FOR THE RADIO ENTHUSIAST . . .

Practical Wireless

DECEMBER 1982

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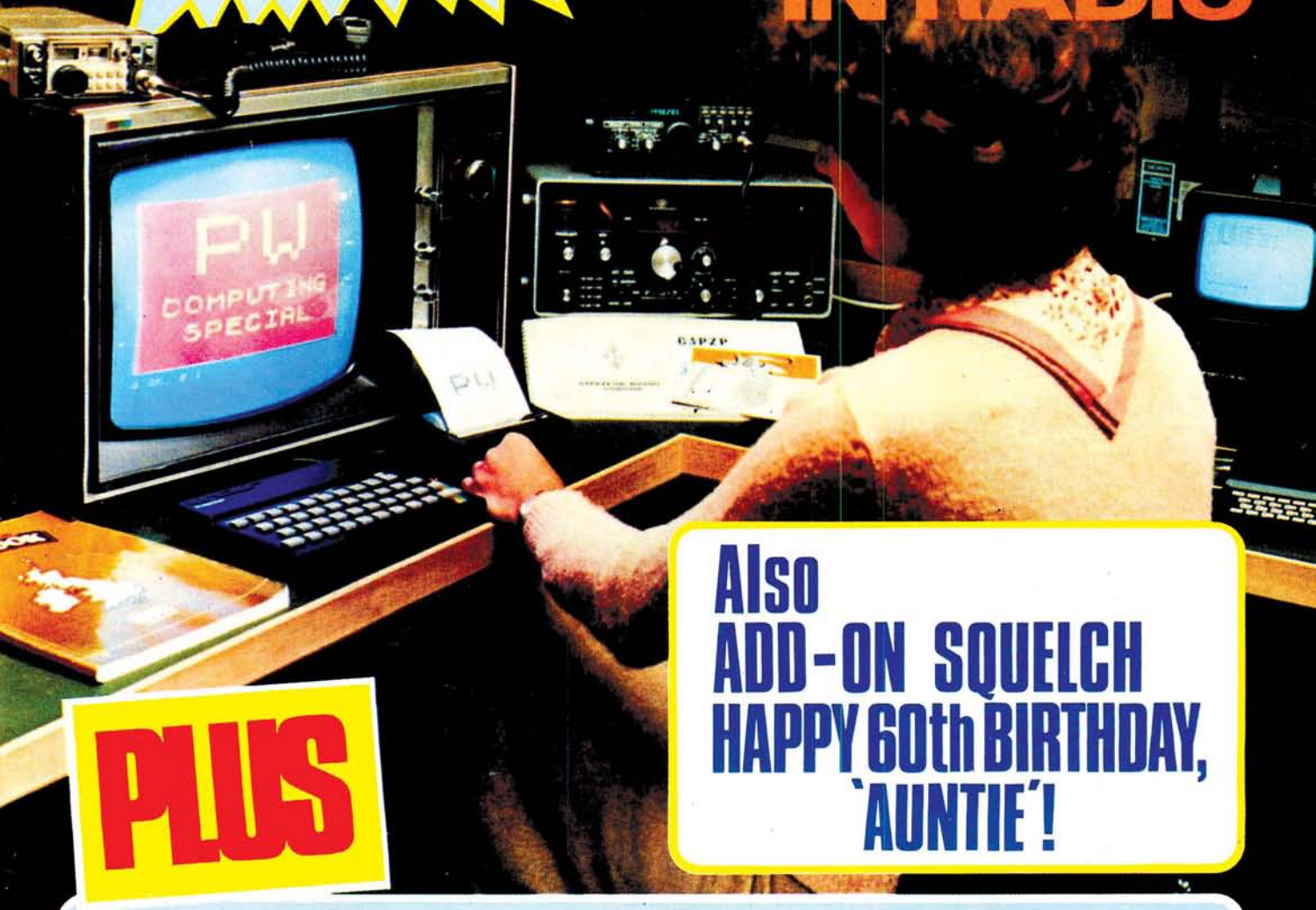
ZX COMPUTING IN RADIO



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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	199.00	(—)
FRG7700	200KHz-30MHz Gen. Coverage Receiver	329.00	(—)
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	(—)
FP80	Matching 230V AC Power Supply	63.00	(1.50)
FT290R	2M Portable Multimode	249.00	(—)
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 700EX	2M FM Synthesised 25W Mobile	189.00	(—)
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	(—)
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 1⅛" 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	694.00	(—)
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)
TS530S	160-10m Transceiver	534.00	(—)
TS130S	8 Band 200W Pep Transceiver	525.00	(—)
TS130V	8 Band 20W Pep Transceiver	445.00	(—)
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	166.00	(—)
VB2300	10W Amplifier for TR2300	58.00	(1.50)
MB2	Mobile Mount for TR2300	17.71	(1.50)
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 800	64.00	(2.00)
TR9500	70cm Synthesised Multimode	449.00	(—)
R1000	200KHz-30MHz Receiver	297.00	(—)
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	(—)
FXI Wavemeter	250MHz MAX	33.00	(0.75)
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 which)		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	169.00	(—)
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	(—)
ASP/B	Auto RF Speech Clipper (Trio Plug)	82.80	(—)
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	(—)

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Practical Wireless

DECEMBER 1982 VOL. 58 NO. 12 ISSUE 909

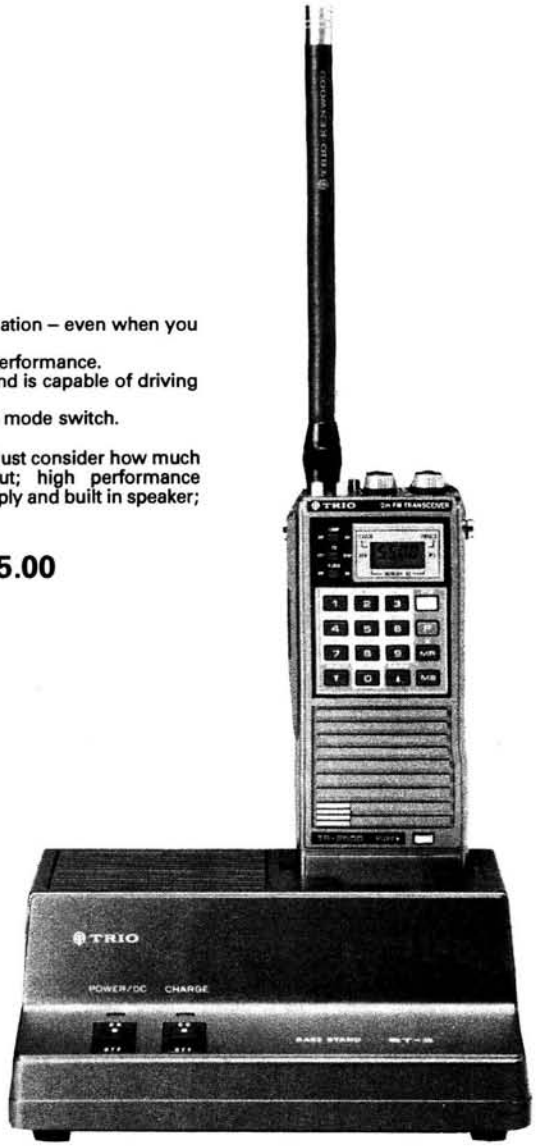
contents

ok, it was always a good receiver, but now with FM the **SRX 30D**, todays rig, yesterdays price.

- Extended coverage 200KHz-30MHz.
- Digital readout in large green display units which give true unambiguous frequency information – even when you switch sidebands or use the clarifier.
- All new frequency synthesis using Plessey SL 1600 series ICs for a new high standard of performance.
- All new audio system which produces outstandingly good quality on the built in speaker, and is capable of driving external hi fi speaker units for even better sound.
- All new IF filters with optimum bandwidth for mode in use. Automatic filter selection from mode switch.

We predict that the SRX30D will be a landmark in low cost, high performance SWL receivers. Just consider how much you should pay for a receiver covering 200KHz-30MHz with accurate digital readout; high performance FM/USB/LSB/AM with switched filters; drift cancelling frequency synthesis; built in mains supply and built in speaker; high quality construction and advanced design – and so much more.

SRX30D Now with FM but still **ONLY £215 Carriage £5.00**



The TR-2500 is a compact 2 metre FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan and Hi/Lo power switch.

TR-2500 FEATURES

- Extremely compact size and lightweight 66 (2⅝) W x 168 (6⅝) H x 40 (1⅝) D, mm (inches) 540g, (1.2lbs) with Ni-Cd pack.
- LCD digital frequency readout, with memory channel and function indication.
- Ten channel memory, includes "MO" memory for non-standard split frequencies.
- Memory scan, stops on busy channels, skips channels in which no data is stored.
- UP/DOWN manual scan in 5kHz steps.
- 2.5W or 300mW RF output. (HI/LOW power switch.)
- Programmable automatic band scan allows upper and lower frequency limits and scan steps of 5kHz and larger (5, 10, 15, 20, 25, 30kHz . . . etc) to be programmed.
- Repeater reverse operation.
- Keyboard frequency selection across full range.
- Frequency coverage, 144.000 to 145.995MHz.
- Two lock switches for keyboard and transmit.

TR-2500 HANDHELD £207 Carriage £5.00

handability TR 2500

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

AF606K

DAIWA ALL MODE ACTIVE FILTER £56.50

From Daiwa yet another aid to operating. In addition to the notch, SSB and CW filters, the AF606K is equipped with a PLL tone decoder; when the tone frequency of the CW signal and the free running frequency of the PLL tone decoder are the same, a locked signal is generated. This locked signal keys an audio oscillator which then reproduces the received CW signal. However, there is a tremendous difference between the produced signal and the received one – no noise and, of course, no fading. ANOTHER PIECE OF EQUIPMENT TO ENHANCE YOUR LISTENING.

DK 210

DAIWA ELECTRONIC KEYER £42.00

With so many electronic keys and keyers on the market, it's hard to describe one that is better than the rest. Inevitably it is a matter of "feel", and the feel of the New Daiwa DK210 is superb. Being Daiwa, the quality of design and construction has to be of the best, but it's in use that the DK210 is so impressive. Designed to be used with an external paddle, to give greater personal choice, the DK210 is otherwise self contained, even to being battery powered (PP3). It offers a speed range of 10 to 50 w.p.m., built in sidetone, facilities for semi auto, or fully auto keying, and a tune position for adjusting your transmitter, but the outstanding feature is the adjustable "weight" control. This control gives an amazing improvement in the character of the sending, and completely removes that mechanical sounding "electronic morse" characteristic. Those experienced CW users who have tried out the DK210, have all said how good it sounds – and have usually purchased one. So will you if you try it out.

DK210 from DAIWA – A truly nicer Keyer.

DON'T FORGET OUR FULL RANGE OF DAIWA METERS, ROTATORS, ETC.

Now from Daiwa, a new 2 metre monitor receiver. Using PLL synthesized circuitry, the SR1000 E covers the entire amateur band in 5 KHz steps.
It provides for today's amateur a small convenient means of monitoring activity on the busy 2 metre band. Compact and supplied with earphone, mounting bracket, the SR1000 provides for you mobile or fixed your contact with the 2 metre band.

SR100E 2 METRE RECEIVER £72.50 CARRIAGE £2.25

DAIWA SR 1000 E

With the arrival of the TS780, the dual bander rig has come of age, giving the two band multimode facilities of the original concept, plus a wealth of additional operating facilities. Taking a trip across the front panel of the rig we have the repeater facilities, a non-locking tone switch, ideal now that most repeaters are tone accessed and carrier maintained. The tone, of course, only works whilst the rig is in the FM mode. Below the tone switch is the TX offset switch giving plus or minus 600 KHz or 1.6 MHz, depending on whether 2 metres or 70 cm is selected and last, but certainly not least, reverse repeater – to my way of thinking proof that the TS780 was designed for amateurs by amateurs.

