine which is like a computer but has a mechanical Braille display, and **Alan Reynolds** G3VRI who uses a talking calculator, clock and thermometer and says that a later device on sale will speak the day and date.

TV

by Ron Ham BRS15744

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

Judging from the many reports I receive, it is obvious that the interest in ATV, DXTV and SSTV increased greatly during the past year, so let us hope that all the newcomers liked what they saw and that their enthusiasm will encourage others and continue throughout 1983.

Amateur Television

Setting up a portable station for a weekend event requires a lot of planning and voluntary effort, even more so if your particular group is going to operate on an island and there is a stretch of water to cross. Proof of this can be seen in Fig. 1 as **Nick Foot** G8MCQ and YL Michelle pushed the gear to and from the boat when they were involved with setting up a station on Brownsea Island in Poole harbour, for the 75th anniversary of the foundation of the Scout movement.

Aurora

Around 1700 on September 6, **Sam Faulkner,** Burton-on-Trent, received a caption from TVR Romania, Fig. 2, on Ch. R2, showing the geographical outline of the country. At this time Sam's beam was facing north-west and the picture was being reflected from the prevailing auroral display.

SSTV

Between September 15 and October 11, **Richard Thurlow,** March, Cambridge, made two-way QSOs with 21 stations for the first time, contributing to a total of 8 in colour and 33 in monochrome including stations previously worked. The first timers ranged from Europe to the USA and the colour contacts were with G3NOX and G4IMO on 144MHz, W4 and W9 on 28MHz and DL, EA and I on 14MHz. Among the monochrome QSOs, which came from Asia, Europe, Japan, South Africa, Scandinavia and the USA, was one of our readers, ZS2AO.


Fig. 1: G8MCQ and Michelle with the expedition gear

www.americanradiohistory.com

During the October SSTV contest, **Peter Lincoln,** Aldershot, received pictures from stations in 8 countries, DJ, F, FM7, IV3, LZ2, WA1, YO8 and YU2. Peter has been interested in Slow Scan Television for just over a year and with his WRAASE SC–140 SSTV Scan converter board, assembled into a home-brew module, he has logged pictures from most of Europe and his best DX so far is Argentina, Japan and the USA.

"From September 15 to October 12, I have been monitoring the calling channel 28·680MHz and enjoying video from stations in JA, LZ, VE, Ws 0–9, ZS2 and ZS6", writes Sam Faulkner. At 1705 on September 23 Sam received pictures of the operator and equipment of ZD8DZ while he was working K4KUG, and at 1015 on October 10, he saw the callsign JA2UJ amid tremendous QRM from central European s.s.b.

Sporadic-E

Although the 1982 sporadic-E season has finished, it is still worth keeping an eye on those favourite spots in Band I for short-lived events, which, if they only last for 30 minutes or so, can be very rewarding. Between Sept 19 and October 18, I have seen frequent bursts of test card from Budapest, Czechoslovakia, Poland and a cartoon film at 0910 on October 3 on Ch. R1. For the most of the afternoon of the 3rd, Sam Faulkner watched motor racing, tennis, noticias and weather from TVE Spain on Chs. E2 and E3.

Major Rana Roy had his share of sporadic-E DX in India and during the season, regularly receives test cards and pictures from the USSR in Band I and kindly sent a photograph (Fig. 3) of a Russian test card he received at 1500 on August 6.

Tropospheric

"The September openings were by far the best I have ever known since I started TV DXing" writes **Simon Hamer,** who sums up the feelings of many DXers including **George Garden,** Bracknell, Sam Faulkner and me. On September 3, Simon received strong pictures from the Dutch transmitter at Goes on Ch. 32 and his usual comprehensive report to NOS was acknowledged by the station's QSL card (Fig. 4). During the evenings of the 14th he received pictures from Belgium BRT–1 Egem on Ch. E43 and BRT–2 Egem on E46, Holland NOS-1 and 2 from Goes on Chs. E29 and 32, and Germany ZDF on E37 and "negative"

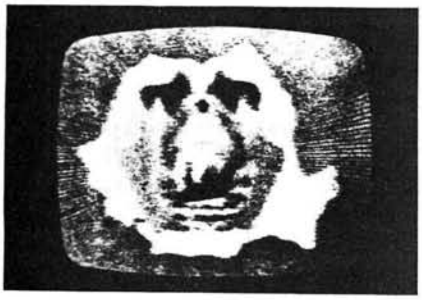


Fig. 2: Auroral picture from Romania received by Sam Faulkner

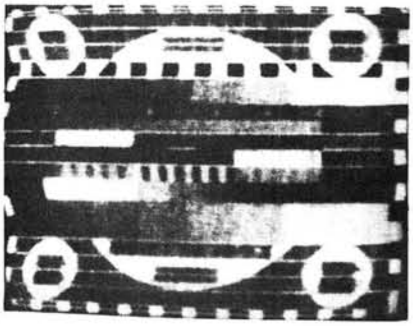


Fig. 3: Russian test card received in India by Major Rana Roy

Fig. 4: Dutch QSL card sent to Simon Hamer

Fig. 5: Announcer from TF1 Lille

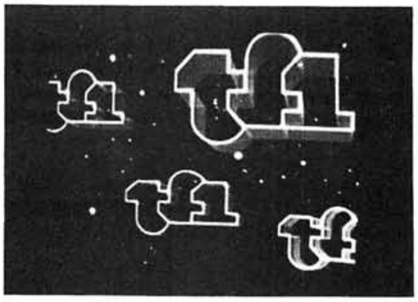


Fig. 6: French TV caption

Fig. 7: Advert seen on Dutch TV by David Girdlestone

Fig. 8: ZDF programme announcement

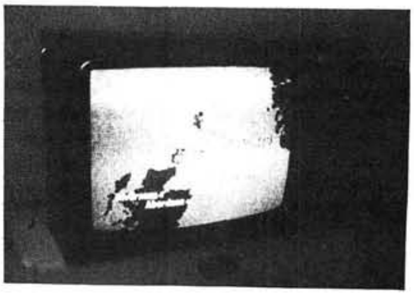


Fig. 9: Tyne Tees on Ch. 29 as seen in Bracknell

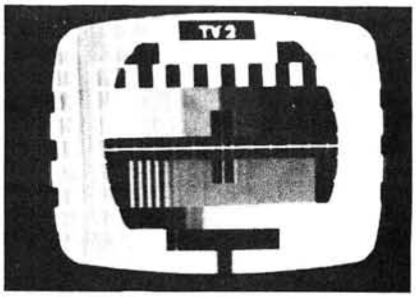


Fig. 10: Test card from Sweden on Ch. 32 received by Sam Faulkner

www.americanradiohistory.com

pictures from France TDF on Chs. 21, 27, 37, 39 and 40. **Nicholas Wythe,** Folkestone, is equipped to receive "positive" pictures from France (Figs. 5 and 6), showing that added enjoyment can be had with this facility on the DX receivers.

Between 1945 and 2045, Simon watched a news programme, *NOS Journal* from NOS–1 Roermond in Band III on Ch. E5 and saw adverts for Oil of Ulay, Amro Bank, Duracel Batteries, Oryza washing up liquid and National Panasonic video equipment. Later, Simon watched a Stravinsky concert from a Rotterdam hall. Among the Dutch adverts for British goods seen by David Girdlestone, Norwich, was one for Mars Bars, Fig. 7.

At 2300 on the 14th, George Garden, Bracknell, received strong colour pictures from Germany ZDF on Ch. 21 (Fig. 8) and between 1800 and 1930, colour pictures from Anglia TV Sudbury Ch. 41, Central TV Waltham Ch. 61 and later, *News at Ten* from Tyne Tees TV Bilsdale on Ch. 29, (Fig. 9). "Band III conditions were also exciting on September 13" writes Sam Faulkner, who received pictures from Radio Telefis Eireann RTE–1 and 2 on Chs. H and J, a news programme caption Berche Montage on Ch. E10, a Scandinavian news programme on E5, the Dienstag Rundfunk caption from East-Germany DDR-1 on E6 and an exhibition of satellite TV equipment from Sweden SR on E9. On the 14th, u.h.f. signals from Sweden were very strong and Sam watched a film review programme from SR TV2 on Chs. 30, 31, 32, 41, 42, 48 and 49. "Chs. 30 and 32 were exceptional, a YL announcer gave the closing headlines, then a clock caption and a brief glimpse of TV2 test card, (Fig. 10) before all transmissions closed at 2130, 2330 Swedish time" writes Sam. He continues "During the fantastic conditions in mid-September, many telephone calls were received at Central TV from bewildered viewers complaining of interference to their programmes and Central TV's news co-presenter, Anne Diamond, explained the reason for the problem and added "viewers in the east of our region may receive television from the Netherlands". They sure did Sam, and like many of us on the 14th, Sam logged many German captions such as ARD, DDR, NDR, WDR and the programmes *Antworten* on Ch. 35 and *Heute Journal* on Ch. 36.

At 1650 on September 13, Alan Beech, Dollar, received a test card on Ch. 29 from RTE–1 and at 1655 it was replaced by a clock with the station identification on it. "Nothing big showed up, apart from Border TV and Ulster TV until about 2000" writes Alan, who then received pictures from TSW at Caradon Hill Ch. 25, 400 miles away. "I hastily wrote to TSW and they replied, confirming it with a programme schedule."

swap spot

Have NEC digital transceiver 1·8–30MHz, u.s.b./l.s.b./a.m./c.w./f.s.k. Would part exchange either way for solid state base or mobile transceiver. G. Wilkinson, 114 Cleveland Road, High Barnes, Sunderland, Tyne and Wear. Tel: Sunderland 220935 (office hours). *P722*

Have Vanden-Plas 4 litre R garaged past two years, spare engine, gearbox, many other spares. Would exchange for FT101ZD MkIII or Icom 211E or w.h.y. Tel: Blackpool (0253) 31040. J. M. Duxbury. *P737*

Have Uniace 100 CB radio, Skipmaster 45000 base microphone, Wotpole base antenna with coaxial cable, s.w.r. meter with patch lead, also Texas TI-51-III calculator. Would exchange for FRG-7 receiver or similar. Michael Young, 64 Williamson Way, Rosehill, Oxford. Tel: 0865 770282 after 4.30pm. *P738*

Have Vero p.c.b. assembly stand. Would exchange for good "Globe King" shortwave one valve receiver and coil set. D. T. Price. Tel: 0533 876459. *P745*

Have Tasco $4\frac{1}{2}$in reflector telescope, tripod, setting circles, mounting and all accessories including two eyepieces and Barlow lens. Would exchange for modern amateur radio receiver, transceiver or transmitter, preferably h.f. bands. Hewitt, Beaumaris, N. Wales. Tel: 0248 810535. *P746*

Have 250 copies of Practical Wireless and 50 copies of Practical Television. Would exchange for 144MHz transceiver or w.h.y. for 144MHz. Tel: Fawley (Hampshire) 897338. *P758*

Have HRO receiver, plus power pack and bandspread coils. Would exchange for photographic items, camera, lenses etc. R. Howard, 32 Windsor Road, Wrenthorpe, Wakefield, W. Yorks. Tel: 362772. *P765*

Have Sharp XC-30 colour video camera. Would exchange for h.f. mobile/base rig with a.m. in good condition. Tel: 0504 882600. *P766*

Have Fidelity 2000 CB with p.s.u., antennas, s.w.r. meter and pre-amp. Also Philips automatic cassette recorder. Would exchange for h.f. bands transceiver or good AR88, CR100, HRO etc. R. Hall, 57 Farnham, Blandford, Dorset. *P783*

Have two-manual organ kit almost finished, variable attack and decay, reverb, drawbars, 36 voices, two 50W amps, 80W speaker and pedal board kit. Would exchange for an amateur or broadcast receiver, 144 or 432MHz hand-held or w.h.y. Oakley 021 550 7818 weekends only. *P807*

Have Mamiya C330 TLR with 3 lens, two computer flash units, flashmeter and lightmeter and hard aluminium case. Worth £500. Would exchange for dual beam oscilloscope. Sean Millar, 24 Steeles Terrace, Ennis, Co. Clare, Eire. *P820*

PW "SWAP SPOT"

Got a camera, want a receiver? Got a v.h.f. rig, want some h.f. gear to go with your new G4? In fact, have you got anything to trade radio-wise?

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

A FEW SIMPLE RULES: Your ad. should follow the format of those appearing above; it must be typed or written in block letters; it must be not more than 40 words long including name and address/telephone number. Swaps only—no items for sale.

www.americanradiohistory.com

ENTER THE NEW WORLD of KW + TEN-TEC

Introducing a New Concept in HF communications

A NEW SERIES WITH NEW FEATURES, NEW PERFORMANCE, AND ALL 9 HF BANDS.

CONTINUING THE SUCCESS OF A GREAT RANGE OF TRANSCEIVERS BACKED BY KW SERVICE –

The OMNI-C
(TOP of any class)
The DELTA
(an excellent "work-horse" for Home station or Mobile)
The ARGONAUT
(amazing performance at low-cost)

-AND NOW! The KW+TEN-TEC 'ARGOSY'

KW + TEN - TEC ARGOSY HF SSB/CW TRANSCEIVER
10-80 metres, 100 watts (Switchable to 10 watts). Notch Filter. Full break-in on CW. Automatic normal sideband selection plus reverse. 12 - 14v D.C. input. All solid-state.
A WINNER AT LOW COST.

Come to KW for all your other amateur radio requirements KW service and guarantee — KW maintains the tradition of service the company is renowned for. Output-transistors unconditionally guaranteed for 12 months. The KW + TEN-TEC units offered above are introduced as a prelude to fully UK essembled equipment.

✱ *(A full range of accessories is available for KW + TEN - TEC equipment)*

Other KW units available
KW 107 Supermatch KW trap dipole KW E-Z match
KW traps KW Balun KW antenna switch.

KW TEN-TEC LTD
Vanguard Works. Jenkins Dale, Chatham ME4 5RT
Tel: 0634-815173 Telex: 965834 KW COMM G

ACCESS MAIL ORDER

Photo Acoustics Ltd
MICROCOMMUNICATIONS DIVISION

BARCLAYCARD MAIL ORDER

TR9130 Probably the best 2 metre multimode
£395.00 INC. VAT

TONNA (F9FT)

144MHz			
9 ele fixed	3.30	1.9	**£17.14**
9 ele portable	3.30	1.7	**£19.40**
9 ele crossed	3.50	2.0	**£31.68**
13 ele portable†	4.50	2.5	**£30.22**
16 ele fixed	6.40	4.4	**£35.19**
17 ele fixed		(NEW)	**£35.19**
435MHz			
19 element	3.20	1.1	**£20.13**
19 ele crossed†	3.30	1.8	**£33.36**
21 element	4.60	2.6	**£28.87**
21 element ATV	4.60	2.6	**£28.87**

TS830S Superb value for money. Only
£632.04 INC. VAT

NEW FT-102 HF all mode transceiver
£725.00 INC. VAT

NEW TS930S Amateur band transceiver with 100KHz-30MHz general coverage receiver
£1078.00 INC. VAT

NEW FT-790R 70cms all mode portable
£299.00 INC. VAT

We welcome Access

CREDITCHARGE INSTANT FINANCE – PART EXCHANGE
58 HIGH STREET, NEWPORT PAGNELL, BUCKS.
TEL: 0908 610625 OR WATFORD 32006

BARCLAYCARD VISA

www.americanradiohistory.com

Sinclair ZX Spectr

16K or 48K RAM... full-size moving-key keyboard... colour and sound... high-resolution graphics...

From only £125!

First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power– personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer–available now–is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232/network interface board.

Key features of the Sinclair ZX Spectrum

- Full colour–8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound–BEEP command with variable pitch and duration.
- Massive RAM–16K or 48K.
- Full-size moving-key keyboard– all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution–256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set–with upper- and lower-case characters.
- Teletext-compatible–user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE–16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC– incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

www.americanradiohistory.com

um

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.

The ZX Microdrive – coming soon

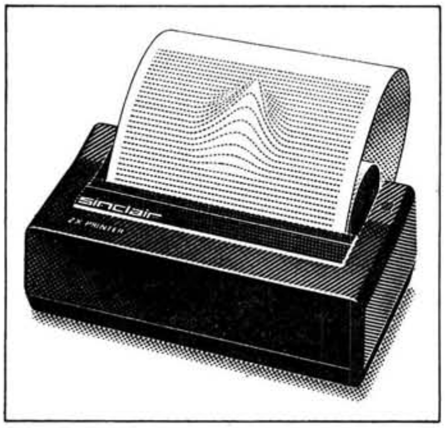
The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

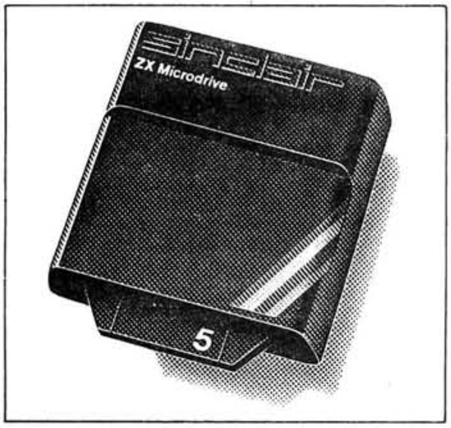
Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy.

The transfer rate is 16K bytes per second, with average access time of 3.5 seconds. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum.

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £50.





ZX Spectrum software on cassettes – available now

The first 21 software cassettes are now available directly from Sinclair. Produced by ICL and Psion, subjects include games, education, and business/household management. Galactic Invasion... Flight Simulation... Chess... History... Inventions... VU-CALC... VU-3D ...47 programs in all. There's something for everyone, and they all make full use of the Spectrum's colour, sound and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

RS232 / network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

sinclair

Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS. Tel: Camberley (0276) 685311.

How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. **Order**

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
			Total £	

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £ ________

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name: Mr/Mrs/Miss

Address

PCW901

FREEPOST – no stamp needed. Prices apply to UK only. Export prices on application.

www.americanradiohistory.com

MICROWAVE MODULES LTD

THEY'RE ALL NEW . . . AND FIRST CLASS!

MM2001

RTTY TO TV CONVERTER

NOW WITH EXTRA FACILITIES! – SUITABLE FOR UOSAT

This converter, MM2001, contains a terminal unit, and a microprocessor controlled TV interface, and requires only an audio input from a receiver and a 12 volt DC supply to enable a live display of "off-air" RTTY and ASC11 on any standard domestic UHF TV set. **The MM2001 will decode these speeds:** RTTY: 45.5, 50, 75, 100 baud; ASC11: 110, 300, 600, 1200 baud. A printer output (Centronics compatible) allows hard copy of received signals. This unit is compatible with amateur and commercial transmissions.

£189.00 inc. VAT (P+P £2.50)

MML144/30-LS

144MHz 30 WATT LINEAR & RX PREAMP

FEATURES:
- 30 WATTS OUTPUT POWER
- SUITABLE FOR 1 OR 3 WATT TRANSCEIVERS
- LINEAR ALL MODE OPERATION
- STRAIGHT THROUGH MODE WHEN TURNED OFF
- ULTRA LOW NOISE RECEIVE PREAMP (3SK88)
- EQUIPPED WITH RFVOX

This new product has been developed from our highly successful MML144/25. It is suitable for use with 1 watt or 3 watt transceivers and the input level is switch selectable from the front panel. Other front panel mounted switches controlling the switching circuitry allow the unit to be left in circuit at all times. The linear amplifier and the ultra low noise receive preamp can both be independently switched in and out of circuit. In this way maximum versatility is afforded. Use this new amplifier with your FT290R, C58, TR2300 etc. and have mobile or base station performance at a realistic cost!

£69.95 inc. VAT (P+P £2.50)

MML144/100-LS

144MHz 100 WATT LINEAR & RX PREAMP

(Appearance as 30 watt model)

100 WATTS OUT FOR 1 OR 3 WATTS INPUT ON 144MHz

FEATURES:
- 100 WATTS RF OUTPUT SUITABLE FOR 1 WATT OR 3 WATT TRANSCEIVERS
- STRAIGHT THROUGH MODE WHEN TURNED OFF
- ULTRA LOW NOISE RECEIVE PREAMP (3SK88)
- EQUIPPED WITH RFVOX
- SUPPLIED WITH ALL CONNECTORS

This new two stage 144MHz solid-state linear amplifier has been introduced as a result of the large number of low power transceivers currently available. When used in conjunction with such transceivers this unit will provide an output of 100 watts.

Several front panel mounted switches controlling the switching circuitry allow the unit to be left in circuit at all times. The linear amplifier and the ultra low-noise receive preamp can both be independently switched in and out of circuit. In this way maximum versatility and flexibility is available to the user at the flick of a switch. Use this new amplifier with your FT90R, C58, TR2300 etc. and have mobile or base station performance.

£159.95 inc. VAT (P+P £3)

MTV435

435MHz TELEVISION TRANSMITTER

FEATURES:
- 20 WATTS PSP OUTPUT POWER
- BUILT IN WAVEFORM TEST GENERATOR
- TWO VIDEO INPUTS
- AERIAL CHANGEOVER FOR RX CONVERTER
- TWO CHANNEL USING PLUG-IN CRYSTALS

This high performance ATV transmitter consists of a two channel exciter, video modulator and a two stage 20 watt linear amplifier. The unit will accept both colour and monochrome signals, and a sync pulse clamp is incorporated to ensure maximum output. An internal pin diode aerial c/o switch allows connection of the aerial to a suitable receive converter when in the receive mode. **(MMC435/600 – £27.90).** Full transmit/receive switching is included together with an internal waveform test generator which will assist the user in adjusting the gain and black level controls.