The meter functions on receive as S. meter, ALC meter or as a centre meter, the functions being controlled from a panel switch. On transmit the meter reads relative RF output. Immediately above the digital frequency and memory/VFO indicator are indicating leds: a "busy" led indicating in FM mode whether the squelch is open thereby, assuming the squelch level is correctly set, that the other station is transmitting. A "frequency lock" led tells that the F lock switch is pressed and the VFO knob inoperative. The "on air" led indicates the rig is transmitting and the "offset" led reminds you that the TX offset switch is set to repeater.

The memory operation has been updated: instead of having to progressively move through the memory content in sequence, by means of a rotary switch any of the ten memories (two more than the TS770's) can be selected at will. Entering frequencies into the memory is easier, as anyone who has a TS770 series will explain. Two priority frequencies are included: 9 and 10. Push buttons to the left of the VFO knob allow either of the two programmed frequencies to be quickly selected, immediately cancelling the previous instructions given to the rig. Just the thing for local net frequencies. SSB mic gain needs no explanation, as does the AF/RF gain control.

On the same control knob as the squelch level is a switch enabling the frequency width of scan to be determined. Briefly, when the rig is set to scan either in FM, FM step or SSB mode you can determine the amount of band to be covered.

The ranges are 0.5, 1, 3, 5 and 10 MHz, thus you can limit the rig to scan just the section of the band used by the mode you have selected. Example: scan width 0.5 MHz, VFO set at 144.000, coverage – 144.000 to144.5, mode side band – result: free scanning of the SSB portion of the band. On FM the scan locks if a signal is present. On SSB the scan does not stop but you are made aware that there is activity on the band.

Another new control on the TS780 is the IF shift. Available for some time on HF equipment to cope with crowded band conditions, obviously the Trio design engineers have recognised that the 2 metre SSB end of the band can become crowded during contests or when there is "a bit of a lift on". At these times a rig that has the "IF shift" facility will certainly "score points".

The send/receive Vox/Man, meter function, NB, low/high power switches are all well known and have been found on previous generations of Trio base station equipment and again require no explanation. I could say the same thing about the mode switch but here you will notice alongside the standard FM position another marked FM CH. Put the mode switch in this position and instead of a free-running VFO you have a mechanical "click" step feel, the frequency now moving in either 12.5 KHz or 5 KHz steps. Of course the rig will also scan in these steps, controlled either by the scan switch or the up/down shift microphone. Again the Trio amateurs who design the equipment have here a major triumph.

By now you may be seeing why I am so enthusiastic about the TS780 but there is still more to come. How about a memory scan system that will scan either the 2 metre frequencies stored in the memory or the 70 cm ones or, if you wish, both. Well that's another feature of the TS780. Add to this list variable VFO steps of either 20 Hz or 200 Hz, a selectable braked feel to the VFO knob, rapid up and down MHz switching and you have the most comprehensive rig ever seen.

Too complicated some may say. Rubbish say I. Trio thrive on rigs designed to be simple to operate. Do you remember what John wrote in Radcom about the TR7500 and its competitors? And, finally, how about a rig that without resorting to a MHz switch will, by use of the VFO knob, tune from 144 to 146 MHz and from 430 to 440 MHz – only one rig –

the TS 780

£748 inc VAT carr £5.00

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FT ONE £1,295 inc. VAT @ 15% & SECURICOR

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*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 £725 inc. VAT @ 15% & SECURICOR

"INSTANT" H.P.

- ★ 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.

FT707 £569 inc. VAT @ 15% & SECURICOR

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SMC FM MODIFIED VERSION AVAILABLE

- ★ 80-10 metres (including 10, 18 and 24MHz bands).
- ★ USB-LSB-CWN-AM (Tx and Rx operation).
- ★ 100W PEP, 50% power output at 3:1 VSWR.
- ★ Full "broad band" no tune output stage.
- ★ Excellent Rx dynamic range, power transistor buffers.
- ★ Rx Schottky diode ring mixer module.
- ★ Local oscillator with ultra-low noise floor.
- ★ Variable IF bandwidth – 16 crystal poles.
- ★ Bandwidths 6kHz*, 2.4kHz-300Hz. (600-350) Hz*.
- ★ AGC; slow-fast switchable VOX built-in.
- ★ Semi-break in with side tone for excellent CW.
- ★ Digital (100Hz) plus analogue frequency display.
- ★ LED Level meter reads: S, PO and ALC.
- ★ Indicators for: calibrator, fix, int/ext VFO.
- ★ Receiver offset tuning (RIT-clarifier) control.
- ★ Advanced noise blanker with local loop AGC.

WIDE COVERAGE ALL MODE Rx; FRG7700 £329 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.

TWO AND SEVENTY SMC HAVE THE SOLUTION

FT290R £249 inc.

VAT @ 15% & POSTAGE

- ★ 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).

- ★ 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).

		TOS
SMC2.2C	NiCad 2.2A/hr, "C"	
SMC2.0C	NiCad 2.0A/hr "C"	**2.35**
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FL2010	Linear Amplifier 2m 10W	**64.40**
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2 or 70!

FT790R £299 inc.

EX-STOCK

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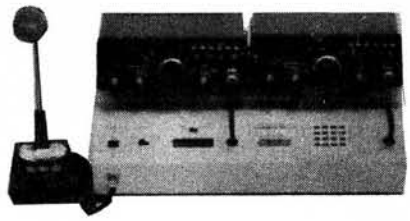
- ★ 430-330MHz (440-450 alternative).
- ★ 1W PEP, 1W/250mW FM/CW out.
- ★ FM: 100kHz and 25kHz steps.
- ★ SSB: 1kHz and 100Hz steps.
- ★ 1.6MHz shift with input monitor,
- ★ 1750Hz burst.
- ★ Rx; 100mA/200mA. Tx; 750mA max.
- ★ BNC Mounting ¼λ flexi antenna.

2 or 70!

FT480R £379 inc. 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.

- ★ 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.

- ★ 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.

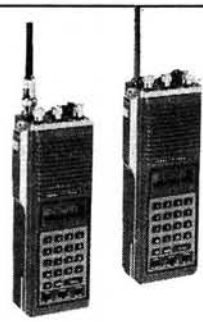
FT780R £449 inc. VAT @ 15% & SECURICOR

FT208R £209 inc.

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.

- ★ 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!

FT708R £219 inc.

VAT @ 15% & POSTAGE

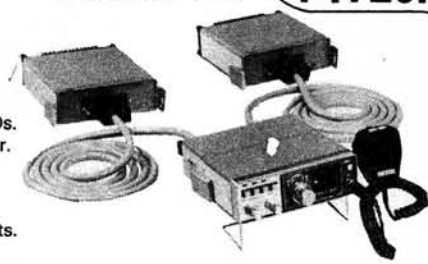
- ★ 430-440MHz (440-450 option).
- ★ 25kHz synthesizer steps.
- ★ ±7.6MHz EU split standard.
- ★ 1W or 100mW RF output.
- ★ Rx: 20mA squelch, 150mA (max AF).
- ★ Tx: 500mA at 1W RF.
- ★ 0.4μV for 12dB SINAD.

2 and/or 70!

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.

- ★ 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.

- ★ 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

FT230R £239 inc.

VAT @ 15% & POSTAGE

- ★ 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.

- ★ 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!

FT730R £000 inc.

VAT @ 15% & POSTAGE

- ★ 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.

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 Thanet ICOM

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.

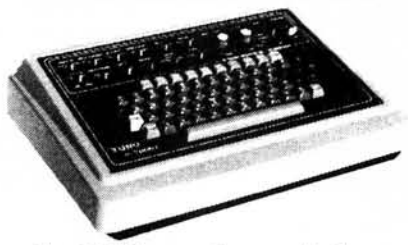
IC-720A Possibly the best choice in HF. £883.inc.

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 ICOM Thanet Electronics

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

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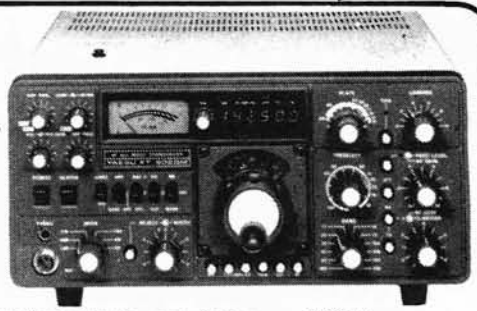
FT-ONE SUPER HF TRANSCEIVER

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

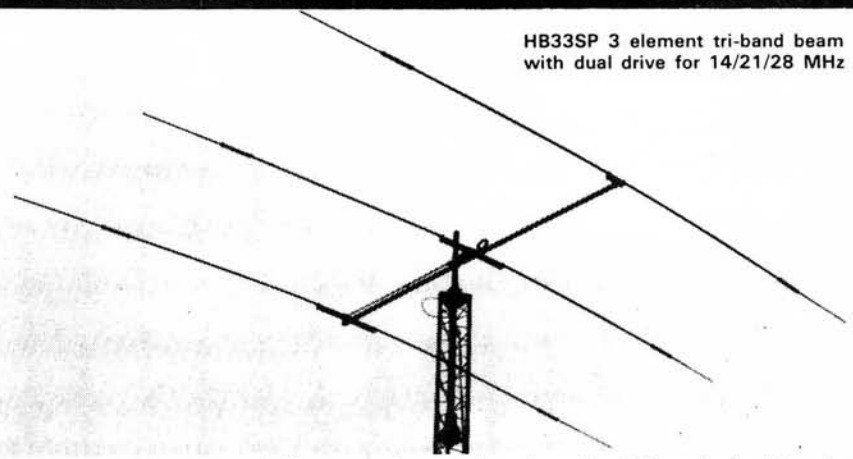
YAESU's top of the range receiver. All mode capability. USB, LSB, CW, AM *and* FM 12 memory channels with back up. Digital quartz clock feature with timer. Pictured here with matching FRT-7700 Antenna tuner and FRV-7700 VHF converter.

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

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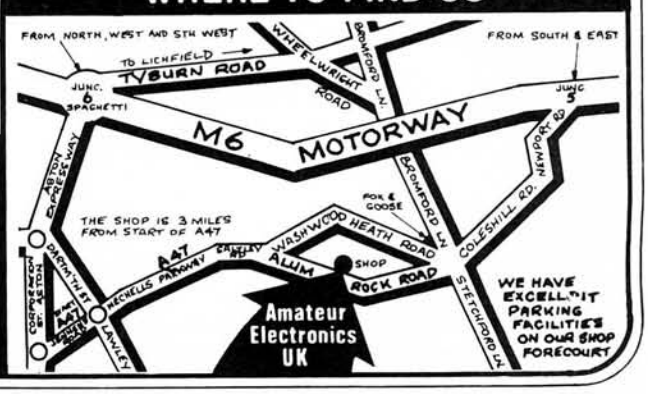

Amateur Electronics UK
504-516 Alum Rock Road · Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 334312 PERLEC G
Opening hours: 9.30 to 5.30 Tues. to Sat. continuous – CLOSED all day Monday.

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SHORT WAVE RECEIVERS – WE STOCK THE LOT!

£235 If you're a beginner just starting out in radio you'll be delighted with the performance that the R600 offers you. Considering the electronics that are packed into this receiver, the price is remarkably low. A few years ago this performance would have cost you twice as much. Full digital readout and really simple tuning in of SSB signals makes this one of the few top receivers that the beginner should consider. With all the gloom and doom one hears about in the news these days, why not put a pair of headphones on *your head*, plug them into the R600 and whisk yourself away into the wonderful world of wireless. Signals from the Australian outback or the flying doctor, radio amateur expeditions on some remote Pacific island, signals from Russian amateurs or young American novices, the latest World news even before the BBC reports it, aircraft over the Atlantic, shipping distress frequencies; all this and much more is possible on this little receiver. So don't delay any further, send today for full details and introduce yourself to an exciting new hobby.

Sony are well known for the innovations and the new ICF2001 is no exception. This receiver covers the full spectrum from 200kHz to 30mHz plus the FM broadcast band. The clear LCD display gives precise frequency readout to 1kHz and the set has six memories for storing popular frequencies. Its diminutive size and complete portability means you can take it anywhere. Powered from internal dry cells it is just as happy on an executive desk as it is in the radio shack. The telescopic aerial gives very creditable performance together with built in aerial tuner. Plug in the external aerial and the World is at your finger tips. It handles both SSB and AM signals and with excellent FM reception can equally double as a domestic receiver. The dual speed electronic tuning and fine tune vernier control make this set a remarkable package at a price that is quite amazing. As the only officially appointed amateur radio Sony dealer in the UK we can give you the kind of after sales service that has made us second to none.

£149

FREE 24 HOUR SECURICOR DELIVERY ON ALL THESE RECEIVERS

£309 The FRG7700 is for the advanced listener or for the enthusiast who demands the best in short wave reception. The receiver covers the complete spectrum 200kHz to 30mHz with a highly accurate digital display. The receiver offers excellent sensitivity and selectivity and has separate detectors for AM, FM and SSB, plus switched bandwidth on AM. Other controls include automatic gain control, noise blanker, attenuator, squelch, rf gain control and clock with timer. There is also facilities for fitting an optional 12 channel memory unit. The receiver runs from 230v AC mains or 12v DC and there is an optional aerial tuner to go with it. And if you are interested in VHF, there is a complete range of specially designed converters to go with the receiver that covers the amateur, aircraft and marine bands, etc. Why not send today for our coloured brochure and get to know more about what the FRG7700 has to offer.

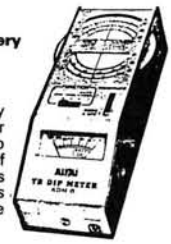
ALL POPULAR MAKES OF AMATEUR RADIO TRANSCEIVERS IN STOCK
SEND S.A.E. FOR COPY OF OUR LATEST CATALOGUE

LEARNING MORSE?
... HERE'S A SPECIAL OFFER

We've put together a complete package for anyone wanting to learn morse. It's based around the now famous Datong electronic morse tutor that we recommend as the best on the market. Add to this our special top grade morse key that plugs straight into the Datong D70 for sending practice plus our free copy of the RSGB morse code manual and you have a real bargain. Price **£65.95 (p&p £1.50).**

A NEW DIP METER ...
... AT AN UNBEATABLE PRICE!

£49 inc. delivery



Here's a brand new Dip meter at a very competitive price. You won't find better value anywhere. Covering 1.8mHz to 250mHz it performs a host of measurements and will also function as a wavemeter which of course is required by the amateur radio licence regulations.

INCREDIBLE PURCHASE!
Limited stocks ... so hurry

M700EX FM TRANSCEIVERS
144-146 MHz 25 WATTS

£189
p&p £3

SUPER DEAL

★ Synthesized
★ 25 & 12½ KHz steps
★ Priority scanning
★ Variable power
★ Digital display
★ Tone burst
★ Reverse repeater
★ Fully protected
★ Hardware kit

FULL 12 MONTH WARRANTY

BRAND NEW POWER & SWR METER WELZ SP10X
AMAZING ACCURACY
INCREDIBLE PRICE

Ideal for commercial amateur or CB use.

£19.95 p&p £1.50

This high grade instrument gives accurate readings of swr and power in the range 1.8 to 150 MHz. No more fiddly adjustments ... power reading is automatic at the flick of a switch. F.S.D. of 20 watts or 200 watts. Ideal for commercial, amateur of CB operation.

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EXCITING NEW PRODUCTS!

NEW AIRBAND MONITORS – ATC720/ATC720SP

The ATC720 will revolutionise air band monitoring. At the flick of a switch you can immediately dial up any one of the 720 VHF aircraft channels. In fact, it works just like the receivers built into the pilots cockpit. This means no more wondering whether you are tuned to the right frequency. The clear, white on black thumbwheel digits give instant confirmation of the channel frequency and the drift-free performance of the circuitry ensures that it will stay spot on channel indefinitely.

A new high sensitivity circuit ensures that even the weakest of signals can be copied and there is an external aerial socket so that it can be used indoors as a base station monitor. Extensive fatigue-free monitoring is possible using the squelch control setting and a built-in earphone socket provides for private listening. Included with the set is a flexible rubber antenna, rechargeable batteries and AC mains charger.

Two models are available; the ATC720SP is designed for commercial and professional applications, housed in a metal case and built to a stringent specification to meet all kinds of environments; the model ATC720 uses less sophisticated circuitry and is rated for normal domestic and flying club use.

Whether you're a pilot, engineer or aircraft enthusiast, you'll enjoy the performance of these monitors. Follow the action at air shows and listen to the skills of the air crews as they guide their aircraft through the air lanes and finally down onto the runway.

SPECIFICATION

Frequency range	:118-136mHz
Channel Steps	:25kHz
Mode	:AM
Sensitivity	:0.5uv
Selectivity	:8kHz/6dB & 25kHz 60dB
Antenna	:50 ohms

£129 inc. delivery

SP Model £189 inc. delivery

Both models now available

PRICES INCLUDE RECHARGEABLE BATTERIES & AC MAINS CHARGER

THE MOST SENSITIVE MONITOR WE KNOW OF!

TM56B MkII

AVAILABLE FOR 2m or MARINE

ONLY ~~£89.00~~

SPECIFICATION

Frequency Band	:144-146mHz Amateur version :156-162mHz Marine version
Number of Channels	:16 max. 2 fitted
Sensitivity	:0.4uv for 20dB
Mode	:FM modulation
Audio output	:1 watt 8 ohms
Power requirements	:13.8v DC or 230v AC
Sizes (mm)	:190(D), 140(W), 45(H)

LIMITED STOCKS SO HURRY!

SPECIAL THIS MONTH ONLY **£59**

The TM56B Mark II is probably the most sensitive scanning monitor available on the domestic market. It is a highly professional design intended for serious monitoring purposes and as such has found wide acceptance throughout the World.

The TM56B can be supplied either covering the 2m amateur band or the VHF marine band. In accordance with professional techniques, it uses crystals to ensure maximum receive performance. There is a total capacity of up to 16 channels, of which 5 channels are ready fitted, leaving the user the choice of 11 additional channels. 12 channels are selected by the main rotary front panel control and 4 further channels operate in a scanning mode. As soon as a station is heard, the receiver locks itself onto the appropriate channel indicated by an LED display. Any one of these channels may be "locked out" so that the scanner misses that channel. Other front panel controls include volume and squelch and on the rear panel is a standard SO239 aerial socket. The unit is also supplied with a mobile mounting kit. Power requirements are 12v DC or 230v AC for the built-in power supply.

If you are just starting out into amateur radio, then this receiver is a must. Enjoy listening to all your local amateurs both at home and mobile. Switch to your local repeater channel and hear the activity from miles around. The TM56B will give you a splendid introduction to amateur radio and is thoroughly recommended by us.

THE INCREDIBLE SX200N MONITOR RECEIVER

POLICE, AIRCRAFT, TAXIS ETC.

PLUS FREE LIST OF AIRCRAFT & MARINE FREQUENCIES

The SX200N is an extremely versatile and wide range receiver. This revolutionary design embodies a host of features that makes this unit a completely self-contained monitoring station. The frequency coverage extends from 26mHz to 512mHz and covers every conceivable service that utilises the VHF and UHF spectrum. Both AM and FM reception is provided, giving coverage of the Police, Fire Brigade, Ambulance, Aircraft, Taxis, Public Services, etc! The clear digital display gives instant frequency readout and a comprehensive scanning system makes easy work of hunting out the thousands of stations. The SX200 operates from 12v DC or 230v AC and comes complete with aerial. Simply plug the unit in and whisk yourself away into the wonderful World of radio.

ONLY £259.00 + £2.00 Carr.

CHEAPEST SCANNER AROUND! VHF 2m HAM BANDS COMPLETE WITH BRACKETS £39.00

M161 Here's a unit that is really incredible value. Look at the price! This is a complete 16 channel scanning receiver designed for either mobile or home use. It requires 12v DC and comes complete with mobile mounting brackets. Designed for use on the 2m amateur band, the set uses crystals for really top performance. Two of the most popular amateur channels are ready fitted and most other channels of your choice can be supplied from stock. This high performance receiver is ideal for those becoming interested in amateur radio and can be thoroughly recommended.

MAIL ORDER SLIP to: Waters & Stanton Electronics, Main Road, Hockley, Essex.

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Please charge to credit Card No.....

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AMATEUR RADIO EXCHANGE

FT-102

Yaesu's latest HF transceiver . . . a worthy successor to the evergreen FT-101 series, with so many extra features.

• Notch filter • Three 6146B final tubes • IF shift control • Band width control from 2.7kHz to 500Hz • APF control • RF processing • Tunable audio network for speech tailoring • SSB/CW/AM/FM

OUR PRICE OF £725 INCLUDES AM/FM BOARD

IC-740

The latest addition to the ICOM transceiver range, this gives all mode coverage – AM/CW/SSB/FM – right across the amateur bands from 1.8 to 30MHz.

Incorporating such features as IF shift, pass-band tuning and notch-filter as standard, this is one rig that has to be seen and tried by anyone in the market for a really top-quality base station.

PHONE FOR LATEST PRICE

IC-R70

Presenting the best in today's receiver technology from ICOM, featuring:

• Two VFOs • Frequency range 100kc – 30MHz
• Three IFs 70MHz/9MHz/455kHz • HF pre-amp
• Sensitivity 0.5 μv AM – 0.32 μv S/N 12dB

All this . . . and much more . . . for £469

IC-720A

Introduced a year ago, this superb HF rig from ICOM has become a firm favourite because of its remarkable general coverage receive capability from 100kc to 30MHz, plus transmit facility across its entire range for commercial purposes.

OUR PRICE £795

MBA READER

New from the USA, a superb CW/RTTY/ASCII receiver with its own built-in video display.

• Automatic morse tracking, 3-99 wpm.
• RTTY speeds, 60-70-75-100 wpm.
• ASCII speeds, 110 and 300 bauds 13v DC.

£175 inc. FREE stand

FT-290/FT-790

Yaesu's popular 2m Portable format now available for 70cm as well, with full 10MHz coverage, all-mode FM/CW/USB/LSB, 25/50kc steps, 1.6MHz shift for repeater operation, toneburst, etc.

FT-290: £249 with our well known mods.
FT-790: £295

ALINCO AMPLIFIERS

These two new RF amplifiers from ALINCO are undoubtedly the smallest units yet available in the UK measuring just 156mm x 91mm x 28mm, but there is nothing diminutive about their performance.

The **ELH-230** has an input of 3W and output of 30W over the frequency range 144-146MHz with a power consumption of 3.5 amps.

The **ELH-710** covers 430-440MHz and has rated input of 1W/3W with output figures of 3W/10W.

Both excellent value at £39 and £59 respectively.

MAXIMAL MK-4000

As sole importers we are proud to offer this first-class scanning receiver featuring FM coverage of 70-87.9875MHz and 140-175.9875MHz in 12.5kc steps on both bands. Sensitivity is 0.5μv S/N 20dB, and selectivity ±15KHz at –50dB, and its AF output is more than 1.3W.

All that, plus a built-in digital clock, for just £99

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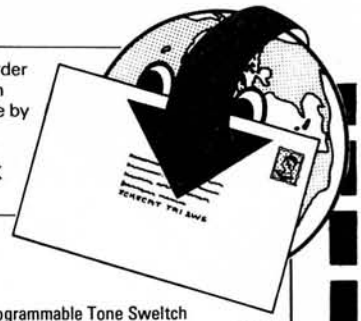

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YAESU

FT 102	160-10M 9-Band Trans.	**NEW**	699.00
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
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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
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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**	P.O.A.
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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
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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 Sweltch 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 9000E	RTTY/CW/ASC11	650.00
THETA 550	The latest – "A Winner"	299.00

AMPLIFIERS

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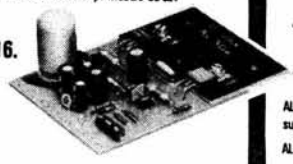
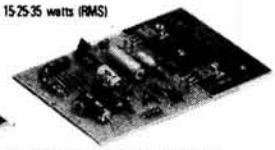


AUDIO AMPLIFIERS

15-25-35 watts (RMS)



AL60 15-25 watt Audio Amp Module 30-50v supply **£5.15.**

AL80 35 watt Audio Amp Module **£8.07**

AUDIO AMPLIFIER

Audio Amplifier, 50W. R.M.S., with integral heat sink and short circuit protection.