£149 inc. VAT (P+P £3)

SPACE PERMITS ONLY A BRIEF DESCRIPTION OF THESE NEW PRODUCTS. HOWEVER A FULL DATA SHEET IS AVAILABLE FREE ON REQUEST. OTHER NEW PRODUCTS AVAILABLE INCLUDE:–

MMS2	– ADVANCED MORSE TRAINER	– £169 inc. VAT (P+P £2.50)
MML28/100-S	– 10 METER 100 WATT LINEAR/RX PREAMP	– £129.95 inc. VAT (P+P £3)
MMK1691/137.5	– 1691MHz WEATHER SATELLITE CONVERTER	– £129.95 inc. VAT (P+P £2.50)

OUR ENTIRE RANGE OF PRODUCTS WILL BE EXHIBITED AND ON SALE AT MOST OF THE 1982 MOBILE RALLIES BY OUR SALES TEAM. SEE YOU THERE

ALL MICROWAVE MODULES' PRODUCTS ARE FULLY GUARANTEED FOR 12 MONTHS (Including PA Transistors). Goods by return.

BARCLAYCARD VISA WELCOME

MICROWAVE MODULES
BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND
Telephone: 051-523 4011 Telex: 628608 MICRO G
CALLERS ARE WELCOME, PLEASE TELEPHONE FIRST

HOURS: MONDAY TO FRIDAY 9–12.30, 1–5.00

MORSE TUTOR

The uniquely effective method of improving and maintaining Morse Code proficiency. Effectiveness proven by thousands of users world-wide.

- ★ Practise anywhere, anytime at your convenience.
- ★ Generates a random stream of perfect Morse in five character groups.
- ★ D70's unique "DELAY" control allows you to learn each character with its correct high speed sound. Start with a long delay between each character and as you improve reduce the delay. The speed **within** each character always remains as set on the independent "SPEED" control.
- ★ Features: long life battery operation, compact size, built-in loudspeaker plus personal earpiece.

Price **£56.35**

ACTIVE RECEIVING ANTENNAS

Datong active antennas are ideal for modern broadband communications receivers – especially where space is limited.

- ★ highly sensitive (comparable to full-size dipoles).
- ★ Broadband coverage (below 200 kHz to over 30 MHz).
- ★ needs no tuning, matching or other adjustments.
- ★ two versions AD270 for indoor mounting or AD370 (illustrated) for outdoor use.
- ★ very compact, only 3 metres overall length.
- ★ professional performance standards.

Prices: Model AD270 (indoor use only) **£47.15**
Model AD370 (for outdoor use) **£64.40**
Both prices include mains power unit.

VERY LOW FREQUENCY CONVERTER

If your communications receiver gives poor results below 500 kHz Model VLF is the answer.

- ★ Connects between antenna and receiver input.
- ★ Converts signals between DC and 500 kHz to the range 28 to 28.5 MHz with low noise and high sensitivity.
- ★ Crystal controlled for high stability.
- ★ Quality construction in diecast aluminium box (size 112 x 62 x 31mm), SO239 connectors, LED indicator, in/out switch.
- ★ Operates from internal 9 volt battery or external supply (5-15 volts DC).

Price: only **£29.90**

Our full catalogue plus further details of any product are available free on request.
All prices include VAT and postage and packing.
Goods normally despatched within 3 days subject to availability.

DATONG ELECTRONICS LIMITED
Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE England.
Tel: (0532) 552461

RARE DX

UNDER QRM? DIG it OUT with a Tunable Audio Notch Filter, between your receiver and speaker, BOOST your DX/QRM ratio, 40dB notch, hear WEAK DX, **£16.40.**
LOSING DX? Antenna Fault? Poor reports? Check FAST with an Antenna Noise Bridge, MEASURE resonance 1-150MHz and radiation resistance 2-1000 ohms, GET answers – MORE DX, **£18.60.**
V.L.F.? EXPLORE 10-150KHz, Receiver **£19.40.**
MISSING DX? Make them HEAR YOU with a Speech Compressor, between your microphone and transmitter, BOOST your POWER up to four times, 60dB agc, SOUND BIG, **£15.30.**
CRYSTAL CALIBRATOR, 1MHz, 100, 25KHz markers, **£28.20.**
LINEAR OKAY? Check with a Two Tone Oscillator, **£13.90.**
EXCITING 100-600KHz? Converter to 3.5-4MHz **£18.70.**

Each fun-to-build kit includes all parts, printed circuit, case, postage etc, instructions, money back assurance so GET yours NOW.
Allow 14 days for delivery.

CAMBRIDGE KITS
45 (PN) Old School Lane, Milton, Cambridge.

T. POWELL 311 EDGWARE ROAD, LONDON W.2

SPECIAL OPENING OFFER – A negative ion generator kit

This kit will saturate your home or office with millions of refreshing ions. Without fans or any moving parts it will put our a pleasant breeze. A pure flow of ions pours out like water from a fountain. The result is that the air feels pure, crisp and wonderfully refreshing.

As a special opening offer we are selling the kit, complete with case for **ONLY £18.**

We also stock PW kits including:–

Amateur TV UP Converter	ZW22		**£14.50**
Morse Practice Oscillator	ZW16	Jan '82	**£8.25**
R.F. Noise Bridge	ZW15	Jan '82	**£22.50**
Beginners Short-wave Receiver (Components only)	ZW11	Sept '81	**£13.50**
Active Receiving Antenna	ZW10	March '81	**£9.00**
Beginners 2 metre Converter	ZW6	Sept '80	**£15.00**
AF Speech Processor	ZW14	Jan '80	**£18.50**

All prices include post & 15% VAT
Reprints of articles 40p extra (+SAE if no kit required)
Barclaycard/Access welcome.
Please allow 14 days for delivery.

We have many millions of components in stock – personal callers are very welcome at our new shop at

311 EDGWARE ROAD, LONDON W2. 01-723 9246

www.americanradiohistory.com

RST

MAIL ORDER CO.
Langrex Supplies Ltd.,
Climax House,
159 Fallsbrook Road, Streatham, SW16 6ED.
SPECIAL EXPRESS MAIL ORDER SERVICE

Type	£p
AZ31	2.75
CL33	4.00
DY86/7	1.50
DY802	1.50
E88CC	7.46
E180F	9.90
E810F	21.26
EABC80	1.25
EB91	1.50
EBF80	1.50
EBF89	1.50
EC91	8.00
ECC33	4.50
ECC35	4.50
ECC81	1.75
ECC82	1.75
ECC83	1.75
ECC85	1.75
ECC88	2.10
ECC91	8.93
ECF80	1.55
ECH35	3.00
ECH42	3.50
ECH81	3.00
ECL80	1.50
ECL82	1.50
ECL83	3.00
ECL86	1.75
EF37A	5.00
EF39	2.75
EF41	3.50
EF42	4.50
EF50	2.50
EF54	5.00
EF55	3.50
EF80	1.75
EF86	1.75
EF91	2.95
EF92	6.37
EF183	2.00
EF184	2.00
EH90	1.75
EL32	2.50
EL33	4.00
EL34	3.00
EL36	2.50
EL81	5.25
EL84	2.25
EL86	2.75
EL91	9.69
EL95	2.00
EL360	8.50
EM81	2.50

EM87	2.50
EN91	7.05
EY51	2.75
EY86	1.75
EY88	1.75
EY500A	3.00
EZ80	1.50
EZ81	1.50
GY501	3.00
GZ32	2.50
GZ33	4.75
GZ34	3.00
GZ37	4.75
KT61	5.00
KT66	8.00
KT77	8.00
KT88	11.00
N78	15.00
OA2	3.25
OB2	4.35
OC3	2.50
OD3	2.50
PC86	2.50
PC88	2.50
PC92	1.75
PC97	1.75
PC900	1.75
PCF80	2.00
PCF82	1.50
PCF86	2.50
PCF801	2.50
PCF802	2.50
PCF805	1.70
PCF808	1.70
PCH200	3.00
PCL82	2.00
PCL83	3.00
PCL84	2.00
PCL85	2.50
PCL86	2.50
PCL805	2.50
PD500	6.00
PFL200	3.50
PL36	2.50
PL81	1.75
PL82	1.50
PL83	2.50
PL84	2.00
PL504	2.50
PL508	2.50
PL509	6.00
PL519	6.00
PL802	6.00
PY33	2.50

PY81	1.50
PY82	1.50
PY83	1.25
PY88	2.00
PY500A	3.00
PY800	1.50
PY801	1.50
QQV02-6	16.50
QQV03-10	14.10
QQV03-20A	48.38
QQV06-40A	48.38
QV03-12	6.80
R18	9.24
R19	2.50
SP41	6.00
SP61	4.00
U19	13.75
U25	2.50
U26	2.50
U37	12.00
UABC80	1.25
UBF89	1.50
UCH42	2.50
UCH81	1.50
UCL82	1.75
UCL83	2.75
UF89	2.00
UL41	3.50
UL84	1.75
UY41	2.25
UY85	2.25
VR105330	2.50
VR150/30	2.50
Z759	25.00
Z803U	19.00
2D21	3.25
3B28	40.00
4CX250B	40.00
5R4GY	3.50
5U4G	3.00
5V4G	2.50
5Y3GT	2.50
5Z3	4.00
5Z4GT	2.50
6/3OL2	1.75
6AB7	3.00
6AH6	5.00
6AK5	5.99
6AL5	1.50
6AM6	6.02
6AN5	4.75

6AN8A	3.50
6AQ5	2.25
6AR5	3.50
6AS6	8.66
6AS7GA	8.75
6AT6	1.25
6AU5GT	5.00
6AU6	2.50
6AW8A	3.75
6B7	3.25
6B8	3.25
6BA6	1.50
6BA7	5.00
6BE6	1.50
6BH6	2.50
6BJ6	2.25
6BN6	2.00
6BQ7A	3.50
6BR7	6.00
6BR8A	3.50
6BS7	6.00
6BW6	6.00
6BW7	1.50
6BZ6	2.75
6C4	1.25
6C6	1.75
6CB6A	2.50
6CD6GA	5.00
6CL6	3.75
6CH6	13.00
6CW4	8.00
6D6	1.75
6DQ5	6.00
6EA8	3.00
6EH5	1.85
6F6	3.00
6Gk6	2.75
6H6	3.00
6HS6	3.77
6J5	4.50
6J6	8.93
6J7	4.75
6JB6A	5.00
6JS6C	6.00
6K4N	2.50
6K6GT	2.75
6K7	3.00
6K8	3.00
6KD6	7.00
6L6G	3.00
6L6GC	2.25
6L7	2.50
6LQ6	7.50

6Q7	3.75
6SA7	3.00
6SC7	2.75
6SJ7	3.25
6SK7	3.50
6SL7GT	3.00
6SN7GT	3.00
6SS7	2.75
6SG7M	2.50
6U8A	2.25
6V6GT	2.25
6X4	2.00
6X5GT	1.75
75C1	4.50
85A2	4.45
90C1	6.00
150B2	6.50
150C2	3.25
150C4	6.00
12AX7	1.75
12BA6	2.50
12BE6	2.50
12BY7A	3.00
12HG7	4.50
30FL1/2	1.38
30P4	2.50
30P19	2.50
30PL13	1.80
30PL14	1.80
75C1	4.50
85A2	4.45
90C1	3.20
150B2	6.50
150C2	3.25
150C4	6.00
572B	30.00
805	45.00
807	3.75
811A	28.33
812A	28.33
813	125.86
866A	20.03
872A	20.00
931A	18.52
2050	7.00
5763	4.50
5814A	4.00
5842	12.00
6080	14.00
6146A	8.25
6146B	8.25
6883B	8.25
6973	4.00
7360	10.00
7586	12.00
7587	18.50

Open daily to callers: Mon-Fri 9 a.m.-5 p.m.
Valves, Tubes and Transistors · Closed Saturday
Terms C.W.O. only, allow 7 days for delivery. Tel. 01-677 2424-7.
Prices excluding VAT add 15% Quotations for any types not listed S.A.E. **Post and packing 50p per order**
Telex 946708

Prices correct when going to press

MODULAR ELECTRONICS

95 HIGH STREET SELSEY, Nr CHICHESTER, SUSSEX. TEL: SELSEY (0243) 602916

DISTRIBUTOR FOR SOLID STATE MICROWAVE (THOMPSON-CSF) RF PRODUCTS G8COS

Type	P/out	Gain	Volts	Freq.	Price
2N3866	1w	10dB	28	175MHz	£1.01
2N4427	1w	10dB	12	175MHz	£1.22
2N3553	2.5w	9dB	28	175MHz	£1.34
2N5913	2w	7dB	12	470MHz	£1.95
SD1127	4w	12dB	12	175MHz	£2.75
2N6080	4w	12dB	12	175MHz	£5.97
SD1143	10w	10dB	12	175MHz	£7.75
2N6081	15w	6.3dB	12	175MHz	£8.66
2N6082	25w	5.7dB	12	175MHz	£9.49
2N6084	40w	4.5dB	12	175MHz	£13.90
SD1428	45w	6.5dB	12	175MHz	£17.55
SD1416	70w	6.7dB	12	175MHz	£26.75
SD1477	100w	6.0dB+	12	175MHz	£31.50
2N5590	10w	5.2dB	13.6	175MHz	£7.10
2N5591	25w	4.4dB	13.6	175MHz	£9.15
2N5944	2w	9dB	12	470MHz	£7.47
2N5945	4w	8dB	12	470MHz	£9.65
SD1135	5w	7.5dB	12	470MHz	£6.99
SD1136	10w	6dB	12	470MHz	£9.50
2N5946	10w	6dB	12	470MHz	£12.02
SD1088	25w	6.8dB	12	470MHz	£21.50
SD1089	40w	4.3dB	12	470MHz	£31.25
SD1434	50w	6.0dB	12	470MHz	£28.33

Ex Equip 2N5070 2 30MHz 25wPEP £2.88
2N5645 Mot. 12v 470MHz 4W out. £4.50
2N5914 RCA 12v 470MHz 2w 7dB £4.60
218BLY Mul Studless BLY38 2w 470MHz £3.45
61387 RCA Studless Sim C1 12 CTC £3.45
Free data sheets with all purchases which include typical circuits etc

LOW NOISE SMALL SIGNAL SEMICONDUCTORS.
BFR90 Mul T Pack 2.5dB N/F 1GHz £2.82
BFR91 Mul T Pack 2.5dB N/F 1.2GHz £3.45
BFR34a T Pack 4dB N/F GHz £2.25
BFT66 Low Intermod. T072 £2.59
SD306 "D" MOS MOSFET £2.60
40673 RCA MOSFET £0.92
BF900 UHF MOSFET Equiv 3SK88 £1.30

UNELCO Cased RF Mica Caps. Following PFs 10/20/30/40/50/60/70/80pF **£1.61**; 100/150/180/250pF **£1.73**; 1000pF **£1.84**.
PTFE Sheet 0.25mm 300mm Square £2.30
HP 5082 2800 Hot Car. Diodes £1.12
HP 5082 2835 Hot Car. Diodes £0.98

Motorola MC12013L ÷ 10 Prescaler I.C. with full data/instructions **£11.50**
BB103 Varicap Diodes **£0.50**
TIP33 **£0.58**; 2N918 **£0.50**; BF180 **£0.50**; BF115 **£0.50**; 2N5179 **£0.82**; BFY90 **£1.15**; ST2110 BSX20/2N2369a **£0.30**.

TRIMMERS
Tetfer PTFE 1-10pF **44p.** DAU PTFE Film 1 to 9pF or 1.5-18pF **34p.** Surplus 2.5-25pF **22p.**
SPRAGUE (Grade 1) Mica Trimmers (500v) for R.F. Amps. 2.5-7pF **81p.** 4-20pF **86p.** 7-40pF **86p.** 16-100pF **98p.** 25-150pF **£1.09.** 40-200pF **£1.15.**
HEATSINKS single sided ideal for RF amps. Redpoint 6M1 2.6 deg/w **£2.20**

FINISHED MADE UP AND TESTED EQUIPMENT
PA2 Preamplifier for 2 meters, using the latest UHF stripline MOSFET the BF900 1½" square for fitting in the rig 50Ω in/out imp. Only **£8.05** with instructions.
PAU2 432MHz Preamp, stripline using the BFR34a 14dB gain N/F < 2dB **£8.63.**

LINEAR AMPLIFIER MODULES for 144MHz without Ch/Over. Size 55×93mm with thermal interface. 50Ω.
PM2 10 0.4w in 10w out 13.8v **£19.75**
PM2 15 1.5w in 15w out 13.8v **£21.75**
PM2 25 4w in 25w out 13.8v **£22.95**
CPM LINEAR AMPS with full RF Changeover. Size 82×102mm. Preamp can be fitted in RX path. Spec. as for PM Series. Specify CPM type and add £7.00 to PM series prices.

PRESCALER BOARD ÷ 10 Size 55×93mm with input amplifier (2×BFR34a) sens. 40mV 432mc uses MOT MC12012I I/C. 500MHz typ 600MHz. Only **£23.00.** 5v neg E supply

Allow 7 days for delivery.
Barclaycard or Access on orders above £10.
POST and PACKING ADD 50p TO ALL ORDERS.
Orders sent 1st Class Post where weight permits.
SAME DAY DISPATCH ON ALL IN STOCK ITEMS.
Minimum invoiced order to approved customers £15.00.
ALL PRICES NOW INCLUDE VAT AT 15%.

TOROIDALS

The toroidal transformer is now accepted as the standard in industry, overtaking the obsolete laminated type. Industry has been quick to recognise the advantages toroidals offer in size, weight, lower radiated field and, thanks to I.L.P., PRICE.

Our large standard range is complemented by our SPECIAL DESIGN section which can offer a prototype service within 7 DAYS together with a short lead time on quantity orders which can be programmed to your requirements with no price penalty.

★ **294 TYPES TO CHOOSE FROM!**
★ **ORDERS DESPATCHED WITHIN 7 DAYS OF RECEIPT FOR SINGLE OR SMALL QUANTITY ORDERS**
★ **5 YEAR NO QUIBBLE GUARANTEE**

TYPE	SERIES No	SECONDARY Volts	RMS Current	PRICE
30 VA 70×30mm 0.45Kg Regulation 18%	1x010	6+6	2.50	**£5.12** +p/p £1.04 +VAT £0.92 TOTAL £7.08
	1x011	9+9	1.66	
	1x012	12+12	1.25	
	1x013	15+15	1.00	
	1x014	18+18	0.83	
	1x015	22+22	0.68	
	1x016	25+25	0.60	
	1x017	30+30	0.50	
50 VA 80×35mm 0.9Kg Regulation 13%	2x010	6+6	4.16	**£5.70** +p/p £1.30 +VAT £1.05 TOTAL £8.05
	2x011	9+9	2.77	
	2x012	12+12	2.08	
	2x013	15+15	1.66	
	2x014	18+18	1.38	
	2x015	22+22	1.13	
	2x016	25+25	1.00	
	2x017	30+30	0.83	
	2x028	110	0.45	
	2x029	220	0.22	
	2x030	240	0.20	
80 VA 90×30mm 1Kg Regulation 12%	3x010	6+6	6.64	**£6.08** +p/p £1.67 +VAT £1.16 TOTAL £8.91
	3x011	9+9	4.44	
	3x012	12+12	3.33	
	3x013	15+15	2.66	
	3x014	18+18	2.22	
	3x015	22+22	1.81	
	3x016	25+25	1.60	
	3x017	30+30	1.33	
	3x028	110	0.72	
	3x029	220	0.36	
	3x030	240	0.33	
120 VA 90×40mm 1.2Kg Regulation 11%	4x010	6+6	10.00	**£6.90** +p/p £1.67 +VAT £1.29 TOTAL £9.86
	4x011	9+9	6.66	
	4x012	12+12	5.00	
	4x013	15+15	4.00	
	4x014	18+18	3.33	
	4x015	22+22	2.72	
	4x016	25+25	2.40	
	4x017	30+30	2.00	
	4x018	35+35	1.71	
	4x028	110	1.09	
	4x029	220	0.54	
	4x030	240	0.50	
160 VA 110×40mm 1.8Kg Regulation 8%	5x011	9+9	8.89	**£7.91** +p/p [illegible] +VAT £1.44 TOTAL [illegible]
	5x012	12+12	6.66	
	5x013	15+15	5.33	
	5x014	18+18	4.44	
	5x015	22+22	3.63	
	5x016	25+25	3.20	
	5x017	30+30	2.66	
	5x018	35+35	2.28	
	5x026	40+40	2.00	
	5x028	110	1.45	
	5x029	220	0.72	
	5x030	240	0.66	

TYPE	SERIES No	SECONDARY Volts	RMS Current	PRICE
225 VA 110×45mm 2.2Kg Regulation 7%	6x012	12+12	9.38	**£9.20** +p/p £2.00 +VAT £1.68 TOTAL £12.88
	6x013	15+15	7.50	
	6x014	18+18	6.25	
	6x015	22+22	5.11	
	6x016	25+25	4.50	
	6x017	30+30	3.75	
	6x018	35+35	3.21	
	6x026	40+40	2.81	
	6x025	45+45	2.50	
	6x033	50+50	2.25	
	6x028	110	2.04	
	6x029	220	1.02	
	6x030	240	0.93	
300 VA 110×50mm 2.6Kg Regulation 6%	7x013	15+15	10.00	**£10.17** +p/p £2.00 +VAT £1.83 TOTAL £14.00
	7x014	18+18	8.33	
	7x015	22+22	6.82	
	7x016	25+25	6.00	
	7x017	30+30	5.00	
	7x018	35+35	4.28	
	7x026	40+40	3.75	
	7x025	45+45	3.33	
	7x033	50+50	3.00	
	7x028	110	2.72	
	7x029	220	1.36	
	7x030	240	1.25	
500 VA 140×60mm 4Kg Regulation 4%	8x016	25+25	10.00	**£13.53** +p/p £2.35 +VAT £2.38 TOTAL £18.26
	8x017	30+30	8.33	
	8x018	35+35	7.14	
	8x026	40+40	6.25	
	8x025	45+45	5.55	
	8x033	50+50	5.00	
	8x042	55+55	4.54	
	8x028	110	4.54	
	8x029	220	2.27	
	8x030	240	2.08	
625 VA 140×75mm 5Kg Regulation 4%	9x017	30+30	10.41	**£16.13** +p/p [illegible] +VAT [illegible] TOTAL [illegible]
	9x018	35+35	8.92	
	9x026	40+40	7.81	
	9x025	45+45	6.94	
	9x033	50+50	6.25	
	9x042	55+55	5.68	
	9x028	110	5.68	
	9x029	220	2.84	
	9x030	240	2.60	

IMPORTANT: Regulation – All voltages quoted are FULL LOAD. Please add regulation figure to secondary voltage to obtain off load voltage.