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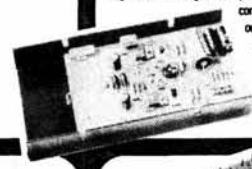

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125 watts (RMS), AL250.

A power amplifier providing an output of up to 125w RMS, into a 4 ohm load. Four 115w transistors in the output stage makes it extremely rugged while damage from incorrect or short circuit loads is prevented by a four transistor protection circuit. For use in many applications such as disco units, sound re-inforcement systems, background music players etc.

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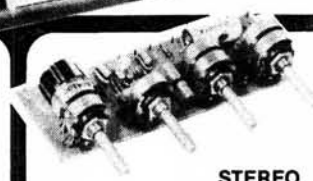
STEREO PRE-AMPLIFIERS



PA12 Supply voltage 22-32v input sensitivity 300mv Suit: AL10/AL20/AL30 **£8.55.** PA100 Supply voltage 30-55v inputs. Tape Tuner Mag P.U. Suit: AL60/AL80 **£17.85.** PA200 Supply voltage 35-70v inputs. Tape Tuner Mag P.U. Suit: AL80/AL120/AL250 **£18.24.**

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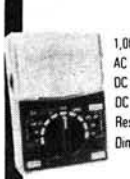

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TR9130	New 25W synthesised multimode	395.00
TR9500	70cm all-mode	449.00
TR7800	2m FM synthesised mobile	284.00
TR7850	40W version of above	314.00
TR8400	70cm FM synthesised	299.00
TR2300	2m FM synthesised portable	166.75
TR2500	2m FM synthesised handheld	207.00
R1000	Gen. Coverage Receiver	297.00
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FT101ZDFM	160-10m 9 band transceiver	665.00
FT902DM	9 band AM/FM transceiver	885.00
FC902	9 band atu. swr/pwr etc.	135.00
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MMB2	Mobile mounting bracket	16.00
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FP80A	230V AC power supply	63.25
FT780R	70cm all-mode transceiver	449.00
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FT208	2m synthesised portable FM	209.00
FT708R	70cm hand-held	219.00

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.

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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
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Our readers write:

Sir: I cannot say that I was entirely in sympathy with Mr Harada's comments about the RSGB (Oct '82 Letters), although he did raise a number of valid points. There is clearly a nucleus of members who are not altogether satisfied with the way the hierarchy look after our interests. Having first joined the Society in 1946 (or thereabouts) I have a strong feeling of loyalty to our representative body, whatever their faults. I admit to being a lazy member. I have only visited HQ on two occasions. I pressed a bell at 28 Doughty Street, being invited to do so by a notice if I desired attention. I waited and waited. Eventually someone appeared and was unable to answer my question concerning reciprocal licensing procedures for Kenya. So I went to the Kenya High Commission where I was not kept waiting and my question was answered very satisfactorily.

The general feeling I have after some 36 years is mixed. A mixture of good and bad impressions.

I wish that the Society were capable of dealing with the appalling intrusion by both unlicensed and illegally operated stations, particularly on 144MHz, who, often using obscene language, bring ham radio into disrepute. Cannot we fund a DF van to seek out these law breakers and bring them to book? We should campaign for a change in the law so that the evidence we could bring would be used. Anyway, why do members encourage them by responding to their transmissions?

But, when I read the RSGB's official reply, for the first time in 36 years I was incensed. I quote David Evans, General Manager/Secretary, "Mr Harada has raised in his letter a large number of points, the majority of which have been voiced at one time or another **with considerably more grace.**" (my emphasis). Who the h . . . does David Evans think he is? I presume a paid employee of **our** society and it certainly does him no credit to start a letter by rudely criticising a member. I did not bother to read the rest of his letter since in my 60th year I abhor pomposity.

I shall continue to support the Society and the many devoted servants who endeavour to protect our interests, but it is evident that there needs to be some changes, first in the attitude of one of its officials.

V. J. Copley-May G3AAG
Petersfield

Sir: I was interested to read both Mr Harada's letter and Mr Evans' reply from the RSGB on matters raised in the October issue.

Whilst Mr Harada may be misinformed over many of the points raised, it should still be impressed upon Mr Evans that the real situation is that many Radio Amateurs are dissatisfied with the way the Society represents the average Radio Amateur.

It is unfortunate that the Society generally looks down upon Class B licensees as second class radio amateurs irrespective of the fact that many technical articles are written by G8's and G6's. How, passing a Morse Test at 12 w.p.m. makes you eligible to be a first class radio amateur, I have yet to find out.

Instead of the Society spending an enormous amount of effort to gain third party greetings privileges, I would have thought their energies could have been more usefully directed at trying to obtain full use of all the v.h.f. bands for Class B licensees (i.e. including 50MHz and 70MHz), instead of just the "first class citizens", and permission for using c.w. on a small portion of 144MHz as a training ground for that mode of operation.

These criticisms are not made as a counter-productive exercise but are offered in the spirit which permeates amateur radio. I hope that Mr Evans will be responsive to these views which are shared by so many of his members.

N. Dilley G8YBT
Poole

comment...

Our Society

THE LETTERS about the RSGB which appeared in our October issue have provoked much comment from radio amateurs. That which has come to our ears is typified by two letters published above, representing (I am sure their writers will not mind my saying) the older brigade and the newer recruits to the hobby.

Regular readers will know that our policy on *PW* has been to encourage readers to support the RSGB, so that it might truly represent as many UK amateurs and s.w.l.s as possible. Unfortunately, it is our experience that many, inside and outside the Society, are far from satisfied with the way it operates.

It is indeed ironic that in a communications-based hobby, the problem should seemingly boil down to lack of communication at the centre, both within RSGB headquarters and between there and the outside world. Division of departments within HQ is so rigid that when the person responsible for a particular topic is away for any reason, it is impossible to get an answer to even a simple query. And that's assuming that you can get through on the telephone in the first place.

There seems to be no-one at HQ to deal with questions from the media. One national newspaper correspondent complained to us recently that it took four hours to get through to RSGB HQ, and when he did, he was shunted around various departments before eventually receiving an unsatisfactory answer to his query. Apart from a little coverage at the beginning of the Falklands war, when did you last see any mention of amateur radio on TV, or in national or local papers? The CB fraternity know how to use the media to publicise and promote their interests—we amateurs it seems do not. The RSGB fact-sheet distributed to the press a while back did a woefully inadequate job of explaining the difference between CB and amateur radio.

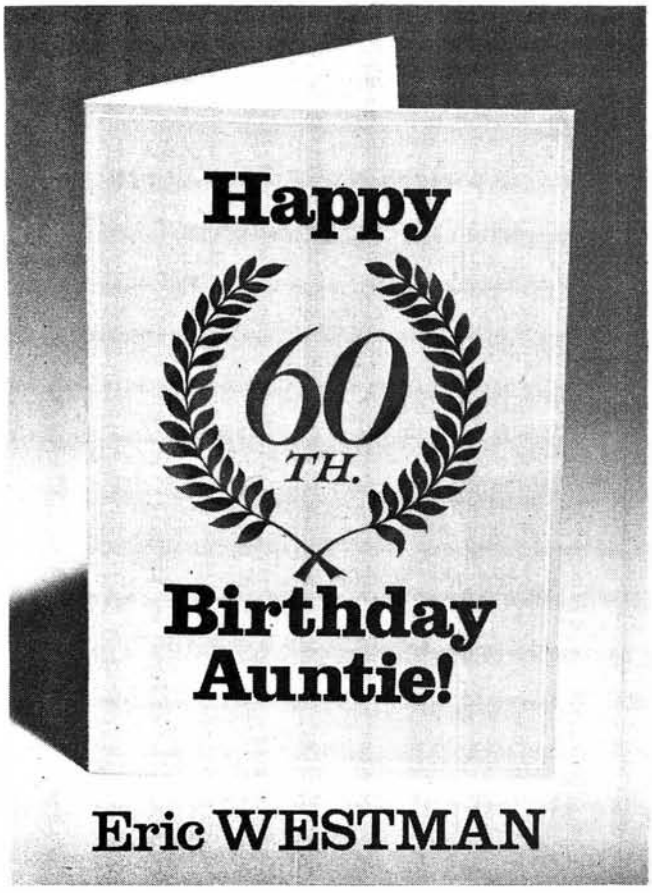
The same comments apply to political support for amateur radio. Are there any MPs promoting our cause in Parliament, as there were for CB? Are MPs in general being kept informed about our problems and our worries on topics such as planning restrictions, EMC of domestic appliances, cable television, etc.?

"Selling" the benefits of membership of any society to prospective members is a most difficult task, but we receive quite a few complaints from readers who are interested in joining the RSGB but have either got no answer or else what they felt was an inadequate one. Despite that, membership has grown significantly. The installation of a computer has undoubtedly helped to cope with this, but was it really necessary to choose a system that has to have data loaded and unloaded each day so that HQ hours of opening for enquiries were reduced?

With the weekly GB2RS news broadcasts and *Radio Communication,* the RSGB undoubtedly has a better system of communications open to it than any other society in the UK. Why then do so many members feel "cut off"? An encouraging sign (and frankly the only one I can find at present) is the wider dissemination of what was discussed at Council Meetings. There does, though, seem to be a certain insensitivity in framing some comments in the announcements about spectrum space "won" and "lost".

Obviously, amateur radio in the UK needs a representative body. If the RSGB is to be truly representative, it needs to show a greater willingness to listen to its grass roots membership, and to accept criticism. None of us is perfect, and a willingness to say: "Sorry, chaps, we got it wrong. We'll make sure it can't happen again," is appreciated by everyone.

Geoff Arnold



Sixty years ago, on 14 November 1922, Britain's official broadcasting service, the BBC, began the regular transmission of programmes. For the British people it was the most exciting event since the end of World War I, although as yet few could take advantage of the new service. For the British radio manufacturers it was the beginning of a very prosperous period—even though many of them would have ceased trading by the end of the decade.

Interest in broadcasting began in Britain when, after the Great War of 1914–18, amateurs experimented with transmitting speech instead of Morse, and some—fancying themselves as entertainers—would transmit wisecracks and gramophone records. Many of these lively souls became local celebrities and acquired a following of receiver owners who eagerly looked forward to the improvised Sunday "concerts".

Commercial interests weren't slow to realise that here could be a huge market for radio receivers, and in order to whip up further public interest they, too, began to transmit "concerts", as they were popularly known. The Marconi Company started occasional transmissions from their Chelmsford works in February 1920, and caused a great stir when, on 15 June, they transmitted a recital by the world-famous soprano Dame Nellie Melba, who was on one of her several "final tours". However, in the autumn of 1920 the Post Office banned these transmissions on the ground that they interfered with communication.

Over a year later the programmes were resumed, after the Post Office had received a petition from the amateur movement. They agreed to allow telephony transmissions for "the scientific purpose of improving the receiving arrangements". Only 15 minutes of telephony were allowed in a single weekly transmission, but with frequent compulsory breaks the programme managed to spread over a whole hour.

Marconi's began the first regular transmissions on 14 February 1922 from their station 2MT ("two Emma Toc") which was housed in a hut in a field at Writtle, near their Chelmsford works. The 250W transmitter, powered by a petrol engine, was built of such components as were available and was operated by enthusiastic young engineers in their spare time. During the week, parts of the transmitter were removed for other work, but every Tuesday it was reconstituted and used for a weekly improvised programme, led by the humorous Peter Eckersley, later to become famous. Towards the end of 1922 the Post Office granted three more licences to transmitting stations.

The Post Office's seemingly grudging attitude was almost certainly a reaction to the "free-for-all" in America, where transmitters were being set up at an incredible rate. In the single month of May 1922 a further 99 stations had been opened across America with resultant mutual interference of chaotic proportions.

The British authorities decided to avoid a similar situation here by restricting the number of transmitters, and it was agreed that all transmitting should be operated by a commercial monopoly to be named The British Broadcasting Company (not Corporation yet) and run by British radio manufacturers. The monopoly received the revenue from the ten-shilling receiving licences that wireless owners had to buy annually, and also from a royalty on receivers. All importing of foreign receivers was banned for two years, and all "official" British-made apparatus had to bear a BBC/Postmaster General transfer and a registration number. If a receiving licence fee of ten shillings (£0·50) seems derisory to us now, it was nevertheless a full week's income for an old-age pensioner.

Regular broadcasting by the BBC began on 14 November 1922 from the former Marconi station 2LO at Marconi House in London. The next day the former Western Electric station 5IT began transmissions in Birmingham, together with the ex-Metropolitan Vickers 2ZY in Manchester. In December, Mr. J. C. W. Reith, who was to have an enormous influence on British broadcasting, was appointed General Manager and in February 1923 the popular Peter Eckersley became Chief Engineer. By October 1923, eight main stations were being operated, enabling half the population of Great Britain to receive a signal strong enough to operate a crystal set. Owing to the high cost of valve receivers, it seemed likely that for the foreseeable future most reception would be by means of crystal sets. Of course, nowhere near half the population possessed wireless sets.

In order to extend the reception of its programmes to large towns not within range of the main stations, the BBC set up 11 "relay" stations during the period from November 1923 to the end of 1924. These were low-powered transmitters of from 100–200 watts, usually with antennas slung between factory chimneys. Nevertheless, they were a low-cost means of increasing the proportion of the population within "crystal range" of a transmitter; of the remaining 30 per cent of the British public, many could receive a

Fig. 1: The Post Master General's stamp of approval which appeared, together with an official GPO registration number, on all receivers on sale to the public between autumn 1922 and mid 1924

station if they could rise to a valve receiver. In July 1925 many rural areas were brought within "crystal range" by the opening of the world's most powerful station, the 25kW transmitter at Daventry, which relayed the London programme. It was the first broadcasting station in the world to operate on long waves instead of the more usual medium waves of 1500–500kHz (200–600m), and could be received by 55 per cent of the British people. Incidentally, the people of Daventry were incensed by the BBC's decision to pronounce the locality's name as it was spelt, and not "Daintry" in the local manner. Was this the first dispute over BBC English?

The greatest expense of operating a valve receiver was the provision of a high-tension supply for the anodes of the triode valves then in use. In the early days, the high-tension battery of around 100V was made up from 4½V flash-lamp batteries connected in series. One enterprising battery manufacturer gave a free set of connecting clips to customers who bought a certain number of their batteries. Those who could afford it would buy a Milnes Unit, a set of small accumulators mounted in a wooden frame, which gave a high-tension voltage and could be recharged when necessary at the local garage or radio shop. The filaments of the valves, operating at six, four and later two volts, were powered from a large accumulator which would have to be recharged weekly or fortnightly, according to size and use. Many people owned two filament accumulators so that one was always available while the other was being charged. Recharging of the accumulators was relatively cheap: 4d or 6d according to size were common prices. Many radio shops hired out charged accumulators.

A licensed listener was allowed to erect an antenna not more than 30·5m (100ft) long, including the "lead-in" or section of wire that led from the antenna proper to the receiver. Thus, if the antenna was a horizontal one slung 9 metres above the ground, its horizontal section could not be longer than 21·5m. However, any number of wires could be connected in parallel without contravening regulations.

Thus it can be seen that the great majority of receivers in use in the early days of broadcasting were simple crystal sets, and it was expected that these would form the main means of reception for many years to come. As the prices of wireless apparatus went in those days, crystal sets were relatively cheap—the main expense being at least one pair of high resistance headphones—and easy to operate. Since there was likely to be only one station within receivable range, tuning arrangements could be extremely simple, often a matter of merely selecting a tapping on a coil, or a moving slider along a bared strip of the coil. In its most primitive form a crystal set consisted of just a coil and a crystal detector: but it did require a long and high antenna, preferably pointing in the direction of the one station that could be received, and a good earth connection. As a result, many people made their own crystal set, with much advice—not all of it trustworthy—from local enthusiasts reputed to have a vast knowledge of the subject.

A septuagenarian recently recounted how he, as a boy, and his father made their first crystal set to receive the new broadcasting. They took a 2lb jam jar—in those days a fluted white pottery container about 102mm diameter and 203mm long—and wrapped 12 pieces of thick brown paper around it to form a tube, each sheet of paper glued to its predecessor with Scotch glue (a smelly fish glue used by carpenters, which had to be heated to melt it). When the tube was dry, they slipped it off the jam jar and wound it with as many turns as it would hold of 22 s.w.g. copper wire and painted it with shellac varnish to hold the turns together. They then affixed a wooden square to each end of the coil, and screwed them to a baseboard. Their next operation was to screw a square-section brass bar to the

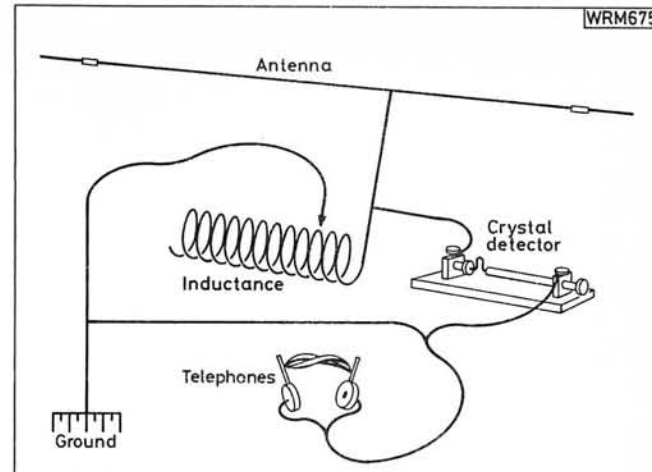


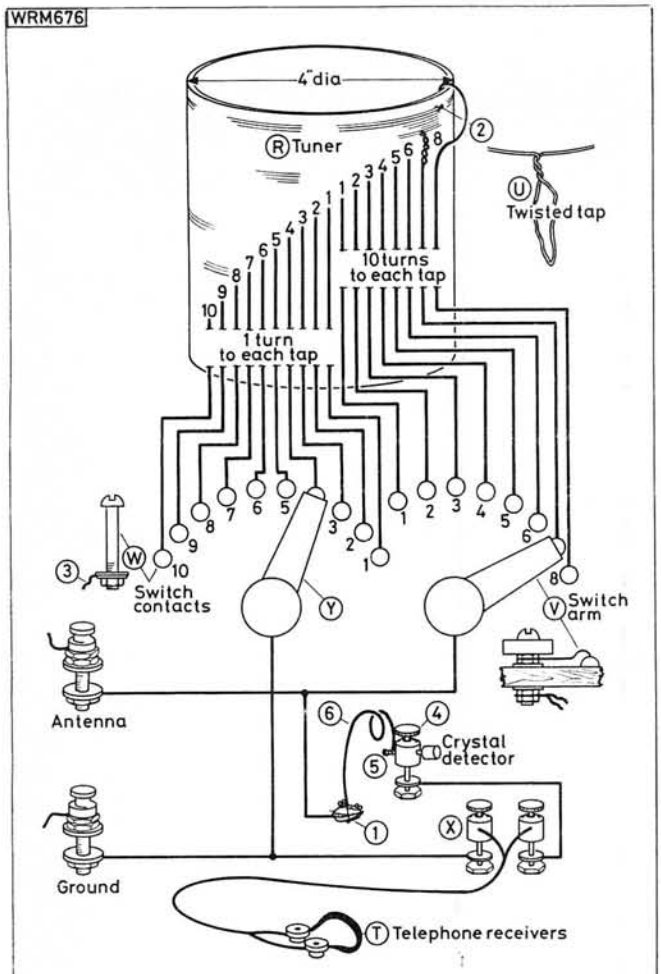
Fig. 2: The essentials of receiving radio signals, comprising the antenna, inductance coil for tuning, crystal detector, telephones and the ground

wooden endpieces so that it ran about 13mm above the length of the coil, and to contrive a slider to move along the brass bar and so make contact with a bared strip on the coil. The brass bar had previously formed part of the lavatory cistern. After connections had been made to the crystal detector and terminals, and the catswhisker had been adjusted, they just managed to hear the last stroke of Big Ben as the BBC closed down for the night. All this work had been done in just one evening.

At first, most receivers were owned by members of the middle class—there were much franker class divisions in those days—and the original requirement of the BBC was as a broadcaster of uplifting talks, sermons, operas, religious services and the like. But as wireless spread to more humble folk—mainly young ones—there grew an overwhelming demand for dance music. The longing of ordinary people to participate in the new wonder was so great that soon a flood of cheap booklets and magazines appeared to instruct them how to do so at no great cost. Among popular improvisions were such remarkable contrivances as a high resistance "grid leak" (for a valve set) consisting of a pencil line drawn on a strip of wood or ebonite; a lower resistance "anode load" formed by a line of indian ink on a piece of blotting paper; a semicircle of indian ink contacted by a radiating brass arm to form a rheostat; and the broken-off neck of a glass bottle for use as an antenna insulator. If sixpence or one shilling were too much to squander on a crystal, a careful search in the coalshed might unearth a small piece of shiny coal that would serve; even a lump of sugar would sometimes rectify! But the main stumbling-block was acquiring a pair of high-resistance (2kΩ or 4kΩ) headphones: they could cost more than a workman's wages for two weeks.

Ladies who did not want to disarrange their coiffure by wearing headphones would hold to their ear a single earpiece mounted on an ebonite stem, a kind of aural version of a quizzing-glass or lorgnette. And a device for those who craved the benefits of a loudspeaker but could not afford the high prices demanded, consisted of a conical horn mounted either vertically or at an angle of 45° on a horizontal tube to which one affixed one's headphones. This amplified the sound magnificently. For those who could not afford even that, a simpler solution was to place one's headphones in a large pudding-basin, and the resultant amplification was often enough to fill a room.

Many housewives disliked the clutter of wireless apparatus in their drawing-rooms, so much of it was hidden inside imitation Chippendale cabinets and other elegant



R—tuner (inductance wound on a 4in diameter cardboard tube)
2—two holes ½in apart for anchoring wire at start of inductance winding
U—detail of a tapping on the inductance
V & Y—switch arms: V used for rough tuning by selecting tappings 10 turns apart; Y used for finer tuning by selecting individual turns
W—switch contacts (machine screws or studs; even nails!)
3—detail showing wire from tapping on inductance, connected to switch contact
4—gripping screw of terminal
5—nail passed through the hole in the terminal, with a small piece of dowel at one end for a handle
6—catswhisker made from bare copper wire, one end twisted around the nail, the other resting lightly on the crystal
1—piece of suitable crystal held to baseboard by three screws
T—high-resistance headphones
X—screw-type terminals

Fig. 3: Constructional details of the simple radio receiving set designed by the US Bureau of Standards for the use of laymen

items of furniture. One commercial crystal set was disguised as a book bearing the inscription *The Listener by E. R. Fone,* and it was not uncommon for home radio builders to glue the pages of a thick book together, hollow out the middle of it, line it with thin wood and build a crystal set in it. A papier-mâché horn loudspeaker owned

The bird and conical beehive horn loudspeaker made by Royal Doulton

by the writer was made in the shape of a lady wearing a crinoline dress; the driving unit was situated inside the hollow skirt, pointing upwards, and the sound was rather indelicately reflected downwards from the lady's nether regions, along the cone-shaped interior of the skirt, and escaped through vents at the bottom. It worked well, and variations consisted of a seated, pot-bellied Buddha, or a bird standing on a conical beehive. Yet another horn loudspeaker was disguised as a classic mantel-clock and contained a somewhat convoluted horn that expelled the sound through the "dial". A natty affair was a commercial crystal set that appeared as a pair of headphones; one earpiece really was what it purported to be, while the other was a miniature variometer-tuned crystal set which had to be connected to an external antenna and earth.