The benefits of ILP toroidal transformers

ILP toroidal transformers are only half the weight and height of their laminated equivalents, and are available with 110V, 220V or 240V primaries coded as follows:

For 110V primary insert "0" in place of "X" in type number.

For 220V primary (Europe) insert "1" in place of "X" in type number.

For 240V primary (UK) insert "2" in place of "X" in type number.

How to order Freepost:

Use this coupon, or a separate sheet of paper, to order these products, or any products from other ILP Electronics advertisements. No stamp is needed if you address to Freepost. Cheques and postal orders must be crossed and payable to ILP Electronics Ltd. Access and Barclaycard welcome. All UK orders sent within 7 days of receipt of order for single and small quantity orders.

Also available at Electrovalue, Maplin and Technomatic.

ILP Electronics Ltd.
Freepost 3, Graham Bell House, Roper Close, Canterbury CT2 7EP.

Please send ______
Total purchase price ______
I enclose Cheque ☐ Postal Orders ☐ Int. Money Order ☐
Debit my Access/Barclaycard No. ______
Name ______
Address ______
Signature ______

Post to: ILP Electronics Ltd, Freepost, 3 Graham Bell House, Roper Close, Canterbury CT2 7EP, Kent, England. PW/1/83

Telephone Sales (0227) 54778. Technical (0227) 64723. Telex 965780

ILP TRANSFORMERS
(a division of ILP Electronics Ltd)

www.americanradiohistory.com

BOXES

High quality Black ABS plastic or diecast plain or stove grey

L	W	D	ABS		PLAIN		STOVE GREY	
50	50	25	—		5001P	90p	5001	123p
100	60	25	2002	96p	5002P	117p	5002	154p
113	63	31	2003	109p	5003P	143p	5003	184p
121	66	40	2004	115p	5004P	162p	5004	210p
152	82	50	2005	134p	5005P	216p	5005	288p
192	113	61	2006	235p	5006P	314p	5006	401p

VERO RANGE Plastic Boxes

L	W	D		
72	47	25	21024	51p
120	50	35	21390	83p
180	110	55	21391	151p

'G' RANGE Professional Instrument Cases

134	90	44	21089	£7.28N
224	140	64	21090	£11.02N
302	170	84	21091	£14.98N

VEROBOX CASES

to give a completely professional finish to a much valued project

ABS, light grey top, dark grey bottom + 2 anodised panels

L	D	H	TYPE	PRICE
205	140	40	21034	£4.52
205	140	75	21035	£5.02
205	140	110	21036	£8.54
180	120	39	21037	£4.11
180	120	65	21038	£4.40
180	120	90	21039	£4.89
155	85	39	21040	£3.31
155	85	60	21041	£3.31
155	85	80	21042	£4.30
125	65	30	21047	£2.35
125	65	39	21048	£2.99
125	65	50	21049	£3.37

SWITCHES — *Wavechange*

Type CK – 1P/12 way; 2P/6 W; 3P/4 W; 4P/3 W **48p**.
MIN. TOGGLES – S7101, SPDT **57p**; S7201 DPDT **87p**; S7301 3PDT **£1.64**; S7401 4PDT **£2.75**; S7211 1P3W **£1.40**; Centre off S7103 SPDT **71p**; S7203 DPDT **96p**.

Push Button min 8531 make/8533 break **62p**; 8225 DPDT **£1.34**.
DUAL IN LINE, ERG colour coded 0.3" x 0.1" format, On/Off single throw 2P SDS2 **54p**; 4P SDS4 **95p**; 6P SDS6 **£1.36**; 8P SDS8 **£1.87**; 10P SDS0 **£2.10**.
LOW COST D-I-L 4P DNS04 **65p**; 8P DNS08 **£1.00**.

METERS

Large range of types in stock; also probes, leads, accessories etc.

PANEL MOUNTING in 50, 100, 500µA; 1, 5, 10, 50, 100, 500mA; 1A either model.

T Range
60 x 45mm
£5.95

MU Range
50 x 45mm
£2.68

MULTIMETERS

NH56A

New – 20KΩ/V: AC/DC/RES./dB in 23 ranges: 130 x 88 x 37mm **£11.20N**

YN 360TR

20KΩ/V: AC/DC/R/ dB/transistor Test: in 21 ranges: 145 x 96 x 45mm **£16.45N**

DMM DD601

LCD 3½ digit (1999) Push button 26 ranges: 170 x 80 x 38mm **£32.00N**

ELECTROVALUE

FOR SERVICE YOU CAN TRUST

FOR SERVICE, QUALITY AND VALUE

MORE IC SUPER SAVERS

ALL PRICES SHOWN ARE NET AND IN PENCE

7400

7400	11	74791	36
7401	11	7492	25
7402	12	7493	25
7403	12	7494	35
7404	13	7495	35
7405	15	7496	40
7406	20	74100	80
7407	20	74104	40
7408	14	74107	22
7409	14	74121	24
7410	14	74123	40
7413	18	74125	34
7414	20	74126	33
7420	15	74141	51
7430	14	74151	40
7440	14	74154	60
7442	32	74155	39
7443	60	74156	40
7444	60	74157	50
7447	36	74190	48
7448	40	74192	48
7450	14	74193	48
7451	14	74393	95
7453	14		
7454	14		
7460	14		
7470	24		
7472	26		
7473	26		
7474	23		
7475	32		
7476	30		
7480	36		
7482	65		
7483	38		
7485	60		
7486	20		
7489	159		
7489	28		

74LS

74LS00	11	74LS51	14	74LS221	51
74LS02	11	74LS73	18	74LS240	55
74LS04	12	74LS74	18	74LS241	55
74LS05	12	74LS75	22	74LS242	75
74LS08	12	74LS76	19	74LS243	75
74LS10	12	74LS85	48	74LS244	60
74LS11	12	74LS86	20	74LS245	85
74LS14	30	74LS90	27	74LS251	55
74LS20	12	74LS92	32	74LS253	43
74LS30	12	74LS93	24	74LS257	35
74LS32	14	74LS107	40	74LS259	84
74LS37	14	74LS112	22	74LS266	28
74LS38	15	74LS123	38	74LS273	60
74LS42	28	74LS125	29	74LS279	40
74LS47	56	74LS126	27	74LS299	250
		74LS132	40	74LS367	34
		74LS136	25	74LS368	24
		74LS137	110	74LS373	84
		74LS138	30	74LS374	68
		74LS139	35	74LS378	60
		74LS145	70	74LS393	60
		74LS148	89		
		74LS151	40		
		74LS153	40		
		74LS155	38		
		74LS156	36		
		74LS157	30		
		74LS161	37		
		74LS163	36		
		74LS164	43		
		74LS165	60		
		74LS166	90		
		74LS173	55		
		74LS174	45		
		74LS175	40		
		74LS191	50		
		74LS193	40		
		74LS195	39		
		74LS196	48		
		74LS197	60		

CMOS

4000	10	4020	42
4001	10	4021	40
4002	12	4022	35
4006	50	4023	14
4007	14	4024	32
4008	40	4025	14
4009	24	4026	80
4010	24	4027	20
4011	12	4028	39
4012	15	4029	45
4013	20	4030	16
4014	46	4041	44
4015	40	4042	40
4016	20	4043	40
4017	35	4044	40
4018	45	4046	46
4019	25	4049	23
		4050	23
		4060	46
		4069	14
		4070	14
		4071	14
		4072	14
		4081	14
		4082	14
		4093	20
		4510	46
		4511	46
		4514	120
		4516	63
		4518	40
		4520	60
		4543	120
		4583	130

RESISTORS ¼, ⅓, ½, ¾ watt – **all 2p each**, 10 of one value **15p**.
2% Mullard metal film 5.1 ohms – 300K **5p each**, 10 of one value **40p**.
5% wire wound 3W or 7W, most E12 values 1.2 ohms to 8K2 **9p ea.** 10 for **70p**.

POTENTIOMETERS CARBON ROTARY (P20) 100 ohms-4M7 lin, 220 ohms-2M2 log, **ea. 32p**, or with switch **87p**. Dual gang (JP20) 4K7-2M2 lin or log **95p**, or with switch **£1.50**. **SLIDERS** 58mm, low cost 10K-1M log only **29p**. Std 58mm mono 4K7-1M lin or log **74p**, stereo matched **£1.25**. Graduated bezels **ea. 38p**. **PRESET** Min. 10mm dia. Horizontal or vert. 100 ohms-1M **ea. 24p**. Cermet 10mm dia. Horiz. or Vert. 100Ω-1M **ea. 24p**. Cermet rectilinear type **89p**; 100Ω-1M, **ea. £1.06**. PLESSEY MPW moulded carbon 47Ω-2M2 **ea. 59p**.

CAPACITORS

POLYSTYRENE, SIEMENS
5% Tolerance. 160V
5, 7, 10, 12, 15, 18, 22, 27, 33, 39pF **15p**; 47, 56, 68, 82, 100, 120, 150, 180, 220, 270, 330, 390, 470, 560, 680, 820pF, 1n, 1n2, 1n5, 1n8, 2n2, 2n7, 3n3, 3n9, 4n7 **10p**; 5n6, 6n8, 8n2, 10n **13p**.

CERAMIC Very small 1.8, 2.2 2.7 etc. up to 1n **5p each**. 1n5, 2n2, 3n3, 4n7, 6n8 **5p**; 10n, 22n, **6p**; 33n, 47n **7p**; 100n **8p**.

POLYESTER, SIEMENS LAYER TYPE 7.5mm lead spacing 100V
1n, 1n5, 2n2, 3n3 **6p**; 4n7, 6n8, 8n2, 10n, 12n, 15n, 18n, 22n, 27n, 33n, 39n, 47n **7p**; 56n, 68n **7p**; 82n, 100n **9p**; 120n, 150n **11p**; 180n, 220n **12p**; 270n, 330n, 390n, 470n **15p**; 560n, 680n **24p**. *10mm spacing* 1µF **26p**. *15mm spacing* 2µ2 **35p**. *22.5mm spacing* 1µF 400V **58p**; 3.3µF 100V **69p**.
In-depth stocks.

ELECTROLYTICS

NON-polar (for LS X-overs) 50V peak 2µF **26p**; 4µF **28p**; 6, 8, 10, 16µF **32p**; 25µF **37p**; 40, 60µF **59p**; 100µF **89p**.

POLARISED SIEMENS or MULLARD FOR QUALITY (µF/V) 1/63, 2.2/63, 4.7/63, 6.8/40, 10/25, 22/10 **ea. 10p**; 10/40, 22/25, 47/10 **11p**; 47/25 **12p**; 100/10 **13p**; 10/03, 22/40, 100/16 **14p**; 22/63, 47/40, 100/25, 100/40 **15p**; 220/10, 220/16 **16p**; 220/25 **18p**; 220/40 **20p**; 470/10, 470/16, 470/25, 1000/10 **19p**; 470/40, 1000/16 **27p**; 1000/25 **26p**; 1000/40, 2200/16 **44p**; 1000/63 **76p**; 2200/40, 4700/16 **73p**.

PLUGGABLE SIEMENS single ended
1/63, 2.2/63, 4.7/63 **10p**; 10/63, 22/63 **8p**; 22/40, 47/16 **10p**; 47/40 **12p**; 47/63 **10p**; 100/16, 100/25 **10p**; 100/40 **10p**; 100/63 **20p**; 220/10, 220/16, 220/25 **13p**; 470/6.3 **15p**; 470/10 **16p**; 470/16 **18p**; 470/25 **22p**; 470/40 **26p**; 1000/10 **22p**; 1000/16 **24p**; 1000/25 **40p**.

LARGE CANS – SIEMENS
2200/63 **£1.77**; 4700/40 **£1.78**; 4700/63 **£2.98**; 4700/100 **£5.54**; 10000/16 **£1.93**; 10000/25 **£2.78**; 22000/16 **£3.20**; 22000/25 **£4.73**.

TANTALUM
0.1/35, 0.22/35, 0.47/35, 1/35, 2.2/16, **ea. 13p**; 2.2/35, 4.7/16, 10/6.3 **16p**; 4.7/35, 10/16, 22/6.3, 10/25 **18p**; 22/16, 22/25, 33/10, 47/6.3, 100/3 **30p**.

LOW LEAKAGE All single ended
0.1/50, 0.22/50, 0.47/50, 4.7/35 **11p**; 1/50, 2.2/50, 4.7/50, **ea. 11p**; 10/16, 22/6, **11p**; 10/35, 22/10, 22/16, 22/35, 47/6, 47/10 **12p**; 47/16, 100/6 **12p**.

LARGE SAE BRINGS LATEST PRICE & ITEMS LIST FREE

BARCLAYCARD VISA

Buy it with Access

ORDERS CAN BE ACCEPTED BY MAIL OR TELEPHONE
GIRO A/C No. 38/671/4002

Please mention this Journal when ordering or writing

- VAT – additional at 15% on all UK orders.
- FREE POSTAGE and packing on UK CWO orders £5.75 inc. VAT and upwards. Under add 40p inc. VAT.
- DISCOUNTS on orders over £23.00 – 5%, over £57.50 – 10%

Discounts do not apply to 'Net' items (shown by N after the price or to orders paid for by credit card)
Special quantity discounts available

Headquarters for Mail Orders and Shop

ELECTROVALUE LTD.
28b St. Jude's Rd., Englefield Green, Egham, Surrey TW20 0HB.
Telephone Egham (STD 0784; London 87) 33603: Telex 264475.
Northern Branch (Personal shoppers only) 680 Burnage, Manchester M19 1NA. Telephone 061 432 4945.

Computing at:
700 Burnage Lane, Manchester. Tel: 061 431 4866.
Shop hours (all addresses) Mon-Fri 9am-5.30pm. Sat 9am-1.0pm.

World Radio TV Handbook 1983

delivered by first class letter post as soon as published. Just send £00.00 or your Access or Visa number to:

Pointsea Research,
25 Westgate, North Berwick, East Lothian. Tel. (0620) 2144.

If publication is delayed we will send you regular reports and hold your cheque uncashed.

MARCO TRADING

TRANSFORMERS

British made transformers at very attractive prices.

Primary	Secondary	Current	1+	10+	100+
240v:	4.5-0-4.5v	400m/a	**50p**	**45p**	**35p**
240v:	6-0-6v	100m/a	**58p**	**52p**	**43p**
240v:	6-0-6v	500m/a	**65p**	**60p**	**48p**
240v:	9-0-9v	200m/a	**75p**	**70p**	**58p**

Manufacturers note: We can supply FROM STOCK, 1000+ quantities of the above transformers and adaptors below.

EUROPEAN ADAPTORS

These very high quality British made two pin European adaptors are ideal for driving Radios, cassette recorders, TV games, calculators etc. The adaptors fit the UK shaver socket.

REF.	D.C. Voltage	Current	1+	10+	100+
EOB	4.5V	200m/a	50p	45p	32p
EM3	6V	200m/a	£1.00	80p	55p
EO9	6V	400m/a	£1.50	£1.25	85p

Just arrived: UK power supply. Fully stabilized. 240v in, 9v 200m/a out. Complete with 4 way combination plug. Price **£2.95** + 75p P+P.
Export please add Sea/Air mail at cost.
Callers welcome Mon-Fri 9-5. Sat. 9-12.00pm.

MARCO TRADING, DEPT. PW1,

Send 25p now for our latest catalogue which includes Resistors, Transistors, I.C.'s, C-Mos, TTL, LED's, Polyesters, Ceramics, Electrolytics, Diodes, Vero, Cable, Boxes, and Multimeters and Cuart Recorders at greatly reduced prices. Also included are special offer lists and pre-paid envelopes.

All orders despatched by return of mail. **Tel: (0939) 32763**

THE microdot

CW/RTTY COMMUNICATIONS TERMINAL

STANDARD FEATURES INCLUDE

- ★ Integral high resolution video monitor
- ★ Professional keyboard with many special functions
- ★ Real-time clock (constantly displayed)
- ★ Transmit and receive both CW (morse) and RTTY (teleprinter)
- ★ Users callsign programmed in
- ★ Receive CW speed tracking and display
- ★ Self checking facility
- ★ Char. by char. or 'page' transmission modes
- ★ Stylish two tone metal cabinet

OTHER OPTIONAL FEATURES

- ★ Printer interface board (Centronics compatible)
- ★ On-board 40 column printer (12V)
- ★ External 80 column printer (SEIKOSHA GP100A)

£381.74 inc. carriage
(Standard unit cost – VAT not included)

We welcome Access

Forget all those messy wires, the MICRODOT now offers a totally integrated communications system. Write for full details to . . .

POLEMARK Ltd. Lower Gower Road, Royston, Herts. SG8 5EA. Tel. Royston (0763) 47874

www.americanradiohistory.com

S.E.M. UNION MILLS, ISLE OF MAN
Tel: MAROWN (0624) 851277

Going to Exhibitions lets us meet people, who are normally just 'phone voices or letters, to give us valuable "feedback". Comments like "Your Pre-amp/Power-amps are the BEST". "My SENTINEL 35 exceeds your spec." or "I experiment with antennas & your TRANZMATCH & EZITUNE will match ANYTHING" make the hard work seem worthwhile. So thanks to everybody in Leicester who came to buy, look or just pass comment.

SENTINEL 2M LINEAR POWER/PRE-AMPLIFIERS
Now feature either POWER AMP alone or PRE-AMP alone or both POWER AND PRE-AMP or STRAIGHT THROU when OFF. Plus a gain control on the PRE-AMP from 0 to 20dB. N.F. around 1dB with a neutralised strip line DUAL GATE MOSFET.

Ultra LINEAR for all modes and R.F. or P.T.T. switched. 13.8V nominal supply. SO239 sockets.

Three Models:
1. **SENTINEL 35** Twelve times power gain. 3W IN 36W OUT. 4 amps. Max. drive 5W. 6" × 2½" front panel, 4½" deep. **£62.50 Ex stock.**
2. **SENTINEL 50** Five times power gain. 10W IN 50W OUT. Max. drive 16W 6 amps. Same size as the Sentinel 35. **£74.50 Ex stock.**
3. **SENTINEL 100** Ten times power gain. 10W IN 100W OUT. Max. drive 16W. Size: 6½" × 4" front panel, 3½" deep. 12 amps. **£100 Ex stock.**

POWER SUPPLIES for our linears 6 amp **£34.** 12 amp **£49.**

SENTINEL AUTO 2 METRE or 4 METRE PRE-AMPLIFIER
Around 1dB N.F. and 20dB gain, (gain control adjusts down to unity) 400W P.E.P. through power rating. Use on any mode. 12V 25mA. Sizes: 1½" × 2½" × 4". **£28.00* Ex stock.**

PA5 Same specification as the Auto including 240V P.S.U. **£33.00***

SENTINEL STANDARD PRE-AMPLIFIER £15.00* Ex stock.

PA3. 1 cubic inch p.c.b. to fit inside your equipment. **£10.00 Ex stock.**
70cm versions of all these (except PA5) **£4.00 extra. All ex stock.**

S.E.M. TRANZMATCH
The most VERSATILE Ant. Matching system. Will match from 15-5000 Ohms BALANCED or UNBALANCED at up to 1kW. Link coupled balun means no connection to the equipment which can cure TVI both ways. SO239 and 4mm connectors for co-ax or wire feed. 160-10 metres TRANZMATCH **£69.60.** 80-10 metres **£62.60.** EZITUNE built in for **£19.50 extra.** (See below for details of EZITUNE). **All ex stock.**

3 WAY ANTENNA SWITCH 1Kw SO239s. Good to 2 metres. **£15.00 Ex stock.**

S.E.M. 2 METRE TRANZMATCH. 5½" × 2", 3" deep. SO239s. **£24.90 Ex stock.**

S.E.M. EZITUNE
Clean up the bands by tuning up without transmitting.
Connects in aerial lead, produces S9 + (1 – 170MHz) noise in receiver. Adjust A.T.U. or aerial for minimum noise. You have now put an exact 50 Ohms into your transceiver. Fully protected, you can transmit through it, save your P.A. and stop QRM. **£25.00* Ex stock.** P.c.b. + instructions to fit in any A.T.U. **£19.50 Ex stock.**

S.E.M. AUDIO MULTIFILTER
To improve ANY receiver on ANY mode. The most versatile filter available. Gives "passband" tuning, "variable selectivity" and one or two notches. Switched Hi-pass, Lo-pass, peak or notch. Selectivity from 2.5KHz to **20Hz.** Tunable from 2.5KHz to 250Hz. PLUS another notch available in any of the four switch positions which covers 10KHz to 100Hz. 12V supply. Sizes: 6" × 2½" front panel, 3½" deep, all for only **£57.00 Ex stock.**

SENTINEL AUTO H.F. WIDEBAND PRE-AMPLIFIER 2-40MHz, 15dB gain. Straight through when OFF, 9-12V. 2½" × 1½" × 3". 200W through power. **£19.55* Ex stock.**

SENTINEL STANDARD H.F. PRE-AMPLIFIER. No R.F. switching. **£12.62* Ex stock.**

S.E.M. IAMBIC KEYER
The ultimate auto keyer using the CURTIS custom LSICMOS chip. Tune and sidetone Switching. **£34.50 Ex stock.** Twin paddle touch key. **£12.50 Ex stock.**

S.E.M. VISA 80 METRE RECEIVER
Already a great success. If you want an 80 metre (3.5-3.8MHz) Rx. Only 2½" × 6" × 3". 12 volt operation. I.W. o/p. This is for you. Still only **£39.00.**

FREQ. CONVERTERS from 10KHz to 2 metres in stock.

12 MONTHS COMPLETE GUARANTEE INCLUDING ALL TRANSISTORS.

Prices include VAT and delivery. C.W.O. or phone your credit card number for same day service.
*Means Belling Lee sockets, add £1.90 for SO239s or BNC sockets. Ring or write for more information. Place orders or request information on our Ansaphone at cheap rate times.

wescom

FACTORY APPOINTED YAESU MUSEN MAIN DEALER

FT 102 Range
FV 102DM External VF0
SP 102 External Speaker with audio filter.
SP 102P External Speaker with phone patch.
FC 102 Antenna Coupler.
AM/FM Unit
MD 1B8 Desk Microphone
MH 1B8 Hand Microphone
XF 8·2 HSN SB Filter (18KHz)
XF 8·2 HC CW Filter (600Hz)
XF 8·2 HCN CW Filter (300Hz)
XF 8·2 GA AM Filter (6KHz)
XF 455 C CW Filter (500Hz)
XF 455 CN CW Filter (270Hz)
FAS-1-4R Remote Antenna Selector.

We hold probably *the most* comprehensive Yaesu Spares stock in *Europe.* What we do not have we will get in the shortest time, if available.

Entire YAESU Range Stocked.

BEARCAT — DEALER
Main SEAFARER Dealer

YAESU P.M.R. Equipment — Full Range.

WESTERN COMMUNICATIONS (GALWAY) LTD.
Unit 1, I.D.A. Cluster Development,
Tuam Road,
Galway, IRELAND

Phone: (091) 65166/65208
U.K./N.I. (0009) 65166/65208
International Dial – Int. (353)/(9)/65166/65208

Telex: 28933 MHTC EI

www.americanradiohistory.com

3 × £1 DISCOUNT VOUCHERS

ambit's new autumn/winter catalogue is OUT NOW!

128 PAGES

70p

ALL THE 'USUAL' BITS
(Rs, Cs, Tr's, ICs etc)
+ ALL THE
TRICKY BITS

at all good newsagents or direct

- TOKO COILS, INDUCTORS, LC FILTERS
- PCM FILTERS, VHF/UHF HELICAL FILTERS
- UNELCO CAPACITORS
- PCI INTELLIGENT LCD MODULES
- TOKO SWITCHES : F SERIES/R7000 SERIES
- ALPS POTENTIOMETERS AND KEYSWITCHES
- TOYO-TSUSHO COAX RELAYS FOR TX/RX
- CRYSTAL FILTERS, CERAMIC FILTERS
- WELLER SOLDERING IRONS
- COOPER TOOLS
- TEST EQUIPMENT
- BOOKS, MANUFACTURERS' HANDBOOKS
- HARDWARE, CASES, PANELWARE, ETC.
- MODULES, R&EW KITS
- RF POWER DEVICES

ORDERS SUBMITTED USING STOCKCODES
DESPATCHED WITHIN 8 WORKING HOURS

- PHONE ORDER SERVICE — (NO MACHINES!)

PLEASE NOTE OUR NEW PHONE SYSTEM AUTOMATICALLY STACKS CALLS IN ORDER OF ARRIVAL SO PLEASE WAIT IF NOT ANSWERED IMMEDIATELY

8 AM — 7 PM MON — SAT
0277 230909

- COMPUTER ORDER SERVICE — 'REWTEL'

6 PM — 9 AM 300 BAUD/RS232
(IT MAY BE 24 HRS BY THE TIME YOU READ THIS)
0277 230959

ambit INTERNATIONAL

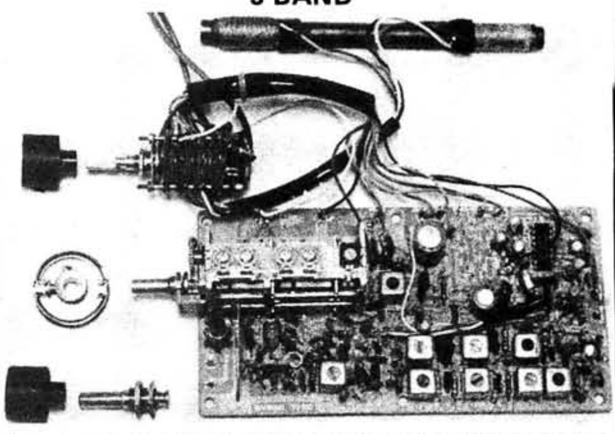
200, NORTH SERVICE ROAD
BRENTWOOD, ESSEX
CM14 4SG
Telephone : (0277) 230909
Telex: 995194 AMBIT G

LECTRO-LINES

SPECIAL OFFER

101 Hainault Road, Romford, Essex RM5 3HF.
Tel. Romford 22018/9

AM/FM STEREO TUNER MODULE 3 BAND



New boxed pre-aligned and tested. Complete with ferrite rod aerial, 6 way function switch, drive drum, cord drive, knobs, sample calibration scale and circuit diagram.

3 stage FM tuning, phase lock loop decoder, L.E.D. stereo indicator, FM sensitivity 2 uV.

Wavebands FM 88-108 MHz, LW 160-280 KHz, MW 525-1650 KHz.
Output approximately 200 mV. Input 12v DC.

Price only £6.90 including VAT
plus £1.50 P & P

VALVES

V.A.T. INCLUDED

A1065	1.40
A2293	8.80
A2900	9.20
AR8	0.75
ARP3	0.70
ATP4	0.60
B12H	3.90
CY31	1.40
DAF96	0.70
DET22	26.95
DF96	0.70
DH76	0.75
DL92	0.60
DY86/87	0.65
DY802	0.70
E55L	14.90
E88CC	1.60
E88CC/01	3.10
E92CC	1.20
E180CC	2.80
E180F	6.30
E182CC	4.95
EA76	2.25
EABC80	0.60
EB91	0.60
EBC33	1.15
EBC90	0.90
EBF80	0.60
EBF83	0.60
EBF89	0.80
EC52	0.65
EC91	3.40
EC92	0.85
ECC81	0.85
ECC82	0.80
ECC83	0.85
ECC84	0.60
ECC85	0.60
ECC86	1.70
ECC88	0.80
ECC189	0.95
ECC804	0.90
ECF80	0.85
ECF82	0.85
ECF801	1.05
ECH34	2.25
ECH35	1.70
ECH42	1.20
ECH81	0.70
ECH84	0.80
ECL80	0.70
ECL82	0.75
ECL83	1.40
ECL85	0.80
ECL86	0.90
EF37A	2.15
EF39	1.80
EF80	0.65

EF83	1.75
EF85	0.60
EF80	0.75
EF89	1.05
EF91	1.50
EF92	2.90
EF95	0.65
EF96	0.60
EF183	0.80
EF184	0.80
EF804	4.95
EF812	0.75
EFL200	1.85
EH90	0.85
EL32	1.10
EL34	1.80
	2.90*
EL37	4.40
EL81	2.45
EL82	0.70
EL84	0.80
EL86	0.95
EL90	1.00
EL91	4.20
EL95	0.80
EL504	1.70
EL803	5.90
EL509	2.70
EL802	1.70
EL821	8.20
EL822	9.95
EM31	1.60
EM80	0.85
EM81	0.85
EM84	0.85
EM87	1.30
EY51	0.95
EY81	0.85
EY86/87	0.60
EY88	0.65
EZ80	0.70
EZ81	0.70
GM4	5.90
GY501	1.30
GZ32	1.05
GZ33	4.20
GZ34	2.75
GZ37	3.95
KT66	6.30
	9.20*
KT88	8.95
	13.80*
MH4	2.50
ML6	2.50
MX10/01	21.50
N78	9.90
OA2	0.70
OB2	0.80

PABC80	0.80
PC85	0.75
PC86	0.95
PC88	0.95
PC97	1.50
PC900	1.15
PCC84	0.50
PCC89	0.85
PCC189	1.05
PCF80	0.80
PCF82	0.70
PCF84	0.75
PCF86	1.50
PCF87	0.50
PCF200	1.60
PCF201	1.65
PCF800	0.50
PCF801	1.75
PCF802	0.85
PCF805	2.45
PCF806	1.20
PCF808	2.75
PCH200	1.35
PCL81	0.75
PCL82	0.95
PCL84	0.90
PCL86	1.05
PCL805/85	1.25
PD500/510	4.30
PFL200	1.10
	2.80*
PL36	1.25
PL81	0.85
PL82	0.70
PL83	0.60
PL84	0.95
PL504	1.45
PL508	1.95
PL509	2.90
PL519	3.20
PL802	3.20
PY33	0.70
PY80	0.70
PY81/800	0.85
PY82	0.65
PY83	0.80
PY88	0.85
PY500	1.70
PY809	6.45
PY801	0.80
QQV03/10	2.85
QQV03--20A	
	14.40
QQV03-25A	
	21.20
QQV06/40A	
	18.10
QV03-12	4.20
SC1/400	4.50
SC1/600	4.50
SP61	1.80
TT21	18.50
U25	1.15
U26	1.15

U27	1.15
U191	0.85
U281	0.70
U301	0.65
U600	11.50
U801	0.90
UBC41	1.20
UABC80	0.75
UAF42	1.20
UBF80	0.70
UBF89	0.70
UBL21	1.75
UCC84	0.85
UCC85	0.70
UCF80	1.30
UCH42	1.65
UCH81	0.75
UCL82	0.95
UF41	1.35
UF80	0.95
UF85	0.95
UL41	2.30
UL84	0.95
UM80	0.90
UM84	0.70
UY82	0.70
UY85	0.85
VR105/30	1.25
VR150/30	1.35
X66	0.95
X61M	1.70
XR1--6400A	
	82.90
Z759	19.00
Z749	0.75
Z800U	3.45
Z801U	3.75
Z803U	16.00
Z900T	2.45
1A3	0.85
1L4	0.50
1R5	0.60
1S4	0.45
1S5	0.45
1T4	0.45
1U4	0.80
1X2B	1.40
2D21	1.10
	1.85*
2K25	11.90
2X2	1.15
3A4	0.70
3AT2	2.40
3D6	0.50
3D22	23.00
3E29	19.00
3S4	0.80
4B32	18.25
5B/254M	16.90
5B/255M	14.50
5B/258M	12.50
5C22	29.90
5R4GY	1.80
5U4G	0.75

5V4G	0.75
5Y3GT	0.80
5Z3	1.50
5Z4G	0.75
5Z4GT	1.05
6/30L2	0.90
6AB7	0.70
6AC7	1.15
6AG5	0.60
6AH6	1.15
6AL5	0.60
6AL5W	0.85
6AK5	0.65
6AK8	0.60
6AL5	4.20
6AM6	1.50
6AN8A	2.50
6AQ4	3.40
6AQ5	1.00
6AQ5W	1.80
6AS6	1.15
6AT6	0.90
6AU6	0.60
6AV6	0.85
6AX4GT	1.30
6AX5GT	1.30
6BA6	0.55
6BE6	0.60
6BG6G	1.60
6BJ6	1.30
6BQ7A	0.85
6BR7	4.80
6BW6	6.20
6BW7	0.90
6C4	0.50
6C6	0.55
6CH6	8.20
6CL6	1.70
6CX8	3.80
6CY5	1.15
6D6	0.70
6EA8	3.20
6F6	1.60
6F6G8	1.10
6F7	2.80
6F8G	0.85
6F12	1.50
6F14	1.15
6F15	1.30
6F17	1.15
6F23	0.75
6F24	1.75
6F33	10.50
6FH8	4.20
6GA8	0.90
6GH8A	0.95
6H6	1.60
6J4	1.35
6J4WA	2.00
6J5	2.30
6J5GT	0.90
6J6	0.85
6J6W	0.90
6JE6C	2.95

6JS6C	2.95
6K7	0.80
6L6M	2.80
6L6G	2.50
6L6GC	2.10
6L6GT	1.25
6L7G	0.65
6L18	0.70
6LD6	2.95
6LD20	0.70
6KG6A	2.70
6Q7G	1.30
6SA7	1.00
6SG7	1.15
6SJ7	1.05
6SK7	0.95
6SL7GT	0.85
6SN7GT	0.80
6SR7	1.10
6SQ7	0.95
6V6G	1.50
6V6GT	0.95
6X4	0.75
6X4WA	2.10
6X5GT	0.65
6Y6G	0.90
6Z4	0.70
7B7	1.75
7Y4	1.25
9D2	0.70
9D6	2.90
10C2	0.85
10F18	0.70
10P13	1.50
11E2	19.50
12A6	0.70
12AT6	0.70
12AT7	0.65
12AU7	0.60
12AV6	0.95
12AX7	0.65
12BA6	0.90
12BE6	1.25
12BH7	1.10
12C8	0.85
12E1	18.95
12J5GT	0.55
12K7GT	0.70
12K8GT	0.80
12Q7GT	0.80
12SC7	0.65
12SH7	0.65
12SJ7	0.70
12SQ7	1.45
12SQ7GT	0.85
12Y4	0.70
13D3	0.70
13D5	0.90
13D6	0.80
14S7	1.15
19AQ5	0.85
19G3	11.50
19G6	8.50
19H5	39.55

20D1	0.80
20F2	0.85
20E1	1.30
20P1	0.65
20P3	0.75
20P4	1.25
20P5	1.35
25L6GT	0.95
25Z4G	0.75
30C15	0.50
30C17	0.50
30C18	2.45
30F5	1.15
30FL2	1.40
30FL12	1.25
30FL14	2.15
30L15	1.10
30L17	1.10
30P12	1.15
30PL13	1.25
30PL14	2.45
35L6GT	1.40
35W4	0.80
35Z4GT	0.80
40KD6	3.15
50C5	1.15
50CD6G	1.35
75B1	1.25
75C1	1.70
76	0.95
78	0.95
80	1.70
85A2	1.40
	2.55*
723A/B	11.90
807	1.25
813	14.80
829B	14.00
832A	8.90
866A	3.80
866E	6.25
931A	13.80
954	0.60
955	0.70
956	0.60
957	1.05
1625	1.80
1629	1.85
2051	2.90
5763	4.20
5842	7.50
5881	3.40
5933	6.90
6057	2.20
6060	1.95
6064	2.30
6065	3.20
6067	2.30
6080	5.30
6146	4.95
6146B	5.20
6360	2.85
6550	6.60
6870	14.00

*SPECIAL QUALITY

VALVES and transistors

Telephone enquiries for valves, transistors, etc: retail 749 3934, trade and export 743 0899.

POSTAGE: £1-£3 45p; £3-£5 55p; £5-£10 60p; £10-£15 75p; £15-£20 90p; over £20 free.

PRICES MAY VARY Delivery by return of post.

COLOMOR 907/3530 London
(ELECTRONICS) LTD.
170 Goldhawk Rd., London W.12

Tel. 01-749 3934
Open Monday to Friday 9-1 pm, 2.00-5.30 pm.

www.americanradiohistory.com

South Wales Communications Ltd 02915-552

LARGEST STOCKS OF AMATEUR RADIO EQUIPMENT IN WALES
G3LJD Bristol (842463) G4NVO Cwmbron (61022) on line GW6 MkI

YAESU

S.W.C. **Helping where it hurts** **YES IT'S FREE!**

	List Price	Deposit	12 payments
FT ONE	£1,295	£650	£53.75
FT 902DM	£885	£400	£41.00
FT 101ZDAM	£650	£325	£27.10
FT 101ZDFM	£665	£325	£28.40
FT 101ZD	£635	£325	£25.90
FT 707	£569	£290	£24.20
FT 102	£725	£370	£29.59
FL 2100Z	£425	£215	£17.50
FRG 7700	£329	£170	£13.25
FT 480R	£379	£190	£15.90
FT 230R	£235	£126	£9.20
FT 290R	£249	£125	£10.40

Other items + accessories usually in stock.

ICOM

IC 740	£699	£350	£20.09
IC 720A	£883	£442	£36.76
IC 730	£586	£290	£24.67
IC 251	£499	£250	£20.76
IC 290E	£366	£180	£15.50
IC 2E	£159	£80	£6.59
IC 4E	£199	£100	£8.25
IC AT500	£299	£150	£12.42
IC AT100	£249	£125	£10.34

Why wait. Order your entire station needs, including Antennas etc., calculate 50% deposit and balance over 12 months interest free.

Don't Like Finance: Contact us for a Cash Price.

Best Part-Exchange Prices: Second Hand machines usually in stock. Contact us for up to date list.

THE MICRODOT

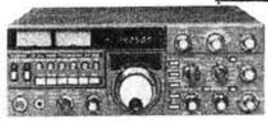
This amazing British made RTTY + C/W Terminal, represent incredible value for money, all you need in one unit, eliminating the clutter on those contest expeditions. Full details on request.

Basic model **£439.**

ICOM IC740

£669 inc.

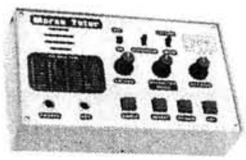
IC 740 Icoms latest thoroughbred at S.W.C.



FT 102

Continuing a tradition of excellence from the Yaesu Musen stable.

Price **£725** inc.



Learning Morse? Here's the answer: facilities include repeat last letter, continuous morse, group of five random letters, speed & space control, practice oscillator, built-in P.S.U.

£46.90 incl VAT & p&p

OSCAR ANTENNAS

2m multi ⅝ co/lin 6.5db base **£24.90** – p&p £2.20
70cm multi ⅝ co/lin 6.8db base **£25.70** – p&p £2.20

⅝ 2 Metre Whip Fold over	Mobile	£12.25	£1.50 p&p
⅝ Ball Joint Base	Mobile	£12.65	£1.50 p&p
70cm 3 Stage Colinear	Mobile	£14.95	£1.50 p&p
10 Metre Fold Over Whip	Mobile	£13.80	£1.50 p&p
15 Metre Fold Over Whip	Mobile	£13.80	£1.50 p&p
20 Metre Fold Over Whip	Mobile	£13.80	£1.50 p&p
Gutter Mount with Keys	Mobile	£3.45	—
Boot Lip Base Mount	Mobile	£3.45	–
Cable Ass. C/W PL259	Mobile	£3.85	–
Mag Mount C/W Cable + Wire Grips	Mobile	£8.50	£1.50 p&p

AZTEC ANTENNA KITS

DO IT YOURSELF KITS

2m multi ⅝co/lin 6.5db base	£12.99	£2.20 p&p
2m 4 element quad	£12.99	£2.80 p&p
6m 6 element quad	£16.99	£3.20 p&p
2m 2 element Yagi HB9CV	£6.90	£1.80 p&p
2m 5 element Yagi	£14.99	£2.20 p&p
6m 6 element Yagi	£16.99	£2.50 p&p
2m 8 element Yagi	£24.60	£3.60 p&p
Porta Mast with Guyes 11'6" × 1"	£6.90	£1.80 p&p
Porta Mast with Guyes 17'6" × 1½"	£10.90	£2.80 p&p
Porta Mast with Guyes 23'3" × 2"	£19.99	£3.60 p&p

PAN ANTENNA PRODUCTS

Fibre Glass Spreaders for H/Brew Antennas

O.D.	TUBE	I.D.	PER MTR. incl.	p&p mtr
9.5mm	TUBE	6.35mm	71p	15p
16.2mm	TUBE	12.2mm	£1.43	19p
19.0mm	TUBE	12.7mm	£1.99	23p
25.4mm	TUBE	19.4mm	£3.16	26p
38.1mm	TUBE	33.1mm	£3.68	30p
9.5mm	SOLID ROD		97p	19p
10.0mm	SOLID ROD		£1.15	20p
16.2mm	SOLID ROD		£2.30	23p
4" pole spider up to 2" boom up to 1" spreader			£8.80	£2.20
8 pole boomless up to 1" spreader			£16.60	£3.20

Minimum postal charge £2.20, maximum postal length 1.5mtr. For longer lengths please ask for carriage quote. For quantities over 16mtrs deduct 10%.

MAIL ORDER EXPRESS

BARCLAYCARD VISA · AMERICAN EXPRESS · We welcome Access

MERRY XMAS TO ALL OUR FRIENDS, CUSTOMERS & READERS
GRAIG-Y-MASTER PENYCAEMARW, NR. USK, GWENT
IN ASSOCIATION WITH THE HASTERRY LTD GROUP OF ENTERPRISES

PLEASE MENTION PRACTICAL WIRELESS WHEN REPLYING TO ADVERTISEMENTS

TELECOM.

ICOM/–	£	YAESU:–	£	SOMMERKAMP:–	£
IC720A	883	FT101ZD	659	TS280FM	169
IC730	586	FT707	565	TS788	359
IC251	495	FP707	125		
IC451	599	FC707	85		
IC290	365	FT290R	245		
IC2E	159	FRG7	195		
IC4E	199	FRG7700	329		
IC25	259	FT207	169		
IC24	169	FC902	135		
AT500	299				

ACCESS
B/CARD
H.P. Facilities

Agents for:–

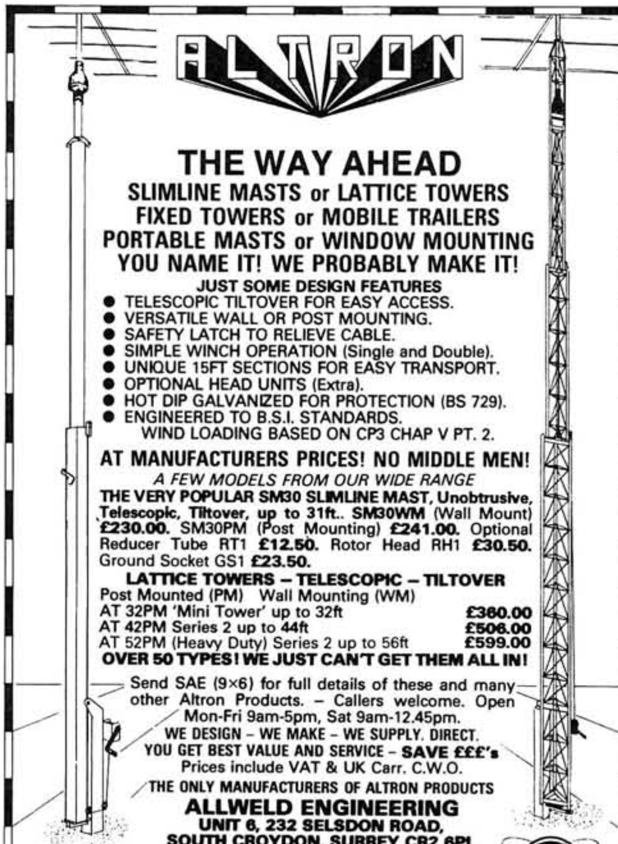
THANDAR TEST, EQUIPMENT

ALSO

ACORN ATOM VIC-20 COMPUTORS

6 NEW ST., BARNSLEY, SOUTH YORKS.
Phone: 0226 5031

ALTRON



THE WAY AHEAD

SLIMLINE MASTS or LATTICE TOWERS
FIXED TOWERS or MOBILE TRAILERS
PORTABLE MASTS or WINDOW MOUNTING
YOU NAME IT! WE PROBABLY MAKE IT!