A great drawback to crystal set operation was the frequent necessity to fiddle with the catswhisker. This was usually operated by a simple ball-and-socket mechanism: the object was to contact the crystal gently with the copper, silver or even gold catswhisker, in the hope of finding a "sensitive spot" on the crystal which would cause rectification of the signal to take place. Many gentle applications of the catswhisker to the crystal were generally required before such a sensitive spot could be found. The pressure with which the catswhisker bore on the crystal then had to be delicately adjusted until the best rectification was obtained. Unfortunately, the slightest vibration would usually destroy this delicate setting, and the whole tedious business would have to be repeated. When Father operated the family crystal set on the drawing-room table,

the atmosphere was generally fraught, and no rustling of pages or movement of the body would be allowed lest ten minutes' delicate manipulation with the catswhisker should be upset!

About the first commercial radio for receiving the new-fangled BBC programmes was the Marconiphone V2 reflex two-valver, which was tuned and adjusted not by rotary knobs but by metal rods that could be moved in and out as required. Ten years ago, on the 50th anniversary of the BBC, the author's V2A (the version with a regenerative unit) would still receive continental stations at loudspeaker volume using only 50V high tension and a short indoor antenna.

As with all innovations that are not popularly understood, wireless became invested with a mystique and a whole lore of popular beliefs. Many people—probably those who did not own receivers—blamed "wireless waves" for bad weather and poor harvests, and even for ill-health. There were many claims of people shouting into their horn loudspeakers and being heard in the headphones of other people in the vicinity; perhaps it could happen with some of the one- or two-valve circuits then in use. Countless were the alleged methods of rejuvenating a tired crystal or of getting more "juice" from a worn-out battery, and many a drink must the local "wireless wizard" have earned by retailing these dubious remedies in the neighbourhood pub.

It was an age of wonderment and excitement never equalled by anything before or since. Who today, when he watches a TV colour programme relayed by a space satellite from a country on the other side of the world, experiences anything comparable to the thrill that gripped the early wireless enthusiast as he heard the faint whisper of his local BBC station all of ten miles away? ●

PW services

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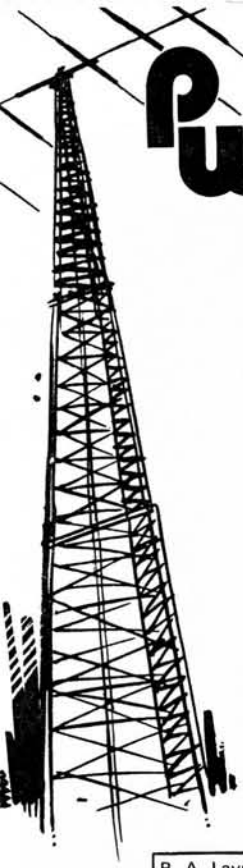

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Post Code

Occupation Age Phone No. (Home) (Work)

I/We hereby apply to insure the equipment detailed below

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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 £

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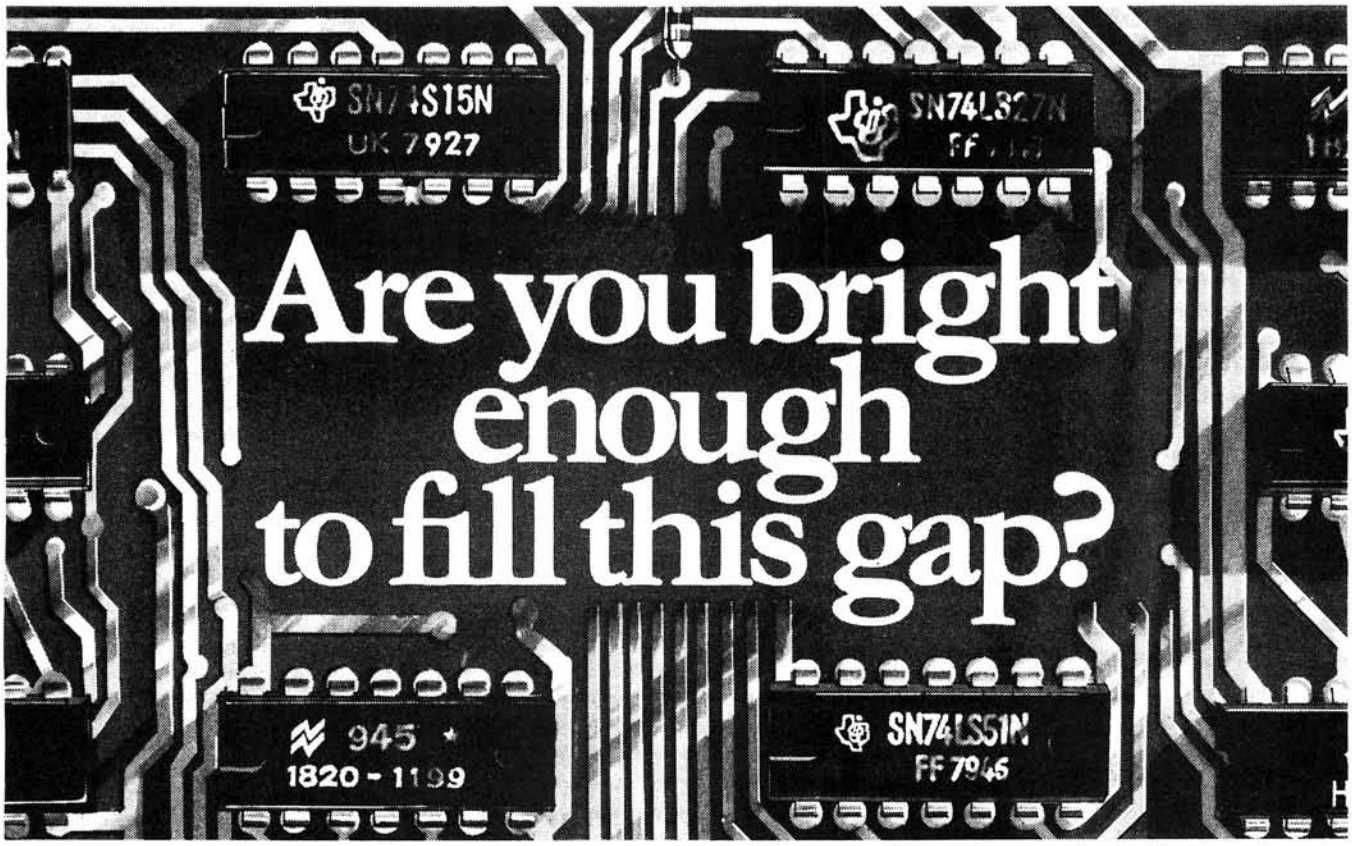

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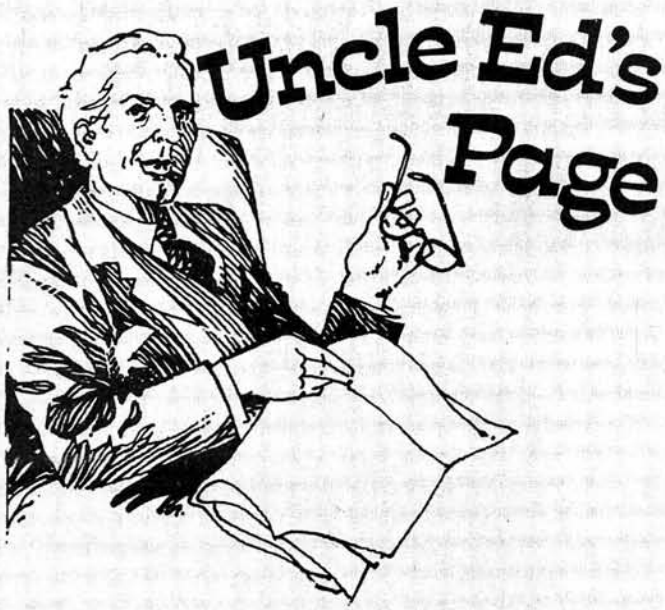


A monthly look at some aspect of the radio/electronics hobby that seems to bug the beginner, or occasionally a more advanced topic seen from an unusual angle.

TRANSFORMERS—1

The ways that mains transformers are described and shown in catalogues and circuit diagrams, and how they are marked "in the flesh", can be quite baffling to the beginner. One of the problems is the use of something called a VA rating in specifying the size of the transformer. What is (or are) VA?

Well, V means volts, and A means amps, and VA means volts multiplied by amps, or voltamps. But volts times amps equals watts, you cry. True, for d.c. circuits, or for a.c. circuits where the load is a pure resistance. If the load connected to an a.c. supply contains reactance, in other words if it's got lots of inductance or capacitance, some of the power delivered to the load during one part of each cycle of the supply will be stored in the magnetic field of the inductance or the electric field of the capacitance, and returned to the supply during a later part of each cycle. When this happens, the real power consumed by the load (in watts) is less than the figure you'd get by multiplying together the readings taken from a voltmeter connected across the load and an ammeter connected in series with the load. So in this case VA is **not** equal to W.

Why should this worry us? Well, in simple terms, because the transformer is worried about the maximum current it will be asked to deliver to the load during each cycle; it doesn't much care that the load is going to return some power later in the cycle.

The figure you get for VA is known as **apparent power,** and W is known as **true power** or **active power,** and the ratio of active power to apparent power is called the **power factor,** which you may have heard of. If you want to find out more, read a text book on basic electricity (a.c. theory).

Back to those ratings. If we had a transformer with just one secondary (output) winding, capable of giving a maximum of 1A at 12V, this would be a 12VA transformer. On a circuit diagram, it would appear like Fig. 1 (sometimes the current rating is written in too), or possibly the windings might be drawn according to different conventions, like Fig. 2 or Fig. 3. They all mean the same thing. Note that I've simply labelled the primary (input) winding "IN"—I'll come back to primaries in a later part.

Often, mains transformers have more than one secondary winding. For example two secondaries capable of 1A at 12V (see Fig. 4, but ignore the black blobs for the moment). This would have a total rating of 24VA. You can use these windings in several different ways: (a) to produce two quite separate and independent supplies. (b) connected in series to give a 24V 1A output (Fig. 5). (c) connected in parallel to give a 12V 2A output (Fig. 6). (d) connected in series but with a connection tapped off the centre junction (called, believe it or not, a centre-tap) to give a double 12V 1A supply with one common line. The two output voltages will be in anti-phase, in other words when one is going positive the other is going negative.

Fig.1 WKM191

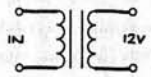


Fig.2

Fig.3

Fig.4

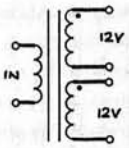


Fig.5

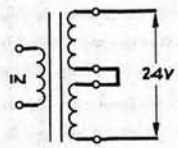


Fig.6

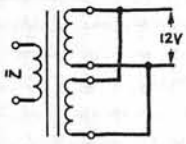


Fig.7

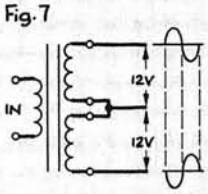


Fig.8

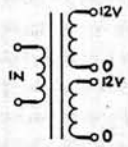
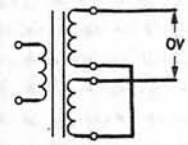


Fig.9



In each of the circuits of Figs. 5, 6 and 7, the phasing of the two secondary windings is important. There are two conventional ways of indicating the phase of transformer windings on drawings. One is to put a black blob at one end of each winding, as in Fig. 4. All the ends marked with blobs are in phase. A more common way for mains transformers is to label the winding ends as shown in Fig. 8. All the ends labelled "0" have the same phase, and all the ends labelled "12V" have the same phase. The transformers shown in Figs. 4 and 8 are identical.