JUST SOME DESIGN FEATURES

- TELESCOPIC TILTOVER FOR EASY ACCESS.
- VERSATILE WALL OR POST MOUNTING.
- SAFETY LATCH TO RELIEVE CABLE.
- SIMPLE WINCH OPERATION (Single and Double).
- UNIQUE 15FT SECTIONS FOR EASY TRANSPORT.
- OPTIONAL HEAD UNITS (Extra).
- HOT DIP GALVANIZED FOR PROTECTION (BS 729).
- ENGINEERED TO B.S.I. STANDARDS.
  WIND LOADING BASED ON CP3 CHAP V PT. 2.

AT MANUFACTURERS PRICES! NO MIDDLE MEN!

A FEW MODELS FROM OUR WIDE RANGE

THE VERY POPULAR SM30 SLIMLINE MAST, Unobtrusive, Telescopic, Tiltover, up to 31ft.. SM30WM (Wall Mount) **£230.00.** SM30PM (Post Mounting) **£241.00.** Optional Reducer Tube RT1 **£12.50.** Rotor Head RH1 **£30.50.** Ground Socket GS1 **£23.50.**

LATTICE TOWERS – TELESCOPIC – TILTOVER

Post Mounted (PM) Wall Mounting (WM)

AT 32PM 'Mini Tower' up to 32ft	**£360.00**
AT 42PM Series 2 up to 44ft	**£506.00**
AT 52PM (Heavy Duty) Series 2 up to 56ft	**£599.00**

OVER 50 TYPES! WE JUST CAN'T GET THEM ALL IN!

Send SAE (9×6) for full details of these and many other Altron Products. – Callers welcome. Open Mon-Fri 9am-5pm, Sat 9am-12.45pm.

WE DESIGN – WE MAKE – WE SUPPLY. DIRECT.
YOU GET BEST VALUE AND SERVICE – **SAVE £££'s**
Prices include VAT & UK Carr. C.W.O.

THE ONLY MANUFACTURERS OF ALTRON PRODUCTS

ALLWELD ENGINEERING
UNIT 6, 232 SELSDON ROAD, SOUTH CROYDON, SURREY CR2 6PL

Telephone:
01-680 2995 (24 hr)
01-651 6734

www.americanradiohistory.com

PM COMPONENTS LTD. VALVE & COMPONENTS SPECIALISTS

BARCLAYCARD VISA

SELECTRON HOUSE, WROTHAM ROAD, MEOPHAM GREEN, MEOPHAM, KENT

PHONE 0474 813225. TELEX 965966 WEST ST G

Buy it with Access

NEW BRANDED VALVES

A2087	11.50
A2134	17.50
A2293	6.50
A2900	11.50
C1148A	60.00
DAF91	0.45
DAF96	0.65
DF91	0.45
DF92	0.60
DF96	0.65
DK91	0.90
DK92	1.20
DK96	2.50
DL92	0.60
DL96	2.50
DLS10	8.00
DLS16	10.00
DM160	2.75
DY86/87	0.55
DY802	0.60
E55L	21.50
E80CC	7.00
E80CF	10.00
E80F	9.50
E81CC	3.50
E82CC	3.50
E83CC	3.50
E83F	3.50
E86C	9.50
E88C	6.00
E88CC	2.60
E130L	13.00
E180F	6.25
E182CC	9.00
E810F	13.50
EABC80	0.80
EAF42	1.20
EB91	0.52
EBC81	0.85
EBC91	0.75
EBF80	0.50
EC80/0	6.00
EC90	0.70
ECC81	0.65
ECC82	0.55
ECC82 Philips	1.10
ECC83	0.65
ECC83 Philips	1.10
ECC85	0.60
ECC88	0.65
ECC91	2.00

ECC804	0.60
ECC807	1.95
ECF80	0.72
ECF82	0.60
ECF86	1.25
ECF806	10.25
ECH3	2.50
ECH35	1.60
ECH42	1.00
ECH81	0.58
ECH84	0.69
ECL80	0.60
ECL82	0.65
ECL84	0.74
ECL86	0.74
ECLL800	16.95
EF37A	2.00
EF39	1.00
EF42	2.50
EF55	2.25
EF80	0.55
EF83	3.50
EF85	0.50
EF86	0.70
EF89	0.85
EF91	1.25
EF92	2.50
EF93	0.85
EF94	0.55
EF183	0.65
EF184	0.65
EF804S	9.85
EF806S	9.85
EH90	0.72
EK90	0.72
EL33	4.00
EL34	1.95
EL36	1.50
EL38	6.00
EL82	0.58
EL84	0.69
EL85	4.50
EL86	0.85
EL90	0.82
EL360	7.95
EL519	4.50
EM80	0.70
EM81	0.70
EM84	1.10
EM85	1.10
EM87	1.10
EMM803	2.50

EN91	0.95
EN92	4.50
EY84	8.00
EY86/87	0.50
EY88	0.60
EZ80	0.75
EZ81	0.56
EZ90	0.96
G1/371K	30.00
G55/1K	9.00
G120/1B	8.00
GS10C	12.00
GXU50	12.50
GY501	1.20
GZ30	1.00
GZ32	1.00
GZ33	4.50
GZ34	2.15
GZ37	4.50
KT61	3.50
KT66 USA	6.00
KT66 UK	9.00
KT77	9.50
KT88 USA	7.00
KT88 UK	11.50
KTW61	2.00
M8079	6.00
M8083	3.25
M8100	2.85
M8137	5.50
M8162	5.50
ME1400	4.00
N78	16.50
OA2	0.60
OB2	0.65
PC86	0.80
PC88	0.75
PC92	0.85
PC97	1.10
PC900	0.75
PCF80	0.65
PCF82	0.60
PCF86	1.20
PCF200	1.35
PCF201	1.35
PCF801	1.35
PCF802	0.60
PCF805	0.80
PCF808	1.25
PCH200	1.10

PCL82	0.80
PCL83	2.50
PCL84	0.80
PCL85	0.80
PCL86	0.65
PCL805	0.90
PD500	3.50
PFL200	1.25
PL36	0.95
PL81A	0.72
PL84	0.65
PL500	0.95
PL504	0.95
PL508	1.75
PL509	4.50
PL519	4.95
PL802	3.25
PY88	0.52
PY500A	1.79
PY800	0.69
PY801	0.69
QQV02-6	12.75
QQV03-10	5.50
QQV03-20A	17.00
QQV06-40A	18.00
QS150/45	7.00
QS1200	3.95
QS1209	2.00
QS1212	3.20
QV03-12	3.50
U19	11.95
UCH81	0.65
UCL82	0.80
UF80	0.80
UL84	0.85
YL1020	29.00
Z759	19.85
ZM1001	5.00
1X2B	1.15
2D21	0.95
2K25	17.50
2C39 Ceramic	14.50
2C39 Ceramic	24.00
4CX250B	37.50
4CX350A	63.75
4X150A	18.95
5U4G	0.75

5U4GB	2.50
5V4G	0.75
5Z4G	0.85
6AB7	0.60
6AB8	0.66
6AC7	1.00
6AF4A	1.20
6AG7	1.20
6AH6	1.00
6AJ7	2.00
6AK6	2.00
6AL5	0.52
6AM4	2.50
6AM5	6.00
6AN5	3.00
6AQ5	0.82
6AS5	1.50
6AS7G	7.50
6AT6	0.75
6AU6	0.55
6AV6	0.72
6AW8A	2.50
6BA6	0.50
6BA7	4.50
6BA8A	3.50
6BE6	0.72
6BD6	1.00
6BH6	1.50
6BJ6	1.05
6BN7	3.50
6BN8	2.00
6BR7	3.75
6BR8A	1.50
6BS7	3.75
6BW6	4.50
6BZ6	2.00
6C4	0.80
6CH6	10.35
6CL6	3.50
6EA8	2.50
6F6G	2.00
6F28	1.25
6GH8A	0.80
6GK6	2.00
6H6	1.35
6J5	1.95
6J5GT	0.75
6J6	0.55
6JB6	3.95
6JS6C	3.50
6KD6	4.50
6L6GC	2.50
6L6GT	1.15
6U8	0.60
6V6GT	0.80
6X5GT	0.50

7B7	1.40
7S7	3.00
7027A	4.65
7591A	2.35
11E2	16.50
12AE6	0.85
12AG8	1.50
12AT6	0.59
12AT7	0.65
12AT7WA	2.50
12AU6	1.50
12AU7	0.55
12AV6	0.80
12AX7	0.65
12AX7WA	2.50
12AY7	4.00
12AZ7A	1.50
12BA6	1.50
12BE6	1.05
12BH7	0.90
12BL6	0.70
12BY7A	2.75
12E1	18.95
12GN7	3.95
12HG7A	3.95
12SN7GT	1.85
30FL2	0.95
31JS6A	2.95
85A1	6.50
85A2	2.00
90CG	11.85
92AG	11.85
92AV	10.00
150B2	3.35
807	1.50
811A	9.00
813	18.50
833A	115.00
5642	5.50
5651	3.20
5670	2.50
5687	3.50
5696	2.55
5749	2.50
5751	1.50
5814A	2.75
5842	6.50
5965	2.25
6060	1.50
6080	4.50
6146B	4.95
6883B	10.50
7025	2.15
7027A	4.65
7360	7.50

INTEGRATED CIRCUITS

AN214Q	2.50
AN240	2.80
HA1151	2.50
LA4031P	2.70
LA4400	4.15
LC7120	3.25
LC7130	3.50
LC7131	5.50
MB3712	2.00
MC1307P	1.00
MC1330P	0.76
ML231B	1.75
SL901B	4.85
SL917B	6.65
SN76003N	1.95
SN76013N	1.95
SN76023N	1.65
SN76033N	1.65
SN76131N	1.30
SN76660N	0.80
SN76666N	0.70
TAA550	0.25
TAA661B	1.20
TA7120	1.65
TA7130	1.50
TA7204	2.15
TA7205AP	1.50
TA7222	1.80
TA7310	1.80
TBA120S	0.70
TBA520Q	1.10
TBA530	1.10
TBA540	1.25
TBA550Q	1.45
TBA800	0.89
TBA810S	1.35
TBA920Q	1.65
TDA1004A	2.20
TDA1170	1.95
TDA1190	2.15
TDA1327	1.70
TDA1412	0.85
TDA2020	2.45
TDA2030	2.80
TDA2532	1.95
TDA2540	1.25
TDA2590	2.95
TDA2600	3.15
TDA2611A	1.95
UPC566H	2.95
UPC575C2	2.75
UPC1001H	2.50
UPC1025	2.50
UPC1156H	2.75

SEMICONDUCTORS

AC127	0.20
AC128	0.20
AC141K	0.34
AC176	0.22
AC176K	0.31
AC187	0.25
AC187K	0.25
AC188	0.22
AD149	0.70
AD161	0.39
AD161/2	0.90
AD162	0.39
AF124	0.34
AF125	0.35
AF126	0.32
AF127	0.32
AF139	0.40
AF239	0.42
AU106	2.00
AU107	1.75
AU110	2.00
AU113	1.85
BC107	0.10
BC108	0.10
BC109B	0.12
BC140	0.31
BC141	0.25
BC142	0.21
BC143	0.24
BC147	0.09
BC148	0.09
BC149	0.09
BC157	0.12
BC158	0.09
BC159	0.09
BC160	0.28
BC170B	0.15

BC171	0.09
BC172	0.10
BC173B	0.10
BC182	0.10
BC183	0.10
BC184LA	0.09
BC212	0.09
BC212L	0.09
BC213	0.09
BC213L	0.09
BC237	0.10
BC238	0.09
BC307	0.09
BC327	0.10
BC461	0.35
BC478	0.20
BC547	0.10
BC548	0.10
BC549A	0.08
BC557	0.08
BC558	0.10
BD131	0.32
BD132	0.35
BD133	0.40
BD135	0.30
BD136	0.30
BD137	0.32
BD138	0.30
BD139	0.32
BD140	0.30
BF179	0.34
BF180	0.29
BF183	0.29
BF194	0.11
BF196	0.11
BF197	0.11
BF198	0.16

BF199	0.14
BF200	0.40
BF258	0.28
BF259	0.28
BF336	0.34
BFX29	0.30
BFX84	0.26
BFX85	0.32
BFX86	0.30
BFX88	0.25
BFY50	0.21
BFY51	0.21
BFY52	0.25
BFY90	0.77
BT106	1.22
BT108	1.22
BT116	1.20
BU105	1.22
BU108	1.69
BU124	1.00
BU126	1.60
BU205	1.30
BU208	1.39
BU208A	1.52
BU326A	1.42
BU526	1.90
MRF450A	11.50
MRF453	15.50
MRF454	17.50
MRF475	2.50
MRF477	10.00
OC71	0.40
R2008B	1.70
R2010B	1.70
R2540	2.48

TIP29	0.40
TIP29C	0.42
TIP30C	0.43
TIP31C	0.42
TIP32C	0.42
TIP41C	0.45
TIP42C	0.47
TIP47	0.65
TIP2955	0.80
TIP3055	0.55
TIS91	0.20
2N3054	0.59
2N3055	0.52
2N3702	0.12
2N3704	0.12
2N3705	0.12
2N3708	0.12
2N5294	0.42
2N5296	0.48
2N5496	0.65
2SA715	0.95
2SC495	0.80
2SC496	0.80
2SC1096	0.80
2SC1173	1.15
2SC1306	1.00
2SC1307	1.50
2SC1449	0.80
2SC1678	1.25
2SC1945	2.10
2SC1953	0.95
2SC1957	0.80
2SC1969	1.95
2SC2028	1.15
2SC2029	1.95
2SC2078	1.45
2SC2091	0.85
2SC2134	0.80
2SD234	0.50

Many other items available
Please phone send list for quote
Goods normally despatched within 24 hours

CALLERS WELCOME

★ Entrance on A227 50yds South of Meopham Green
Export enquiries welcome

★ Hours
Mon.-Fri. 9.30-5.30

P. & P. 50p. Please add V.A.T. at 15%

★ 24-HOUR ANSAPHONE SERVICE ★

SELECTRONIC SERVICES

THE FINEST ANTENNAS IN THE WORLD ARE NOW AVAILABLE

No hi-fi specifications here, just antennas that are stronger, last longer and work better than any other antenna available today.

HF Antennas
10MHz Broadside, similar to classic bobtail array (10/BDA): gain 5dBd with this wire array at only £41.25. 14MHz Broadside, same specifications as 10/BDA, (14/BDA): £36.25.

4m Quads
4 Ele quad (4/4EQ): gain 7dBd, £58.50; 6 Ele quad (4/6EQ): gain 9dBd, £60.50

2m Quads
4 Ele quad (2/4EQ): gain 7dBd, £45.25; 8 Ele quad (2/8Eq): gain 12dBd, long yagi spacing (12ft boom), £62.50
All quad antennas have glass fibre booms and supports for strength and less corrosion and less effect on performance.

Helix range
70cms, 6 turn (6/7OH): gain 12dBd, £42.85; 12 turn (12/7OH): gain 16dBd, £46.85. 23cms, 6 turn (6/23H): gain 12dBd, £34.50; 12 turn (12/23H): gain 16dBd, £35.50; 20 turn (20/23H): gain 17dBd, £37.50.
Helix range uses glass fibre booms and comes complete with 'N' plug and socket. All helix antennas have a 50∫ feed impedance suitable for satellites, tropo, FM repeaters and ATV.

Stacked collinear arrays
70cms, 16 Ele (70/SC16): gain 14dBd, £45.20; 20 Ele (70/SC20): gain 16dBd, £49.20. 23cms, 16 Ele (23/SC16): gain 13dBd, £43.50; 20 Ele (23/SC20): gain 14.5dBd, £38.50.
Continuation to be placed after stacked collinear array specifications.

COMMING SOON!

Due to the massive response to our previous advertisements and many pleas for an HF minibeam "at a reasonable price that works and is not a rotatable dummy load on 20m"! We are pleased to say that the research and development of a very high performance minibeam is well advanced. The price will be considerably lower than it's competitors and constructional techniques we use will ensure that they will last for years.
Thanks for the interest you have shown. Any suggestions? Please ring. (As long as they are decent). We hope to visit most rallys and exhibitions during 1983.

OVER 40 NEW ANTENNAS TO COME

The most comprehensive range of anntenas to suit every operator and every climatic condition.
Please enclose a stamped addressed envelope with all enquiries.

For further information contact:

SELECTRONIC SERVICES
Unit BT50/55B, Perry Avenue,
Teesside Industrial Estate, Thornaby,
Stockton-on-Tees, Cleveland TS17 9LN.
Tel: (0642) 760093

ISHERWOOD ELECTRONICS

BARGAIN

FM4 Tuners **ONLY £9.95** incl. P.&P.

A complete AM/ FM tuner chassis covering L.W., M.W. & V.H.F. (stereo). Brand new and boxed.

Condenser microphones inserts with built in F.E.T. amplifier 5k IMP2. 20mm diam. **£1.25** incl. P.&P.

S.A.E. for lists:

HOZIER ST., BLACKBURN.

Tel: (0254 57616)

J. BIRKETT

25 The Strait, Lincoln LN2 1JF. Telephone 20767

MULLARD SUB-MINIATURE CERAMIC PLATE CAPACITORS 63 V.W. 1.5, 1.8, 3.9, 4.7, 5.6, 6.8, 12, 15, 18, 22, 27, 33, 39, 44, 56, 68, 100, 180, 220, 330, 1000, 1200, 1800, 2200, 3300, 4700pf. And **MICRO** 0.01uf. All at **25p** doz.
TRANSISTORS. BSX19, BSX20, BSX21, BC548, BC549, BC558, ZTX108, ZTX213, ZTX342, ZTX450. All @ 6 for **50p.**
FERRITE RODS. 6" × ⅜" @ **25p, FX1115 BEADS** @ **15p** doz.
GREENPAR 50 OHM BNC SOCKETS @ 3 for **£1.15.**
GREENPAR 50 OHM BNC PUSH ON PLUGS @ 3 for **£1.15.**
25 VARI-CAP DIODES. Assorted for **50p.**
30 ASSORTED SILVER MICA CAPACITORS for **50p.**
50 PLASTIC NPN TRANSISTORS. Untested for **60p.**
PHILLIPS CONCENTRIC TRIMMERS. 3 to 30pf @ **15p** each.
VARIABLE CAPACITORS AIRSPACED. 5pf @ **75p,** 10+10+10pf @ **75p,** 100+200pf @ **85p,** 200+300pf @ **85p,** 250+250pf @ **85p,** 250+250+20+20+20pf @ **75p.**
X BAND GUNN DIODES with data @ **£1.65** each.
L BAND MIXER DIODES. 1 GHz @ **40p, S. BAND MIXER DIODES** CV 291 or CV 364. Both **40p** each, **X BAND DIODES** @ **40p.**
VHF CHANNEL LOW NOISE FET 400 MHz J304 at 5 for **£1.**
10.7MHz CRYSTAL FILTERS B.W. ±6 KHz at **£5.**
MULLARD BLY 90 50 WATT 12.5 VOLT 550MHz with data @ **£7.50.**
MULLARD BLY 53A 7.5 WATT 12 VOLT 470MHz at **£6.95.**
MULLARD BLY 97 4 WATT 24 VOLT 175MHz with data @ **£3.**
1" COIL FORMERS with can at 3 for **10p.**

Please add 30p for post and packing. Orders over £3 post free.

www.americanradiohistory.com

MAIL ORDER ADVERTISING

British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days, the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

Mail Order Protection Scheme

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, PRACTICAL WIRELESS will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of PRACTICAL WIRELESS summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet clais from readers made in accordance with the above procedure a soon as possible after the Advertiser has been declared bankrupt or insolvent.

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine not, for example payment made in response to catalogues etc, received as a result of answering such advertisements. Classified advertisements are excluded.

Auto Marine

YAESU

WE STOCK YAESU, JAYBEAM, CUSHCRAFT, MICROWAVE MODULES, MUTEK, DAVTREND ETC.

ALL AT COMPETITIVE PRICES.

Access

AUTO MARINE DEVELOPMENT COMPANY
60 ORLANDO STREET, BOLTON
'Phone (0204) 21059

BARCLAYCARD VISA

ANTENNES TONNA (F9FT)

50MHz	
5 element†	**£31.74(a)**
144MHz	
4 element	**£13.01(a)**
9 element fixed	**£15.44(a)**
9 element portable	**£17.46(a)**
9 element crossed†	**£28.52(a)**
13 element portable†	**£27.21(a)**
NEW 17 element fixed	**£35.19(a)**
435MHz	
19 element	**£18.14(a)**
19 element crossed†	**£30.05(a)**
21 element 432MHz	**£26.00(a)**
21 element ATV	**£26.00(a)**
144/435MHz	
Oscar Special 9 & 19 element†	**£30.05(a)**

Your number one choice for 6m, 2m, 70, 24 & 23cm antennas

1250MHz OR 1296MHz

23 element† **£25.90(b)**

4 × 23 ele antennas – power splitter – stacking frame **£140.00(a)**

Telescopic Portable Masts

4 × 1m **£15.96(a)** 3 × 2m **£19.15(a)**
4 × 2m **£28.75(a)**

ANDREW HELIAX LDF4-50 COAXIAL CABLE

Attenuation per 100ft. 144MHz-0.8dB 435MHz-1.6dB. 1296MHz-2.9dB.
£2.90 per metre (a). 'N' Type connectors for LDF4-50 male or female **£10.35.**

MICROWAVE MODULES – ROTATORS – COAXIAL CABLES ETC.

POWER SPLITTERS AVAILABLE FOR 2 OR 4 ANTENNAS

†Denotes 50Ω ONLY – all others 50Ω OR 75Ω impedance

PLEASE ADD CARRIAGE AS SHOWN (a) £4.00. (b) £1.80. **ALL PRICES INCLUDE VAT AT 15%**

Terms: Cash with order, ACCESS – VISA – telephone your card number.

FOR FULL SPECIFICATION OF OUR RANGE SEND 30p FOR CATALOGUE

Callers welcome, but by telephone appointment only please. Goods by return.

RANDAM ELECTRONICS (P)
12 Conduit Road, Abingdon, Oxon OX14 1DB. Tel: (0235) 23080 (24 hours)

Technical Training in Radio, Television and Electronics

ICS have helped thousands of ambitious people to move up into higher paid, more secure jobs in the field of electronics—now it can be your turn. Whether you are a newcomer to the field or already working in the industry, ICS can provide you with the specialised training so essential to success.

Personal Tuition and Guaranteed Success

The expert and personal guidance by fully qualified tutors, backed by the ICS guarantee of tuition until successful is the key to our outstanding record in the technical training field. You study at the time and pace that suits you best and in your own home. In the words of one of our many successful students: "Since starting my course, my salary has trebled and I am expecting a further increase when my course is completed".

CITY AND GUILDS CERTIFICATES

Excellent job prospects await those who hold one of these recognised certificates. ICS can coach you for:

Basic Electronic Engineering (C&G/ICS)
Radio Amateurs

CERTIFICATE COURSES

TV & Audio Servicing
TV, Radio and Audio Engineering
Radio & Amplifier Construction
Electronic Engineering*
Computer Electronics*
Industrial Electronics*
Radio Frequency Electronics*
Introduction to Microprocessing*
Electrical Engineering*
Electrical Contracting & Installation

*Qualify for IET Associate Membership

CACC Approved by CACC — ICS Div. National Education Corporation — ABCC Member of ABCC

POST OR PHONE TODAY FOR FREE BOOKLET

Please send me your FREE School of Electronics Prospectus.

Subject of Interest ______

Name ______

Address ______

ICS Post to: **Dept C276**
ICS School of Electronics
160 Stewarts Road
London SW8 4UJ

01-622 9911 (All Hours)

www.americanradiohistory.com

When replying to Classified Advertisements please ensure:

(A) That you have clearly stated your requirements.
(B) That you have enclosed the right remittance.
(C) That your name and address is written in block capitals, and
(D) That your letter is correctly addressed to the adviser.

This will assist advertisers in processing and despatching orders with the minimum of delay.

SMALL ADS

The prepaid rate for classified advertisements is 34 pence per word (minimum 12 words), box number 60p extra. Semi-display setting £11.20 per single column centimetre (minimum 2·5 cms). All cheques, postal orders etc., to be made payable to Practical Wireless and crossed "Lloyds Bank Ltd". Treasury notes should always be sent registered post. Advertisements, together with remittance should be sent to the Classified Advertisement Dept., Practical Wireless, Room 2612, IPC Magazines Limited, King's Reach Tower, Stamford St., London, SE1 9LS. (Telephone 01-261 5846).

NOTICE TO READERS

Whilst prices of goods shown in advertisements are correct at the time of closing for press, readers are advised to check with the advertiser both prices and availability of goods before ordering from non-current issues of the magazine.

Receivers and Components

BRAND NEW COMPONENTS BY RETURN

HIGH STABILITY MINIATURE FILM RESISTORS 5%
¼W E24 Series 0.51R-10MO. (Except 7M5)—**1p.**
0.125W E12 Series 10R to 1M8—**2p.** 0.5W E12 Series 1RO to 10MO.—**1½p.** 1.0W E12 Series 10R to 10MO—**3p.**
¼W Metal Film E12 series 10R to 1MO 5%—**2p.** 1%—**3p.**

CAPACITORS.
SUBMINIATURE Ceramic E12 100V 2% 1.8pf to 47pf.—**3p** 2% 56pf. to 330pf.—**4p.** 10% 390pf. to 4700pf.—**4p**
Plate Ceramic 50V Wkg. Vertical Mounting.
E12 22pf. to 1000pf. & E6 1K5pf. to 47Kpf.—**2p**
Miniature Polyester 250V Wkg. Vertical Mounting.
.01. .015. .022. .033. .047 & 068 mfds.—**4p** 0.1—**5p.** 0.15 & 0.22—**6p.** 0.33 & 0.47—**8p** 0.68—**11p.** 1.0—**15p.** 1.5—**20p.** 2.2—**22p**

ELECTROLYTIC. Wire Ended (Mfds/Volts).

0.47/50	5p	22/25	6p	100/25	7p	470/25	11p
1.0/50	5p	22/50	6p	100/50	8p	470/40	16p
2.2/50	5p	47/16	6p	220/16	8p	1000/15	15p
4.7/50	5p	47/25	6p	220/25	8p	1000/25	25p
10/50	5p	47/50	6p	220/50	10p	1000/40	35p
22/16	6p	100/16	7p	470/16	11p	2200/16	20p

TANTALUM BEAD SUBMINIATURE ELECTROLYTICS.
0.1, 0.22, 0.47, 1.0, 2.2 • 35V & 4.7 • 6.3V—**14p** 4.7/16V & 25V—**15p.** 10/16 & 22/6—**20p.** 10/25—**29p** 10/35V, 22/16V, 47/6.3V, 68/3V & 100/3V—**30p** 15/25, 22/25, 47/10—**35p.** 47/16—**80p.** 220/16—**£1.20**
Polystyrene 63V Wkg. E12 Series Long Axial Wires.
10 pf. to 820 pf.—**3p.** 1000 pf. to 10,000pf.—**4p**

TRANSISTORS.

BC107/8/9	12p	BC182L	8p	BF197	10p
BC147/8/9	10p	BC184L	8p	BFY50/51/52	18p
BC157/8/9	10p	BC212L	8p	BFX88	25p
BC547C/8C/9C	7p	BCY70	15p	2N2926	7p
BC557C/8C/9C	7p	BF195	10p	2N3055	50p

8 Pin D.I.L. i.c's 741 Op/amp.—**18p.** 555 Timer—**24p** Holders 8 Pin—**9p.** 14 Pin—**12p.** 16 Pin—**14p.** 18 Pin—**16p.** 24 Pin—**22p.** 28 Pin—**25p.** 40 Pin—**30p.**

DIODES (p.i.v./amps).

75/25mA	1N4148	2p	1250/1A	BY127	10p
100/1A	1N4002	4p	400/3A	1N5404	14p
800/1A	1N4006	6p	60/1.5A	S1M1	5p
1000/1A	1N4007	7p	30/150mA	AAY32	12p

ZENER DIODES.
E24 Series 3V3 to 33V 400mW—**8p.** 1W—**14p**
L.E.D.'s 3 mm. & 5 mm. Red—**10p.** Green, Yellow—**14p**
Grommets for 3 mm.—**1½p.** Holders for 5 mm.—**2p**
FUSES. 20mm. Glass. 100mA to 5A. Q.B.—**5p.** A/S—**8p.**
VOLTAGE REGULATORS+. 5V, 8V, 12V, 15V 100mA.—**35p** 5V, 8V, 12V, 15V, 18V & 24V. 1A—**55p**
PRESET POTENTIOMETERS
50mW & ¼W 100R to 1MO—**7p.**
PAIRS BATTERY SNAPS PP3—**6p.** PP9—**12p.**

THE C. R. SUPPLY CO.
127, Chesterfield Road, Sheffield S8 0RN.
V.A.T. Inclusive Prices, Postage 15p (FREE over £5.00)

VALVES, RADIO, TV. Industrial transmitting, despatched to all parts of the world by post, 6000 parts in stock. Quotation S.A.E. Cox Radio (Sussex) Ltd., The Parade, East Wittering, Sussex. 2023 (024 366).

BOURNEMOUTH/BOSCOMBE. Electronic components specialists for 33 years. Forresters (National Radio Supplies) late Holdenhurst Road. Now at 36, Ashley Road, Boscombe. Tel. 302204. Closed Weds.

RIG ACCESSORIES	PRICE	See P.W. Dated
Overvoltage Crowbar Module	£4.75	March
PSU 4 13.8V 4A Regulated	£19.95	July
Antenna Tuner 27MHz	£7.96	Sept.
PSU 10 13.8V 10A Regulated	£45.83	Not Featured
24-12V 48 Watts Converter	£10.75	Not Featured

All Prices include P&P. VAT. Normally available from stock.

FREMARK EQUIPMENT,
Strattons Walk, Melksham, Wilts. SN12 6LA.

RADIO CANADA, Radio Peking, Voice of America, Radio Moscow. A Vega 308 (short, medium, F.M.). Pulls these and dozens more, daily. £19.99 inclusive. Corrigan Radiowatch, Building 109, Prestwick Airport KA9 2RT.

GENUINE GOVT. SURPLUS RELEASE.

AIRLITE HEADSETS. With boom mike. Must have cost a fortune. Our price **£4.50** per pair, postage £1. 2 pairs **£8** post free. Less boom mike **£4** per pair, postage £1. 2 pairs **£8** post free.
AMPLIVOX HEADSETS. With boom mike. **£4.50** per pair, postage £1. 2 pairs **£9** post free. Less boom mike **£4** per pair, postage £1. 2 pairs **£8** post free.
GENUINE AFV TANK HEADSETS AND MIKE £3.50 per pair, p.p. £1. 2 pairs **£7** post free. All headphones fitted with Ex ministry plug. Standard jack plugs available **25p** each. 2 for **40p.** Headphone extension sockets available at **25p** each 2 for **40p.** Impedance of first two items 600 ohms. All headphones in good condition.
THE GOVT. SURPLUS WIRELESS EQUIPMENT HANDBOOK. This useful handbook gives detailed information and circuit diagrams for British and American Government Surplus Receivers, Transmitters and Test Equipment etc. Also contained are some suggested modification details and improvements for Surplus equipment. Incorporated in this revised edition is a Surplus/Commercial cross referenced valve and transistor guide. Latest revised facsimile edition. Limited number of copies of this invaluable book which is now a standard reference work in this field. **Only £7.50,** p.p. £1.50. No V.A.T. on books.
New release of **MODERN DYNAMIC MOVING COIL MICROPHONES.** 200 ohms impedance. Switch incorporated. Mostly with lead and DIN plug. Used but nice condition. 3 designs of case housing. Price one mike our choice **£2** plus 50p p.p. Bargain offer all 3 mikes **£4.50,** p.p. £1.
GENUINE EX-GOVT COLLAPSIBLE AERIALS. A fully adjustable highly efficient whip aerial in 5 sections. Length 1½ metres. Closed 300 m/m. Copper plated sections. As used on Ex Govt. Manpacks. Brand new in makers boxes. **£2.50** each, p.p. 75p. 2 for **£5** post free.

HAVE YOU SEEN THE GREEN CAT. 1000s of new components, radio, electronic, audio at unbelievably low prices. Send 50p and receive catalogue and FREE RECORD SPEED INDICATOR. Try a JUMBO PACK. Contains transistors, resistors, caps, pots, switches, radio and electronic devices. **Over £50 worth for £11.** Carriage and packing £2.50. MINI JUMBO PACK **(£20 worth) for £5,** p.p. £1.50.

PLEASE ADD 15% V.A.T. to all orders including carriage and p.p.
MYERS ELECTRONICS Dept. PW,
12/14 Harper Street, Leeds LS2 7EA.
Leeds 452045.
New retail premises at above address (opposite Corals). Callers welcome 9 to 5 Mon. to Sat. Sunday 10 till 3pm. Govt. surplus items always in stock.

BIG BARGAIN BOX

Our Big Bargain Box contains over a thousand components – resistors, capacitors, pots, switches, diodes, transistors, panels, bits and pieces, odds and ends. All useful stuff – would cost many times the price we are asking if bought separately. Approx. weight 4lbs. ONLY £5.00 inc. post – you're bound to come back for another!!!

ESP 147B, FOUNDRY LANE, SOUTHAMPTON, SO1 3LS.

Lots of surplus bargains on our latest list – send an SAE for your copy now.

VHF CONVERTORS. 2M, 4M, airband, marine. Mosfet RF stage. 10.7MHz IF. Feed SW receiver or IF strip. Mechanically tuned, 6:1 reduction. £9 each inc pp. SAE data, lists. H. Cocks, Cripps Corner, Roberts-bridge, Sussex. Tel: 058083 317.

MAIDSTONE has its own Component Shop. Thyronics Control Systems, 8 Sandling Road, Maidstone. 675354.

CRYSTALS Brand new high-precision. You benefit from very large stocks held for industrial supplies. All normal freq standards, baud rates, MPU, and all magazine projects inc: HC33/U: 1·0, **£3·75.** 2·5625 MHz, **£3·50.** HC18/U: 4·0, 5·0, 6·0, 7·0, 8·0, 9·0, 10·0, 10·7, 12·0, 15·0, 16·0, 18·0, 20·0, 38·6667 MHz, **£3·35.** Selected freqs stocked in Glider, Marine and 27 MHz bands. Any freq made to order in 8 weeks from **£4.50,** 2-3 week service available.
CB Beat "Bleed-Over" with our special 10.695 MHz, 7 kHz BW. HC 18/U Filters **£4.00** each. Quantity discounts. Many crystals stocked for CB conversions.
Prices inc. VAT and UK post. SAE lists.

P. R. GOLLEDGE ELECTRONICS
G3EDW, Merriott, Somerset, TA16 5NS.
Tel: 0460 73718

Aerials

AERIAL WIRE 14g hand drawn copper 13p/m. 50ft drawn copper £5 per 100' coil. Aluminium 1.6mm dia., 13p/m. Postage up to 20m, £1.40. Over 20m, £2. Add VAT to total. Western Electronics (UK) Ltd, Dept PW, Fairfield Estate, Louth, Lincs LN11 0JH.

COPPER AERIAL WIRE 14swg hard drawn 70' £5.34, 140' £8.84 inc. VAT. Postage £1.75. T.M.P. ELECTRONIC SUPPLIES, Unit 27, Pinfold Workshops, Pinfold Lane, Buckley, Clwyd, North Wales.

G2DYM ANTI-INTERFERENCE
ANTI-TVI TRAP DIPOLES
TX & S.W.L. MODELS OR KITS

Data Sheets Large SAE. Aerial Guide 50p. Indoor and Invisible Aerials **£3.50.**
Callers welcome Tel: 03986-215

G2DYM, Uplowman, Tiverton, Devon.

AERIAL BOOSTERS. Improve UHF/VHF Television, VHF Radio Reception. Price from £7. SAE leaflets. Electronic Mailorder Ltd, Ramsbottom, Lancashire, BL0 9AGW.

AERIAL WIRE 16swg (14awg) hard drawn copper 50 metres £5.90 incl. postage. S. M. Tatham, 1 Orchard Way, Fontwell, Arundel, W. Sussex.

TV-DX

FM-DX and all domestic reception requirements – Fringe or 'Local'. Aerials, Amplifiers, Boosters, Filters, Hardware – and the knowledge. **Our new 1983 Catalogue costs 54p.** SAE all enquiries please.
ROGER BUNNEY'S TVDX BOOK (2ND EDITION) £2.40
Labgear CM7065 high gain (26dB) low noise (less than 2dB) 40-860MHz Masthead Amplifier **£16.95.** inc. post + packing

SOUTH WEST AERIAL SYSTEMS (PW)
10 Old Boundary Road, Shaftesbury, Dorset.
Tel. (0747) 4370.

www.americanradiohistory.com

Books and Publications

"WORLD RADIO TV HANDBOOK" 1983, write for price and publication date. Pointsea, 25 Westgate, North Berwick, East Lothian.

LIST SECONDHAND BOOKS for sale 100 Nos Wireless/TV/Telegraphy etc. SAE please, Gosing Books, 19 Moorside Road, West Moors, Dorset.

POPULAR FREQUENCY CHECKLIST (Europe & U.K; medium & long wave) with unique map for bearings anywhere. £1 postpaid or 7 IRC. – DIAL-SEARCH, 9 Thurrock Close, Eastbourne, BN20 9NF.

SLICES OF HAM. Takes a humourous look at amateur radio. £2 from the author. Pete Bradley G4KJZ, 34 Beresford Road, North Shields, Tyne & Wear, NE30 3JB.

AIRCRAFT COMMUNICATIONS HANDBOOK (UK/Europe) including spot MF, HF, VHF, UHF, frequencies, Military & Civil Airports, Air Traffic Control Centres, Long Range Stations, Meteorological Broadcasts, Broadcast Times, Navigation Beacons, Co-ordinates, Callsigns, Maps, etc £7.50, P/P £1. PLH ELECTRONICS, 97 Broadway, Frome, Somerset, BA11 3HD.

ELECTRONICS BOOKS. International publishers. Lowest rates. Ask list. Business Promotion, 376 Lajpatrai Market, Delhi, India.

For Sale

LIST-A-RIG. A service offered by G3RCQ Electronics to introduce buyers and sellers of used amateur equipment. Buying? its free, just send an S.A.E; Selling/Wanted? send S.A.E for details on how to join the fast growing list. List-A-Rig is sent and updated daily. No waiting no deadlines. List-A-Rig (PW) 65, Cecil Avenue, Hornchurch, Essex, RM11 2NA.

CALL SIGN BADGES professionally engraved by return of post. £1.50 cash with order. State name and call sign. A-K BADGES P, 2 Pickwick Road, Corsham, Wilts. SN13 9BJ.

DIY QSL CARDS. Just add your own callsign, etc. Also SWL design 50 for £1.70. 100 for £3.00 inc. P&P. SAE for samples. LAM ELECTRONICS (PW), 47 Golden Miller Road, Cheltenham, Glos. Tel. 0242 43891 (24Hr).

YAESUS. FT101ZD £580.00, FT107 £540.00, FT208R Handheld £199.00, FT230R Mobile £229.00. Other models on request. Phone 01-594 9979.

VINTAGE RADIO'S over 200 vintage radio's always in stock – open every day – phone anytime. The Clock Shop, 78 The Bayle, Folkestone, Kent. Tel:– (0303) 54233.

AMATEUR EQUIPMENT bought and sold. Cash waiting. Contact G3RCQ Hornchurch 55733 evenings.

DISCOUNT YAESU and other equipment current models 30% off. Tel. 0209 216542.

JULIAN G6HHI

CALL SIGN LAPEL BADGES PROFESSIONALLY ENGRAVED AND BY RETURN OF POST

£1.50. State Name and Callsign.

CORSHAM CAR COMPONENTS-P
2 PICKWICK ROAD,
CORSHAM, WILTS. SN13 9BJ

HEATH KIT H.R. 1680 AMATEUR RX. As new any test £145. Tel: Bristol 568380.

Wanted

ELECTRONIC COMPONENTS PURCHASED. All types considered – Must be new. Send detailed list – Offer by return – WALTONS, 55A Worcester Street, Wolverhampton.

Service Sheets

TECHNICAL INFORMATION SERVICE

SERVICE SHEETS: full size by return – radio, mono etc. £2 + large sae. CTVs & Music Centres from £3.

SERVICE MANUALS: sole suppliers most obsolete equipment. Everything stocked to latest releases. Fantastic stocks CTVs/videos. E.g. A823 £6.50; Autovox (early) £6.50.

TV AND VIDEO: unique repair manuals and collections of circuits – L.s.a.e. for price lists.

Quotations/free 50p magazine/pricelists/etc., for large s.a.e.

£2 plus 8" × 10" s.a.e. for service sheet and manual catalogues with £4 vouchers.

PHONE 0698 883334 FOR FAST QUOTES – Open 4-6 daily, 11-1 weekends

T.I.S., 76 CHURCH ST., LARKHALL, LANARKSHIRE ML9 1HE.

BELL'S TELEVISION SERVICES for service sheets on Radio, TV, etc., £1.25 plus SAE. Colour TV Service Manuals on request. SAE with enquiries to B.T.S., 190 Kings Road, Harrogate, N. Yorkshire. Tel (0423) 55885.

Courses

CONQUER THE CHIP . . . Master modern electronics the PRACTICAL way by SEEING and DOING in your own home. Write for your free colour brochure now to British National Radio & Electronics School, Dept. C1, Reading, Berks. RG1 1BR.

Services

SHEET METAL WORK, fine or general front panels chassis, covers, boxes, prototypes. 1 off or batch work, fast turnround. 01-449 2695. M. GEAR LTD. 179a Victoria Road, New Barnet, Herts.

ORDER FORM PLEASE WRITE IN BLOCK CAPITALS

Please insert the advertisement below in the next available issue of Practical Wireless for .... insertions I enclose Cheque/P.O. for £...

(Cheques and Postal Orders should be crossed Lloyds Bank Ltd. and made payable to Practical Wireless).

NAME ....

ADDRESS ....

....

Send to: Classified Advertisement Dept.,
PRACTICAL WIRELESS
Classified Advertisement Dept., Rm 2612
King's Reach Tower, Stamford Street,
London SE1 9LS Telephone 01-261 5846
Rate
34p per word, minimum 12 words.
Box No. **60p** extra.

Company registered in England. Registered No. 53626. Registered Office: King's Reach Tower, Stamford Street, London SE1 9LS.

1/83

www.americanradiohistory.com

Collector's Items

WORKING GERMAN IMPERIAL J407W RADIO with V.H.F. Over 20 years old – Offers. Lewcock, 27 Rupert Avenue, High Wycombe, Bucks.