Why is phasing important in Figs. 5, 6 and 7? Well, let's look at Fig. 5 first. The way the secondaries are connected makes their voltages add, because the top ends of both windings go positive (or negative) at the same time. If the secondaries were connected like Fig. 9, the output would be zero, because the voltages on the two windings would subtract or cancel each other out.

What would happen if you made the same sort of change to Fig. 6? (Clue: Think of Fig. 7 with the top and bottom output lines connected together.) More next month.

RADIO INTERFERENCE SUPPRESSION

PART 2

E.A.RULE G3FEW

This month we shall be giving full constructional details of low-pass, high-pass and notch filters which, if carefully constructed as shown, will provide very efficient suppression of unwanted frequencies.

Low-pass Filter

The low-pass filter (Fig. 4) has a cut-off frequency of around 33MHz and an ultimate rejection of over 80dB at u.h.f. TV frequencies. It is also fitted with two traps, L1/C1 and L7/C6, tuned to the second harmonic of the 27–30MHz band. The filter is designed to handle powers considerably greater than the 400 watt p.e.p. limit of the UK Amateur bands. Its impedance is 50 ohms, and when used with a correctly matched antenna system the v.s.w.r. is less than 1·2 to 1. The filter is symmetrical and may be connected in circuit either way round. Constructional details are given in Figs. 5–8. In all cases, measurements are critical if optimum performance is to be obtained.

Components

This unit really takes us back to the old days of home-construction—apart from the coaxial connectors **all** the components are home-made.

The coils L1, 2, 4, 6 and 7 are all made from 18 s.w.g. enamelled copper wire, close-wound on a 12·7mm mandrel (such as a ½in twist-drill shank), and then carefully stretched to the lengths given in Fig. 6. The spacing of the turns in each finished coil should be equal.

The capacitors (Fig. 7) are made from small pieces of 0·6mm thickness double-sided, glass-fibre p.c.b. material, the copper cladding on the opposite faces forming the two plates. It is essential to use the specified type and thickness of material, otherwise the capacitance values (and therefore the operating frequencies) will be changed. In each capacitor, side "A" has the copper around its border etched away to give clearance from side "B". Side "B" forms the "earthy" plate of each capacitor, and is soldered to the tin-plate box. Capacitors C2–C5 are each drilled through their centre and a 10mm diameter clearance area etched on side "B" around the hole.

Producing the capacitors in this way means that they have a very low inductance, so that problems due to self-resonance are removed.

A piece of tin-plate 255 × 160mm is required to make the filter box, and should be cut and drilled according to the layout given in Fig. 8 before bending up and soldering the butting edges. A further piece of tin-plate 125 × 50mm is required for the base-plate, which is a tight fit inside the bottom of the box. The tin-plate should be about 0·5mm thick.

Assembly

Capacitors C1 and C6 are fitted first. Place them as shown in Fig. 5, with the larger area of copper (side "B") in contact with the box, one capacitor at each end. Hold the capacitors firmly in place with a block of wood or foam, turn the box upside down and secure them by melting solder through the holes. It may help if the board is tinned before fitting. Check the soldered connection by pulling on the board to see if it comes away from the box. This is important, as once the other components are fitted, it will be difficult to resolder. The SO239 sockets can now be fitted.

Next fit C2 and C5 so that their "A" sides are 35mm from the end of the box, then C3 and C4 so that they are 14mm from C2 and C5, with the "B" sides facing as shown in Fig. 5. These four capacitors are soldered to the box by each corner of their "B" sides. An iron with a long bit will be found helpful.

When you are satisfied that the capacitors are all correctly positioned, the coils can be fitted. Unless self-fluxing wire has been used, carefully scrape and tin about 5mm at the end of each lead-out, being careful not to deform the coils in any way. Start with L1 and L7, the longer lead going to the socket centre connection in each case, followed by L3 and L5 which are short straight lengths of 22 s.w.g. tinned copper wire, passed through the centre holes of C2–C5 and soldered to their "A" sides. The remaining coils can then be fitted in any order, again being careful not to change the dimensions of the coils (other than to trim the leads to length).

After assembly, check with an ohmmeter that you have continuity between the centre connections of the two co-axial sockets, and that there is not a short to the box. The filter is then ready for use and should be tested before the base-plate is fitted. Note that the printed circuit capacitors are shorter than the sides of the box, leaving a 5mm gap so that the base-plate can be positioned inside the bottom of the box. The base-plate may rest on the top edges of C2–C5, and once in position is soldered to the box at the four corners and in the centre of each long side.

Braid-breaker

The braid-breaker high-pass filter is shown in Fig. 9. This is intended to be fitted in a u.h.f. TV receiver antenna

Fig.4

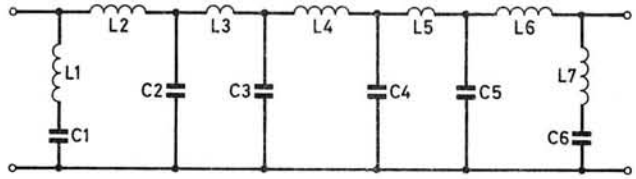


Fig.5

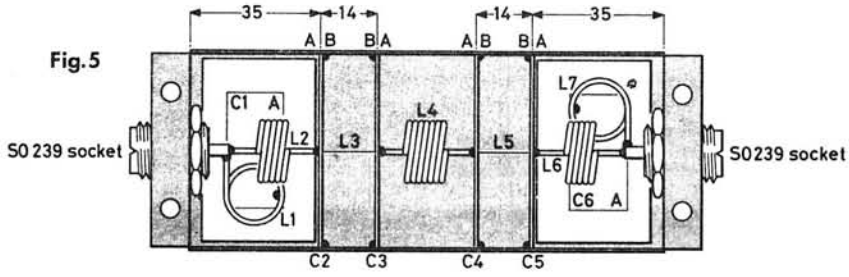
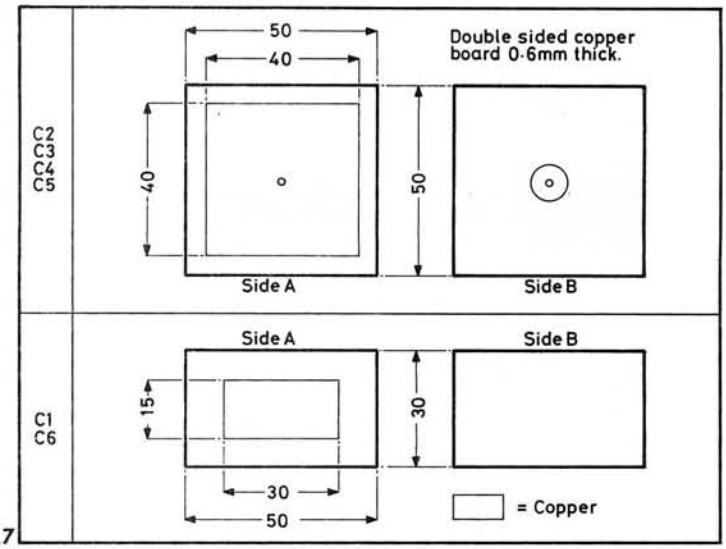


Fig.6

Coil	18s.w.g. enamelled copper wire	Turns
L1 L7	12·7 i.d., 5, 7, 10	4½
L2 L6	12·7 i.d., 7	5
L4	12·7 i.d., 9	7
L3 L5	See text	

Fig.7



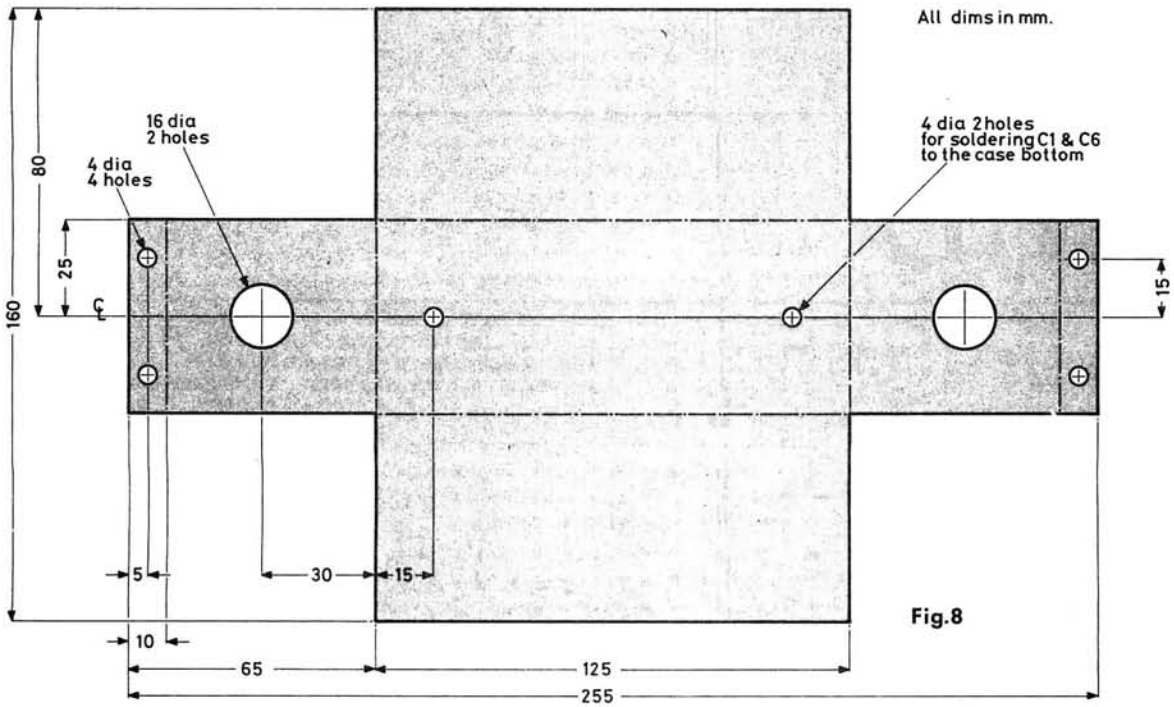


Fig.8

WRM691

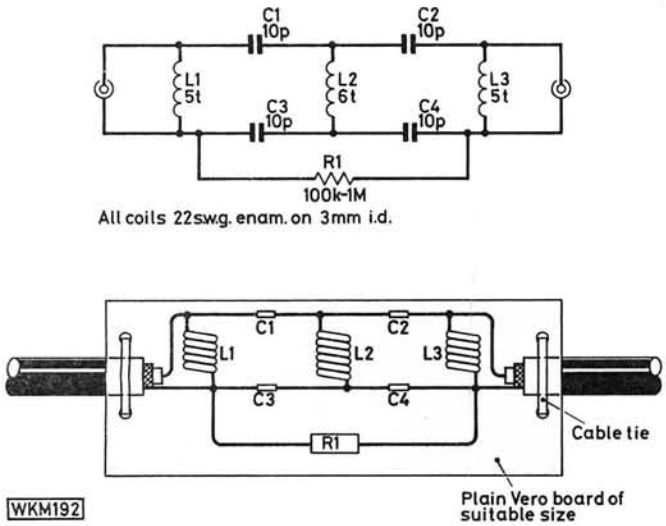


Fig. 9: Braid-breaker high-pass filter. The coils must be mounted not less than 15mm apart

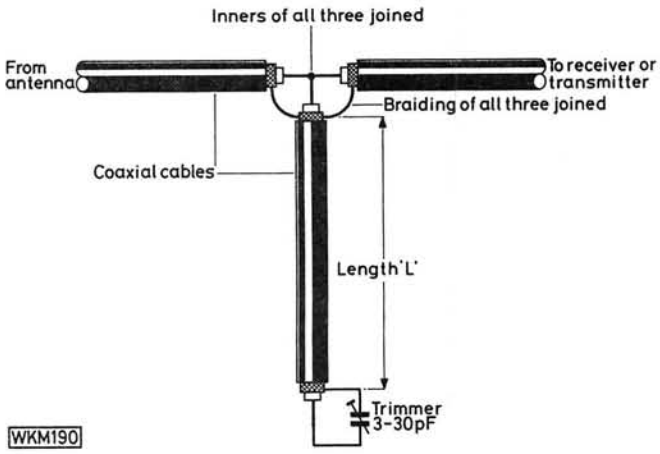


Fig. 10: The quarter-wave stub filter

downlead, allowing the wanted TV signals to pass, but rejecting the interfering signals from a local h.f. transmitter, as described in Part 1. Resistor R1 is a static leak, ensuring that the TV antenna and downlead cannot build up a large static charge when there are electrical storms in the vicinity, but having a high enough value not to "short-circuit" the filter at radio frequencies. The coils are wound from 22 s.w.g. enamelled copper wire on a 3mm mandrel, L1 and L3 having 5 turns and L2 having 6 turns. The capacitors should be miniature or sub-miniature ceramic types.