Educational

COURSES – RADIO AMATEURS EXAMINATION. City & Guilds. Pass this important examination and obtain your licence, with any RRC Home Study Course. For details of this and other courses (GCE, professional examinations, etc.) write or phone – THE RAPID RESULTS COLLEGE, Dept JX5, Tuition House, London SW19 4DS. Tel: 01-947 7272 (9am-5pm) or use our 24 hr Recordacall Service: 01-946 1102 quoting Dept. JX5.

Personal

START YOUR OWN profitable home-based import/export business today. Free Introductory Offer. Worldwide Business Opportunities, Dept. B11, 151 Harefields, Oxford.

Miscellaneous

AVIATION FREQUENCY LISTS (Europe) 384 pages £5.75 per copy. AOS (PW), West London Building, White Waltham Aerodrome, Maidenhead SL6 3MJ.

BURGLAR ALARM EQUIPMENT. Ring Bradford (0274) 308920 for our catalogue or call at our large showrooms opposite Odsal Stadium.

ALUMINIUM TUBES/RODS for masts/aerials. Nerva Metals, Wembley, Middlesex. Tel. 01-904 4647.

MORSE CODE CASSETTES
LANGUAGE CASSETTES

Cassette A: 1-12 w.p.m. for amateur radio examination.
Cassette B: 12-25 w.p.m. for professional examination preparation. Each cassetten is type C90.
Price each Cassette (including booklets) **£4.75**
Rayles 'Speekeezy' Spanish, German, French or Italian **£4.95 each.**
Price includes postage etc. UK only.

MH ELECTRONICS (Dept PW),
12 Longshore Way, Milton,
Portsmouth PO4 8LS.

PRACTICAL WIRELESS PCB's 1.5mm G.F.

May 82	FM Mains Intercom WR149	**£2.36**
June 82	Audio amp WR150	**£1.43**
July 82	Morse Show WR125	**£6.56**
Aug 82	Freq Synth WR145-8 **Set of 4**	**£8.44**
Sep 82	Audio level meter WR139	**£1.98**
Oct 82	Cranbourne freq counter WR 154-5**Set**	**£11.95**
Nov 82	Cranbourne ovened OSC WR159	**£2.39**
	Repeater time out alarm WR156	**£1.85**

Postage for the UK Add 35p postage and packing to complete order. Europe 70p. Overseas please remit accordingly.
Cash with order please.

PROTO DESIGN
14 Downham Road, Ramsden Heath, Billericay, Essex CM11 1PU. Telephone 0268-710722

WAVEGUIDE, FLANGES & DISHES. All standard sizes & alloys stock. Special sizes to order. Call Earth Stations, 01-228 7876, 22 Howie Street, London SW11 4AR.

SUPERB INSTRUMENT CASES by Bazelli, manufactured from PVC Faced Steel. Hundreds of people and industrial users are choosing the cases they require from our vast range. Competitive prices start at a low £1.05. Chassis punching facilities at very competitive prices. 400 models to choose from. Suppliers only to Industry and the Trade. BAZELLI, (Dept No. 25), St. Wilfred's Foundry Lane, Halton, Lancaster LA1 6LT.

THE SCIENTIFIC WIRE COMPANY
PO Box 30, London E.4. Telephone 01-531 1568

SWG	1 lb	8 oz	4 oz	2 oz
ENAMELLED COPPER WIRE				
8 to 34	3 30	1.90	1.00	0.80
35 to 39	3.52	2.10	1.15	0.85
40 to 43	4.87	2.65	2.05	1.46
44 to 47	8.37	5.32	3.19	2.50
48 to 49	15.96	9.58	6.38	3.69
SILVER PLATED COPPER WIRE				
14 to 30	7.09	4.20	2.43	1.72
TINNED COPPER WIRE				
14 to 30	3.97	2.41	1.39	0.94
FLUXCOR SOLDER				
	5.75	3.16	1.73	0.96

Prices include P&P and VAT.
Orders under £2 add 20p.
SAE for list of Copper/Resistance Wire.
Dealer enquiries welcome.

H.A.C SHORT-WAVE KITS

WORLD-WIDE RECEPTION

TRIPLE-T

TRANSISTOR RECEIVER

for use with headphones or small speaker.

Construct your own
SHORTWAVE RECEIVER
for only

£26.50

for the complete kit

All orders despatched within 7 days. Send stamped and addressed envelope now for free descriptive catalogue of kits and accessories.

SORRY, NO CATALOGUES WITHOUT S.A.E.

"H.A.C."
SHORT-WAVE PRODUCTS
P.O. Box No. 16, 10 Windmill Lane Lewes Road, East Grinstead, West Sussex RH19 3SZ.

FT102. Receiver compares with FT1, & TX is Super clean. SAE for leaflet on this fine rig. Delivery by Securicor.

FT102 £725 Carriage paid

YOUR RIG IN OUR HANDS
Yaesu experts.
Sales and repairs

FT290R & FT790R. These rigs really have opened up VHF & UHF multi-mode operation. More facilities than most base stations plus portable operation. We are hardly selling anything else! FT790 has L.O.I., and our FT290s modified L.O.I., tone burst, brighter audio £259 carriage paid.

FT790R £299
Carriage paid

Mobile brackets, nicads etc. in stock.

FERRITE CORES. 30 – 70p elsewhere. 20p each **callers only with copy this adv. Jan. 83.**

600MHz FREQUENCY COUNTERS. 0.1Hz resolution to 10MHz. 10MHz at 600MHz 1.5ppm £99 with mains unit. Post £2.

HI-FI EQUIPMENT. Big flog-off this month.

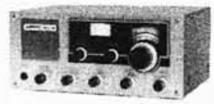
BURGLAR ALARM KITS Callers save £20 this month (were £79).

G-WHIPS. Coils and aerials less 15% this month to callers.

VALVES FOR FT101. 6JS6C NEC original boxes £17 pair. Unstamped £13. 12BY7A NEC £3. 6146B General Electric £19 pair. Post 50p.

SX30D + FM. At last a good receiver with digital readout, FM, & reasonable price. 200KHz-30MHz, AM SSB CW FM.

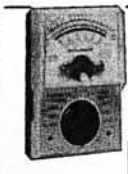
SX30D £219
Carriage paid



TEST EQUIPMENT. SOAR FC841 Frequency counter £47, FC845 £65, Auto Digital Multimeter £41 – Post £1.50 each.

Barclaycard, Access, Cheque, Cash!!

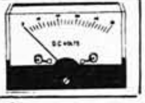
HOLDINGS PHOTO AUDIO CENTRE
39/41 Mincing Lane, BLACKBURN, BB2 2AF
(Tel: (0254) 59595. Closed Thursday.



NEW MODEL MINI-MULTI TESTER
Deluxe pocket size precision moving coil instrument. Impedance + Capacity – 4000 o.p.v. Battery included. 11 instant ranges measure: DC volts 5, 25, 250, 500. AC volts 10, 50, 500, 1000. DC amps 0-250μa; 0-250ma. Continuity and resistance 0 to 600K ohms.
£6.50 post 50p

De-Luxe Range Doubler Model, 50,000 o.p.v. £18.50. 7×5×2in. Post £1

NEW PANEL METERS £4.50
50μa, 100μa, 500μa, 1ma, 5ma, 50ma, 100ma, 25 volt, VU Meter, 500ma, 1 amp, 2 amp. Facia $2\frac{1}{4} \times 2 \times 1\frac{1}{4}$in. Post 50p. Stereo VU $3\frac{1}{4} \times 1\frac{3}{8} \times 1$in. £3.



FAMOUS LOUDSPEAKERS
Post £2 each

Make	Model	Size	Watts	Ohms	Price
Goodmans	Tweeter	$3\frac{1}{2}$in	25	8	£4.00
Seas	Tweeter	4in	50	8	£9.50
Audax	Tweeter	4in	30	8	£6.50
Audax	Mid-Range	4in	50	8	£7.50
Seas	Mid-Range	$4\frac{1}{2}$in	100	8	£12.50
Seas	Mid-Range	5in	80	8	£12.00
Goodmans	Woofer	8in	25	4 or 8	£6.50
Audax	Woofer	8in	40	8	£14.00
Audax	Woofer	10in	50	8	£16.00
Goodmans	8HB	8in	60	8	£12.50
Rigonda	Full-Range	10in	15	8	£5.00
Baker Hi-Fi	Deluxe	12in	15	8	£14.00
Baker Hi-Fi	Major	12in	30	4/8/16	£14.00
Baker Hi-Fi	Superb	12in	30	8/16	£24.00
Baker P.A.	Group 45	12in	45	4/8/16	£14.00
Baker Hi-Fi	Auditorium	12in	45	8/16	£22.00
Baker Hi-Fi	Auditorium	15in	60	8/16	£34.00
Baker P.A.	Group 75	12in	75	4/8/16	£18.00
Goodmans	GR (Group)	12in	90	8/16	£27.50
Baker P.A.	Group 100	12in	100	8/16	£24.00
Baker P.A.	Disco 100	12in	100	8/16	£24.00
Baker P.A.	Group 100	15in	100	8/16	£32.00
Baker P.A.	Disco 100	15in	100	8/16	£32.00
Goodmans	HPD (Disco)	12in	120	8	£29.50
EMI	450	13×8in	10	3/8	£8.00
EMI	Bass	13×8in	20	15	£12.50
Goodmans	HP (Bass)	18in	230	8	£80.00

BATTERY ELIMINATOR MAINS to 9 VOLT DC
Stabilised output, 9 volt 400 m.a. UK made with terminals. Overload cut out. $5 \times 3\frac{1}{4} \times 2\frac{1}{4}$in. Transformer Rectifier Unit. Suitable Radios. Cassettes. **£4.50.** Post 50p.

R.C.S. LOUDSPEAKER BARGAINS
3 ohm, 5 in. 7×4in. **£2.50;** 8×5in. $6\frac{1}{2}$in. **£3;** 8in. **£4.50;** 10in. **£5**
8 ohm, 2in. $2\frac{1}{2}$in. **£2.00;** 3in. 5in. 5×3in. 7×4in. **£2.50.**
$6\frac{1}{2}$in. 8×5in. **£3;** 8in. **£4.50;** 10in. **£5;** 12in. **£6.**
15 ohm, 3in. 5×3in. 6×4in. 7×4in. 5in. **£2.50;** $6\frac{1}{2}$in. **£5.**
25 ohm, 3in. 5×3in. 7×4in. **£2.50;** 120 ohm, $3\frac{1}{4}$in. dia. **£1.50.**

LOW VOLTAGE ELECTROLYTICS
1, 2, 4, 5, 8, 16, 25, 30, 50, 100, 200mF 15V **10p.**
500mF 12V **15p;** 25V **20p;** 50V **30p;**
1000mF 12V **20p;** 25V **35p;** 50V **50p;** 1200mF/76V **80p.**
2000mF 6V **25p;** 25V **42p;** 40V **60p;** 2000mF/100V **£1.20.**
2500mF 50V **70p;** 3000mF 25V **50p;** 50V **65p.**
3300mF 63V **£1·20;** 4700mF 63V **£1·20;** 2700mF/76V **£1.**
4700mF 30V **85p;** 1000mF 100V **£1.**

HIGH VOLTAGE ELECTROLYTICS

8/450V	**45p**	8+8/450V	**75p**	50+50/300V	**50p**
16/350V	**45p**	8+16/450V	**75p**	32+32+32/325V	**75p**
32/350V	**75p**	20+20/450V	**75p**	100+100/275V	**65p**
50/350V	**80p**	32+32/350V	**85p**	150+200/275V	**70p**
50/450V	**95p**	32+32/500V	**£1.80**	220/450V	**95p**

TRIMMERS 30pF, 50pF, **10p.** 100pF, 150pF, **15p.** 500pF **30p.**
CONDENSERS VARIOUS, 1pF to 0·01mF 350V, **5p.** 400V-0·001 to 0·05 **5p;** 0·1 **15p;** 0·25 **25p;** 0·47 **35p.** 1000V 0·1mF **25p;** 0·22mF **30p;** 0·47mF **60p;** 1750V 0·22mF **50p.**
WAFER SWITCHES. 1 pole 12W, 2 pole 6W, 3 pole 4W, 4 pole 3W, 2 pole 2W, 4 pole 2W **60p** ea.
TWIN GANGS 120pF **50p;** 500+200pF **£1.**
SINGLE SOLID DIELECTRIC 100pF, 500pF **£1.50.**
GEARED TWIN GANGS 25pF **95p;** 365+365+25+25pF **£1.**
SLOW MOTION DRIVE 6:1 **90p. REVERSE VERNIER 60p.**
VERNIER DIALS 36mm **£2.25** 50mm **£2.75**
SPINDLE EXTENDERS 60p. COUPLERS 40p.
NEON PANEL INDICATORS 250V. Red $1\frac{1}{4} \times \frac{3}{8}$ **45p.**
RESISTORS. 10Ω to 10M. $\frac{1}{2}$W, 1W, 20% **2p,** 2W. **10p.**
HIGH STABILITY. $\frac{1}{2}$W 2% 10 ohms to 1 meg., **8p.**
WIRE-WOUND 10 ohm to 10K 5 watt, 10 watt, **20p.**
BLANK ALUMINIUM CHASSIS. 6 × 4–**£1.45;** 8 × 6–**£1.80** 10 ×7–**£2.30;** 12 ×8–**£2.60;** 14 ×9–**£3.00;** 16 ×6–**£2.90;** 16 × 10–**£3.20.** *All $2\frac{1}{2}$in. 18 swg.* **ANGLE ALI.** $6 \times \frac{3}{4} \times \frac{3}{4}$in. **30p.**
ALUMINIUM PANELS,–18 swg. 6 × 4–**45p;** 8 × 6–**75p;** 14 × 3–**75p;** 10 × 7–**95p;** 12 × 8–**£1.10;** 12 × 5–**75;** 16 × 6–**£1.10;** 14 × 9–**£1.45;** 12 × 12–**£1.50;** 16 × 10–**£1.75.**
PLASTIC box with aluminium facia $6\frac{1}{4} \times 4\frac{1}{4} \times 2''$ **£1.50.**

ALUMINIUM BOXES WITH LIDS
3×2×1 **£1.** $4 \times 2\frac{1}{2} \times 2$ **£1.** $4 \times 4 \times 2\frac{1}{2}$ **£1.35.**
6×4×2 **£1.60.** 7×5×3 **£2.40.** 8×6×3 **£2.50**
10×7×3 **£3.** 12×5×3 **£2.75.** 12×8×3 **£3.60.**

BRIDGE RECTIFIER 200V PIV $\frac{1}{2}$ amp **50p.** 2 amp **£1·00.** 4 amp **£1.50.** 8 amp **£2.50. DIODES** 1a, **10p;** 3a, **30p.**
TOGGLE SWITCHES SP **40p.** DPST **50p.** DPDT **60p.**
MINIATURE TOGGLES SP, **40p;** DPDT, **60p.**

MAINS TRANSFORMERS

		Post			Post
5-8-10-16V, $\frac{1}{2}$A	**£2.50**	80p	24V $2\frac{1}{2}$A Twice	**£8.00**	£2
6V $\frac{1}{2}$A	**£2.00**	£1	20V 1A	**£3.00**	£1
6-0-6V, $1\frac{1}{2}$A	**£3.50**	£1	20-0-20V 1A	**£3.50**	£1
9V 250ma	**£1.50**	80p	20/40/60V 1A	**£4.00**	£2
9V 3A	**£3.50**	£1	25-0-25V 2A	**£4.50**	£2
9-0-9V 50ma	**£1.50**	80p	28V 1A Twice	**£5.00**	£2
10-0-10V 2A	**£3.00**	£1	30V $1\frac{1}{2}$A	**£3.50**	£1
10-30-40V 2A	**£3.50**	£1	30V 5A and		
12V 100ma	**£2.00**	80p	17-0-17V 2A	**£4.50**	£2
12V 3A	**£3.50**	£1	35V 2A	**£4.00**	£1
12-0-12V, 2A	**£3.50**	£1	34-29-0-29-34V 6A	**£12.00**	£2
15-0-15V 2A	**£3.75**	£1	0-12-27V 2A	**£3.50**	£1

RADIO COMPONENT SPECIALISTS
Dept. 2, 337, WHITEHORSE ROAD, CROYDON, SURREY, U.K. TEL: 01-684 1665
Post 50p Minimum. Callers Welcome.
Closed Wed. Same day despatch.
Access-Barclay-Visa. Lists 31p.

www.americanradiohistory.com

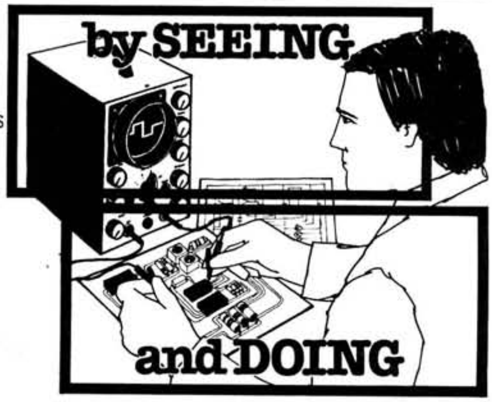
MASTER ELECTRONICS NOW!
The PRACTICAL way!

This new style course will enable anyone to have a real understanding of electronics by a modern, practical and visual method. No previous knowledge is required, no maths, and an absolute minimum of theory.

You learn the practical way in easy steps mastering all the essentials of your hobby or to start or further a career in electronics or as a self-employed servicing engineer.

All the training can be carried out in the comfort of your own home and at your own pace. A tutor is available to whom you can write personally at any time, for advice or help during your work. A Certificate is given at the end of every course.

You will do the following:
- Build a modern oscilloscope
- Recognise and handle current electronic components
- Read, draw and understand circuit diagrams
- Carry out 40 experiments on basic electronic circuits used in modern equipment
- Build and use digital electronic circuits and current solid state 'chips'
- Learn how to test and service every type of electronic device used in industry and commerce today. Servicing of radio, T.V., Hi-Fi and microprocessor/computer equipment.



New Job? New Career? New Hobby? Get into **Electronics** Now!

FREE! COLOUR BROCHURE

Please send your brochure without any obligation to

NAME

ADDRESS

BLOCK CAPS PLEASE

I am interested in:

PW/1/821

- COURSE IN ELECTRONICS as described above
- RADIO AMATEUR LICENCE
- MICROPROCESSORS
- LOGIC COURSE

OTHER SUBJECTS

POST NOW TO:

British National Radio & Electronics School Reading, Berks. RG1 BR

INDEX TO ADVERTISERS

www.americanradiohistory.com

LINEAR I.Cs

AN103	200p
AY1-0212	600p
AY1-1313	660p
AY1-1320	225p
AY1-5050	99p
AY3-1270	750p
AY3-8910	380p
AY3-8912	625p
AY5-4007D	520p
CA3028A	120p
CA3019	80p
CA3046	70p
CA3048	220p
CA3059	285p
CA3080E	70p
CA3086	48p
CA3089E	200p
CA3090AQ	375p
CA3130E	90p
CA3140E	40p
CA3160E	100p
CA3161E	150p
CA3162E	450p
CA3189E	300p
CA3240E	110p
CA3280G	200p
DAC1408-8	200p
HA1366	195p
HA1388	250p
ICL7106	700p
ICL7660	200p
ICL8038	300p
LC7120	300p
LC7130	325p
LF347	150p
LF351	48p
LF353	95p
LF355	95p
LF356P	95p
LF357	110p
LM10C	325p
LM301A	25p
LM307	45p
LM311	70p
LM318	150p
LM319	215p
LM324	30p
LM335Z	140p
LM339	50p
LM348	65p
LM358P	60p
LM377	175p
LM380	75p
LM381AN	180p
LM382	120p
LM386	90p
LM387	120p
LM389	95p
LM393	100p
LM394CH	300p
LM709	36p
LM710	50p
LM725	300p
LM733	60p
LM741	18p
LM747	70p
LM748	35p
LM1871	300p
LM1872	300p
LM1886	700p
LM1889	350p
LM2917	200p
LM3302	75p
LM3900	50p
LM3909	85p
LM3911	125p
LM3914	200p
LM3915	200p
LM3916	225p
LM13600	110p
M51513L	230p
M51516L	500p
MB3712	200p
MC1310P	150p
MC1458	36p
MC1495L	350p
MC1496	70p
MC3340P	120p
MC3401	50p
MC3403	65p
MK50398	635p
ML920	800p
MM57160	620p
NE531	140p
NE555	16p
NE556	45p
NE564	420p
NE565	120p
NE566	155p
NE567	140p
NE570	410p
NE571	400p
NE5534A	125p
PLL02A	500p
RC4136	60p
RC4151	200p
SAA1900	£16
S566B	225p
SAD1024A	850p
SFF96364	800p
SL490	350p
SN76477	450p
SN76488	450p
SP8515	750p
TA7120	150p
TA7204	150p
TA7205	90p
TA7222	150p
TA7310	150p
TBA641AX1	275p
TBA641BX1	300p
TBA800	80p
TBA810	100p
TBA820	80p
TBA920	200p
TBA950	225p
TC9109	750p
TCA210	350p
TCA220	350p
TCA940	175p
TDA1004A	300p
TDA1008	320p
TDA1010	200p
TDA1022	500p
TDA1024	120p
TDA1170	300p
TDA2002V	325p
TDA2020	320p
TL071/81	25p
TL072/82	45p
TL074	100p
TL170	50p
TL430C	70p
UA1003-3	935p
UAA170	170p
UA2240	120p
ULN2003	75p
UPC1156H	275p
XR2206	300p
ZNA234	850p
ZN414	80p
ZN419C	190p
ZN424E	130p
ZN425E	340p
ZN427E	590p
ZN428	400p
ZN1034E	200p
ZN1040E	670p

TRANSISTORS

AC128	20p
AC176	25p
AD161	40p
AD162	40p
BC107	14p
BC108B	15p
BC109C	16p
BC140	30p
BC160	30p
BC177	16p
BC179C	18p
BC182LB	10p
BC183LB	10p
BC184LC	16p
BC212LB	12p
BC213LB	11p
BC214LC	10p
BC237B	10p
BC327	10p
BC337	10p
BC477	30p
BC516	36p
BC517	36p
BC547B	12p
BC548/C	9p
BC549C	12p
BC557B	12p
BC558B	12p
BC559C	16p
BCY71	20p
BD131	60p
BD132	40p
BD135	40p
BD136	35p
BD139	40p
BD140	40p
BD241B	75p
BD242B	75p
BDY56	175p
BF244B	25p
BF256B	45p
BF257	30p
BF259	35p
BF337	30p
BF457	70p
BFR39	20p
BFR40	20p
BFR41	20p
BFR79	20p
BFR80	25p
BFR81	25p
BFX29	25p
BFX30	34p
BFX84	25p
BFX85	30p
BFY50	24p
BFY51	24p
BFY52	24p
BFY90	75p
BRY39	40p
BSX20	20p
BU104	225p
BU105	170p
BU108	250p
BU109	225p
BU180A	120p
BU205	175p
BU208	200p
BU326A	330p
BU406	145p
BUY69C	200p
J300	50p
MJ2501	225p
MJ2955	90p
MJ3001	225p
MJE340	50p
MJE2955	90p
MJE3055	70p
MPF102	30p
MPF103	30p
MPF104	30p
MPF105	30p
MPSA06	25p
MPSA12	30p
MPSA13	30p
MPSA43	50p
MPSA56	25p
MPSU06	55p
TIP29C	40p
TIP30C	45p
TIP31C	50p
TIP32C	50p
TIP33C	70p
TIP34C	80p
TIP35C	150p
TIP36C	160p
TIP41C	55p
TIP42A	50p
TIP42C	60p
TIP47	90p
TIP54	160p
TIP112	100p
TIP122	60p
TIP142	110p
TIP147	120p
TIP2955	60p
TIP3055	60p
VN10KM	55p
VN46AF	70p
VN66AF	80p
VN88AF	95p
ZTX108	10p
ZTX300	13p
ZTX452	45p
ZTX500	13p
ZTX552	55p
ZTX652	60p
ZTX752	70p
2N697	30p
2N706A	16p
2N1613	30p
2N1711	25p
2N1893	30p
2N2102	70p
2N2160	295p
2N2219A	25p
2N2222A	25p
2N2369A	17p
2N2484	25p
2N2646	40p
2N2905A	25p
2N2907A	25p
2N3053	25p
2N3054	55p
2N3055	35p
2N3442	140p
2N3525	200p
2N3553	240p
2N3702	10p
2N3703	10p
2N3704	10p
2N3705	10p
2N3706	10p
2N3707	10p
2N3708	10p
2N3773	200p
2N3819	20p
2N3823	30p
2N3866	90p
2N3904	15p
2N3906	15p
2N4124	27p
2N4126	27p
2N4401	25p
2N4403	25p
2N4427	90p
2N4444	140p
2N4871	60p
2N5062	35p
2N5087	27p
2N5089	27p
2N5192	75p
2N5195	80p
2N5245	40p
2N5401	50p
2N5457	30p
2N5458	30p
2N5459	30p
2N5460	60p
2N5485	36p
2N5459	30p
2N5460	60p
2N5485	36p
2N5777	40p
2N5823	120p
2N6027	30p
2N6052	300p
2N6059	325p
2N6107	65p
2N6123	50p
2N6247	190p
2N6254	130p
2N6292	65p
2SC1306	100p
2SC1307	150p
2SC1384	200p
2SC1957	90p
2SC1969	150p
2SC2028	80p
2SC2029	200p
2SC2078	160p
2SC2335	200p
2SC2612	200p
40290	250p
40409	100p
40410	100p
40594	120p
40595	120p
40673	75p
40871	100p
40872	100p

BRIDGE RECTIFIERS

1A 50V	19p
1A 100V	20p
1A 400V	25p
1A 600V	30p
2A 50V	30p
2A 100V	35p
2A 400V	45p
3A 200V	60p
3A 600V	72p
4A 100V	95p
4A 400V	100p
6A 50V	80p
6A 100V	100p
6A 400V	120p
10A 400V	200p
25A 400V	380p

ZENERS

2.7V-33V	
400mW	9p
1W	15p

TRIACS PLASTIC

3A 400V	60p
6A 400V	70p
6A 500V	88p
8A 400V	75p
8A 500V	95p
12A 400V	85p
12A 500V	105p
16A 400V	110p
16A 500V	130p
T2800D	130p

THYRISTORS

C106D	45p
2N3525	160p
MCR101	36p
2N5060	34p
2N5061	36p
2N5062	38p
2N5064	40p
TIC44	27p
2N4444	160p
2N6397	180p
2N6401	200p
2N6403	220p

VOLTAGE REGULATORS
FIXED PLASTIC

1A	+ve		−ve	
5V 1A	7805	40p	7905	50p
12V 1A	7812	40p	7912	45p
15V 1A	7815	40p	7915	45p
18V 1A	7818	40p	7919	45p
24V 1A	7824	40p	7924	45p
5V 100mA	78L05	30p	79L05	60p
12V 100mA	78L12	30p	79L12	50p
15V 100mA	78L15	30p	79L15	50p

OTHER REGULATORS

LM309K 1A 5V	140p	78HGKC	600p
LM317K	325p	78HO5KC	550p
LM317T 1A Adj	200p	78MGT2C	140p
LM337T	225p	78GUIC	200p
LM323K 3A 5V	350p	79GUIC	225p
LM723 150mA Adj	30p	79HGKC	700p
TL494	300p	TL497	300p
78S40	225p	LM305AH	250p
		SFH205	120p

OPTO-ELECTRONICS

2N5777	45p	ORP60	120p
OCP71	180p	ORP61	120p
ORP12	120p	TIL78	55p

OPTO-ISOLATORS

ILD74	130p	TIL111	70p
MCT6	160p	TIL112	70p
MCS2400	190p	TIL113	70p
ILQ74	240p	TIL116	70p

LEDS

0.125"		0.2"	
TIL209 Red	10p	TIL220 Red	10p
TIL211 Gr	12p	TIL222 Gr	12p
TIL212 Ye	15p	TIL228 Yel	15p
		Rectangular LEDs (R, G, Y)	30p
		NSB5881	570p
		TIL311	600p
		TIL312/3	110p
DISPLAYS		TIL321/2	130p
DL704	140p	TIL330	140p
DL707 Red	140p	7750/60	200p
FND357	120p	**DRIVERS**	
FND500	90p	9368	250p
FND507	90p	9370	300p
MAN3640	175p	UDN6118	320p
MAN4640	200p	UDN6184	320p

TECHNOMATIC LTD

MAIL ORDERS TO: 17 BURNLEY ROAD, LONDON NW10 1ED
SHOPS AT: 17 BURNLEY ROAD, LONDON NW10
(Tel: 01-452 1500, 01-450 6597. Telex: 922800)
305 EDGWARE ROAD, LONDON W2

PLEASE ADD 40p p&p & 15% VAT
(Export: no VAT, p&p at Cost)

Orders from Government Depts. & Colleges etc. welcome.

VISA

Detailed Price List on request.
Stock items are normally by return of post.

2 METER HIGH POWER LINEAR AMPLIFIER

Designed for the FT290R or any transceiver with an output of 2 to 3½ watts, provision internally to fit an attenuator for higher input levels. Minimum power output is 80 watts with 2½ watts of drive. Fully RF switched, straight through operation when switched off. Built to high professional standards with colour to match most rigs storm grey & matt black. Power required is 13.8 volts @ 13 amps for full output. The price is right too – **ONLY £98.00.**

26-30 MHz Receiver pre-amp board ready built on PCB size 60×40mm. 25dB gain 1dB NF. Ideal for that deaf Rx or Tcvr. Very popular item many hundreds sold to date. Gain variable on PCB. **£8.00.**

NBFM ADAPTOR for the FT101 (up to "E" model) we still produce this successful item which gives FM on Tx & Rx just plugs into back of FT101 no PCBs to fit inside, self contained unit colour to match FT101. Size only 185×105×42mm professional quality unit. **PRICE only £70.00.**

RADIOTELEPHONE MARKER OSCILLATORS available in frequencies of 455KHz, 10.695MHz (CB IF FREQ.), 10.700MHz, 21.400MHz. Other frequencies made to order, self contained in die cast box size 25×100×50mm. **PRICE £20.00.**

3SK88 DUAL-GATE MOSFET 26dB gain 1.1dB NF @ 150MHz. Ideal as high gain replacement in most 2mtr Tcvr's to improve the sensitivity, with data sheet **£1.20,** or two for **£2.20.**
3SK87 DUAL-GATE MOSFET similar device to 3SK88 but 3dB more gain, same price as above.

3SK60 (sim. to 3N204) **75p.** 3SK51 (sim. to 40673) **70p.** 3SK45 **60p.** BFR84 **60p.** TIS88A **40p.** 2N3819 **35p.** BF256 **35p.** 2N4381 "p" chan fet **40p.**

BOLT-IN FEEDTHROUGH CAPACITORS due to demand we had some of these made for us. 1000pf 500v 2BA thread. **PRICE 40p each.**

OXLEY PTFE FEEDTHROUGH INSULATORS 3½mm dia. **6p ea. 25 for £1.00.**
SOLDER-IN FEEDTHROUGH CAPACITORS 1000pf 500v 3½mm dia. **50p per 10.**
SOLDER-IN FEEDTHROUGH INSULATORS 4mm dia. glass insulation. **75p per 100.**
LEADLESS DISC CERAMIC CAPACITORS 1000pf 500v **35p per 10.**
BAG OF 100 MIXED DISC CERAMIC CAPs. 1pf-470pf. **£1.50.**
BAG OF 250 MIXED RESISTORS all ¼ watt vertical pre-formed carbon film all long leads **£1.50 per bag.**
FILM TRIMMER CAPs. 2-25pf 10mm dia. **10p ea.** 1-10pf 7mm sq. **12p ea.** 1-10pf tetfer trimmer **35p ea.** (For other types send for list.)
CRYSTAL FILTERS – 10.7MHz ITTO24DE ±3½ KHz BW. imp. 920 ohm. New **£6.00.** BF4133 SSB 10.7MHz LSB only available. 200 ohm imp. **£5.00.**
RF POWER TRANSISTORS – 2N6083 30 watt out @ 175MHz 12v. FM/SSB. 7dB gain @ 145MHz. With data sheet **£6.50.**
PT4236A 1 watt @ 175MHz (TO39 case) **75p.** 2N3866 **75p.** BFW16A **75p.** RCA40081 400m/w @ 28MHz (TO39 case) **60p.** 2N5070 25 watt SSB 30MHz 28v stud mount new **£5.00** with data sheet. 2SC1909 (TO220 case) 5 watt AM/SSB 28MHz **£2.25.** 2SC1307 (TO220 case) 9dB gain 12v 28MHz 25 watt SSB **£3.00.**

We also have a quantity of manuals for the Tektronix 545 & 547 scopes & plug-ins. Send your requirements & for list.

Please add 60p for post & packing. All goods where possible are sent by return of post. Callers only by appointment please. All prices include VAT @ 15%.

AJH **ELECTRONICS**
20, Barby Lane, Hillmorton, Rugby, Warwickshire.
Tel: Rugby (0788) 76473 & 71066.

PYE POCKETFONES
RECEIVER SUITABLE FOR 70CMS — **£6.00**

EX EQ 4C × 250B BASES
PTFE WITH INTEGRAL CHIMNEY — **£10.00**

PYE POCKETFONE NIGHTCALL
FOR PFI/TX/RX. NEW BOXED — **£17.00**

TELEPHONES GPO 706 TYPE
GOOD CONDITION — **£5.00**

EX EQ REFLECTOMETER
MODULES FOR VHF/UHF FORWARD & REVERSE — **£5.00**

All prices include VAT and postage (Mainland Only)

Please allow 14 days for delivery.

A. H. THACKER & SONS LTD.,
High Street, Cheslyn Hay,
Nr. Walsall, Staffs.

Western

"BARGAIN CORNER"

WATCH THIS CORNER EVERY MONTH!
We have reserved this space so that you know exactly where to turn for those SPECIAL OFFERS. Each month we shall feature item/s for *A LIMITED PERIOD ONLY.*

THIS MONTH'S SPECIAL OFFERS

TRIO R-1000 only £279

Rush your order in now whilst stocks last.
"He who hesitates is lost"!

YAESU FT-720RU £235
YAESU FT-720RV £210

Offers close 31 January 1983.

Western Electronics (UK) Ltd
FAIRFIELD ESTATE, LOUTH, LINCS LN11 0JH
Tel: Louth (0507) 604955 Telex: 56121 WEST G.

Published approximately on the 15th of each month by IPC Magazines Ltd., Westover House, West Quay Road, Poole, Dorset BH15 1JG. Printed in England by Chapel River Press, Andover, Hants. Sole Agents for Australia and New Zealand – Gordon & Gotch (A/sia) Ltd.; South Africa – Central News Agency Ltd.
Subscriptions INLAND and OVERSEAS £13·00 payable to IPC Services, Oakfield House, Perrymount Road, Haywards Heath, Sussex.

Practical Electronics is sold subject to the following conditions, namely, that it shall not, without the written consent of the Publishers first given, be lent, resold, hired out or otherwise disposed of by way of Trade at more than the recommended selling price shown on the cover, and that it shall not be lent, resold or hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.

www.americanradiohistory.com

A new venture totally unconnected with any other amateur radio retailer

THE ENFIELD EMPORIUM

DAVE, G8SYG & MIKE, G6LHL

Would like to welcome you to their new emporium. It is just 1 mile from the North Circular Road in Enfield. There is plenty of room to park and cups of cocoa will be available to those in need of refreshment.

GOT AN IC 2E?

Why not let us MOD it? We can add an l.e.d. S-meter to your 2E (or 4E) while you wait!! We supply a completly new face-plate and the mod can either be carried out in our workshop (£20:25p) or we will supply a kit for you to fit yourself (£16).

LOAN SET

LOAN SET — We will have two licensed engineers in attendance to help you with any problems that you may have and they will be willing to repair rigs that were bought elsewhere! We will even offer you the use of a LOAN SET while yours is being repaired!!!

WE STOCK THE FULL RANGE OF

ICOM

EQUIPMENT AND ALL ACCESSORIES ARE AVAILABLE

WE CAN SUPPLY EQUIPMENT AND ACCESSORIES FOR

TRIO & YAESU

WE ARE ASP ANTENNA STOCKISTS

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

TRIO – We are offering substantial reductions on TRIO prices to personal callers only.

(Trio 930S with built-in auto A.T.U. — now in stock)

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

STANDARD – We now have in stock the C58, the C78 and the brand new multi-mode – the superb C5800 (25 watts) only **£359.**

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

ANTENNAS – We now have in stock the full range of TONNA and JAYBEAM antennas. We also have some very special bargains such as:–

2m Colinear (3dB) ....**£17.50** (Base station)
2m Colinear (6dB) ....**£33.00** (Base station)
10-15-20m Vert. trapped Dipole **£45.00**
Halo (Sideband Mobile) **£5.75**
Aerial Poles ($1\frac{1}{2}''$ & 2″) – Assorted lengths in stock. Prices from **£6.50**
Chimney lashing kits (Heavy duty) **£15.00**
Stand-off brackets – 12″ **£11** – 18″ **£12** – 24″ **£15.50.**

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

ROTATORS – Kenpro KR 250 (Light Yagis) – KR 400 (Medium to Heavy) – KR 600 (Heavy) Daiwa DR 7600 (Heavy)–Hirschmann 250 (Heavy).

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

BARGAINS – Sleeving ....**4 pence per m.**
813 Valves (Normally £91.00 each) ....**£35 for TWO**
807 Valves ....**£2.00 each**
We cannot list all of the switches, coils, transformers and components that we have in stock so **COME IN AND RUMMAGE.**

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

SWITCHES – Co-axial antenna switches from DAIWA – 4 Way **£36.99;** 2 Way **£10.50.**

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

CRYSTALS – We have in stock a large selection of crystals, some very rare ....**£2.00 each**

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

METERS – We stock the full range of DAIWA crossed needle SWR/Power meters.

CUE DEE

Specifications:

Antenna	4144A	10144A	15144A
No. Elements	4	10	15
Gain	8dBd	11.4dBd	14dBd
Front/Back	20dB	20dB	26dB
Front/Side	40dB	40dB	40dB
Boom Length	1.1m	4.5m	6.45m
Weight	1Kg	3Kg	5Kg
Boom		3 sections	4 sections

Independent Tests

Model	Boom Length	Gain Annaboda*)	Claimed
15144 (A)	3.1λ	13.0dBd	14.0dBd
C. C. Boomer	3.2λ	12.8dBd	16.2dBd
14 el Parab	2.9λ	12.7dBd	13.7dBd
Tonna	3.1λ	12.2dBd	15.7dBd

*) Gain over dipole under matched condition.

TONO

Linears

2M-50W	40 Watt Linear For 2 Metres	65.00
2M-100W	90 Watt Linear For 2 Metres + switchable pre-amp.	115.00
MR-150W	140 Watt Linear For 2 Metres + switchable pre-amp.	159.00
MR-250W	210 Watt Linear For 2 Metres + switchable pre-amp.	259.00
MR28	100 Watt Linear For 10 Metres + switchable pre-amp.	65.00
UC70	50 Watt Linear For 70cms+switchable pre-amp.	149.00

Full range of TONO products in stock.

Opening hours:
Mon-Thur 9-6
Fri 9-8
Sat 9-6
AND NOW SUN 9-1

★ **SPECIAL OFFER — Only £7.50 inc. p+p.** ★
★ Slim Jim — Collapsible to 20 inches — can be mailed. ★

PART EXCHANGES WELCOME

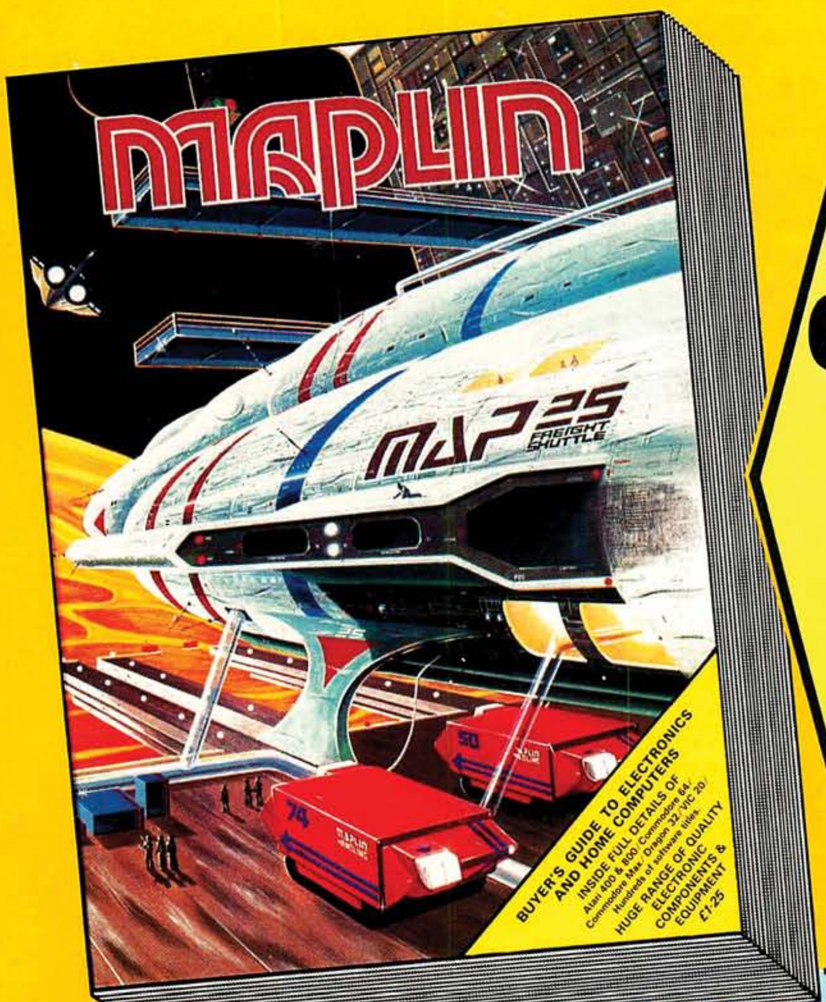
All prices include VAT. Goods normally despatched by return, but please allow up to 7 days.

Buy it with Access

281 HERTFORD ROAD, EDMONTON N9.
Telephone (01) 804 0128
Buses 249, 279 and 149 stop outside the door.

BARCLAYCARD VISA

www.americanradiohistory.com



THE NEW MAPLIN CATALOGUE FOR 1983

BRINGS YOU RIGHT UP-TO-DATE IN ELECTRONICS & COMPUTING

ON SALE IN ALL BRANCHES OF WHSMITH FROM 18th NOVEMBER 1982
PRICE £1.25

Nearly 400 pages of all the most useful components and a whole big new section devoted to home computers and personal software. As always the catalogue keeps you up-to-date with the latest technology — even our ordinary miniature resistors are now superb quality 1% tolerance metal film, yet they're still only 2p each. As well as our usual quality products at low prices, now we're offering quantity discounts too. So pick up a copy of our catalogue now — it's the biggest *and* the best!

Send now for an application form — then buy it with MAPCARD. MAPCARD gives you real spending power — up to 24 times your monthly payments, instantly.

Post this coupon now for your copy of our 1983 catalogue, price £1.25 + 25p p&p. If you live outside the UK send £1.90 or 10 International Reply Coupons. I enclose £1.50.

Name ....

Address ....

....

....

PW 1/83

MAPLIN
ELECTRONIC SUPPLIES LTD
P.O. Box 3, Rayleigh, Essex SS6 8LR.
Telephone: Southend (0702) 552911/554155

Shops at:
159-161 King Street, Hammersmith, London W6 Tel: (01) 748 0926
Lynton Square, Perry Barr, Birmingham. Telephone: (021) 356 7292
284 London Road, Westcliff-on-Sea, Essex. Tel: (0702) 554000
All shops closed Mondays

www.americanradiohistory.com