Plain (unclad) Veroboard makes a simple anchorage for the components, their leads being threaded through the holes and soldered together beneath the board. The coils should be positioned at least 15mm apart. Small plastics cable ties can be used to secure the input and output leads, which are short lengths of 75Ω coaxial cable terminated in TV-type free plugs and sockets.

Stub Filter

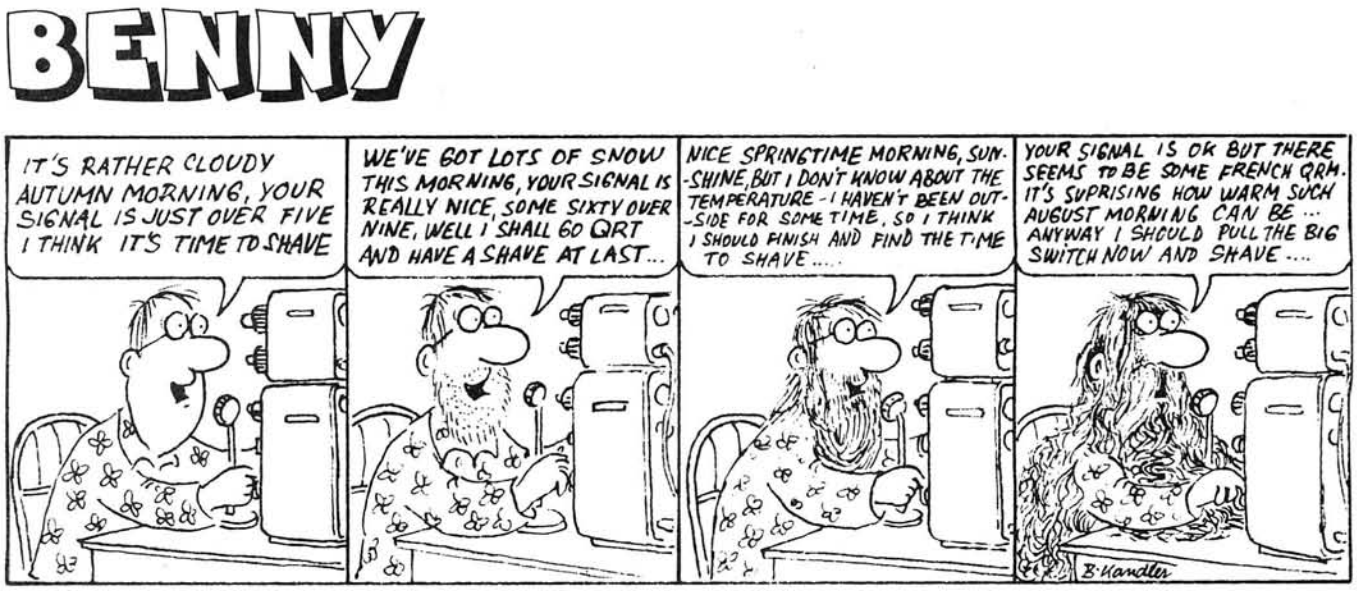
The quarter-wave stub filter shown in Fig. 10 can be used at the transmitter or receiver to provide a sharp rejection notch at the design frequency. The length of the coaxial cable forming the stub is given approximately by the formula:

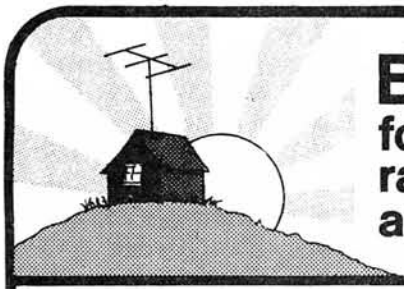
$$L = \frac{74{\cdot}98 \times 0{\cdot}65}{f} \text{ metres}$$

where f is the design frequency in megahertz, and the 0·65 is an average constant for the velocity factor of the coaxial cable. This factor will vary somewhat between different types of cable, but as an example, a stub for 144MHz would be approximately 0·338m (338mm) long.

The trimmer allows the stub to be tuned to the required frequency and also prevents operation on harmonics. Without this trimmer, the stub could be adjusted to frequency by trimming its length, but it would also act as a stub at frequencies where its length was a multiple of a quarter wavelength. This may prove a problem in some instances, but both methods are worth trying.

In the concluding part of this series, we shall look at the problems of r.f.i. in hi-fi and other electronic equipment.





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ANJA SIMPSON-FRASER GM6FLL

My licence arrived at the end of September 1981. Although my rig, a Trio 9000 and the antenna on the roof of the home had been in position since the RAE results came out in the middle of August, some minor adjustments were necessary before operations could commence. The antenna was a $\frac{1}{4}\lambda$ ground plane mounted on a pole on the house extension roof, but unfortunately not clear of the roof which limited the possibilities of radio contact. However, antennas apart, my first night on the airwaves proved to be a poor one for radio contact as I failed to have a QSO either simplex or through the NI repeater, which is the only one I can access from the radio shack.

The next evening was again devoted to an attempt to establish radio contact. As I live in a fairly remote village in a valley in south-west Scotland, I decided that my chances of a simplex contact were not too good and decided to concentrate on the repeater. Hence antenna No. 2 was brought into action. This is a home-made 5-element Yagi beam, manufactured from a rake handle and aluminium tube cut to the appropriate lengths.

My linear amplifier to raise the Trio from its standard 10 watts to 50 watts was still some way from completion, so I hoped that the Yagi, with its 8dB gain, would meet the purpose. A strong gale was blowing and, as I had no intention of ending my life before my first QSO, I positioned it in the loft, aimed at GB3NI, and hastened down to the radio shack to discover that this set up enabled me to access the repeater very successfully but again no other amateurs seemed to have any similar ideas.

The following evening was to be dedicated to trying to establish mobile contact. The storm had worsened; in fact the two main roads from the village were flooded, but as I had to get to the nearest town, I set off by the back road through the hills complete with the Trio coupled into a $\frac{5}{8}\lambda$ magmount. Having completed my business in town, I discovered that the police had now blocked off the back road to the village, but they let me through the road block when I assured them that I was a licensed radio amateur in contact with other stations throughout the country. They accepted my word for it although I was carrying my licence and other identification, but I was relieved that I did not have to produce an as yet unmarked log book!

Saturday evening I settled down in the shack determined to sit it out until I made contact. I did not have to wait for long—my first call through the repeater was answered and after that I had a steady stream of QSOs until the early hours of the morning.

Since then, I have been experimenting further. The Yagi went up to join the $\frac{1}{4}\lambda$ ground plane so I have a choice of antennas in the shack. Of course as time goes on I am always looking to improve the performance of the antennas and rig.

A Year Later

Now after being licensed for a year I have ventured into the field of u.h.f. operation and also RTTY. So now 432MHz antennas have joined the others, which now include elevation tracking and rotatable beams.

I'm not going for my Class A licence in the foreseeable future as my interests are going up in frequency, not down. The next project ready for next spring is high definition television. Nowadays the base station consists of a TR-770E, covering both the 144 and 432MHz bands, and the linear is finished and running to give me full legal output.

A final comment I would like to make is that as YLs in such increasing numbers are a fairly recent phenomenon in the amateur world, I find that I am having to adapt some amateur terms. For example, I refer to the man in my life as the XYM, but I have not been able to find a satisfactory parallel for "old man", rejections being "old lady" (images of white hair and rocking chair) "old girl" (hearty hockey sticks) or "old person" (a bit much). I would be very pleased to hear of any adaptations other YLs have made.

Come and See Us at the Electronic Hobbies Fair

The days between Thursday 18 November and Sunday 21 November, inclusive, will be a very busy time for *PW* staff, as on those days we will be manning our stand at the "Electronic Hobbies Fair", a new IPC organised event, which we intend making the most comprehensive and best exhibition ever to be staged for the radio and electronics enthusiast.

The fair is being presented by *Practical Wireless, Practical Electronics* and *Everyday Electronics* at the new Alexandra Pavilion, Alexandra Palace, and will include stands featuring amateur radio, home computing, CB, radio controlled models, video games, electric vehicles, plus all the usual trade stands and demonstrations by local and national organisations.

Practical Wireless will, of course, be running our usual two special event stations which will be operational on the h.f. and v.h.f./u.h.f. bands. Commemorative QSL cards will be issued to all stations worked. We also hope to feature both slow and fast scan ATV demonstrations and a local group will operate a talk-in station on S22.

Ticket prices at the door will be £2.00 for adults and £1.00 for children, but do look through the advertisement pages of this issue or the November issue for the 50p off coupon.

British Rail are offering a cheap rate rail fare, which includes entrance, from all major stations in the country to Alexandra Palace, where a bus will be waiting to take visitors to the show.

So we, the editorial staff of *PW*, will be there and look forward to meeting as many of our readers as possible.

swap spot

Have pre-war Ultra Lynx radio, working order, plus 20 yards 27in stair carpet, brand new never been stepped on (shop value approximately £70). Would exchange for any interesting short-wave receiving equipment. Prewitt, Ambleside, Burditch Bank, Wootton, Woodstock, Oxford OX7 1EH. Tel: Woodstock 812278. *P462*

Have Realistic DX302 h.f. receiver plus 2m converter, 3 months old. Would exchange for IC-2E and accessories or IC-24G. Will mail if postage costs are also exchanged. G. Richardson, 10 Winslow Crescent, Westlea, Seaham, Co. Durham SR7 8JU. *P471*

Have Sinclair ZX80 plus 8K ROM and p.s.u., all leads, two manuals, programs, good working order. Would exchange for a Morse tutor in v.g.c. or w.h.y. Tel: St. Austell (0726) 3785 evenings. *P473*

Have Leevers-Rich Synchropulse recorder (massive valved portable) plus playback console with oscilloscope for film sync. Would exchange for test equipment, radio gear, something odd? Also have Neutron wireless crystals with cat's whiskers in original tin, any interest? Tel: 04515 514 (Cotswolds). *P474*

Have Kodak EK 160 camera, new. Would exchange for something useful in test or standards line. J. Glover, 1 Bryony Cottages, Hambledon, Godalming, Surrey. Tel: Wormley 4649. *P487*

Have Daiwa Search 9 144MHz receiver, v.f.o. plus 3 crystals included, with 144MHz ¼wave gutter-mount antenna, discone wideband base antenna and 3 amp protected power supply. Also cine projector with camera and six films. Would exchange/part exchange for 70cm transceiver. S. Clifton, 97 Redland Drive, Northampton NN2 8UG. *P499*

Have Sony Walkman portable stereo cassette player with headphones, carry case all as new. Would exchange for SR-9 (marine or amateur 144MHz) v.h.f. receiver. Dave BRS51320, 40 Whitefield Crescent, Penshaw, Houghton-le-Spring, Tyne and Wear DH4 7QT. Tel: 847370. *P500*

Have *PW* valved organ, or will remove and offer only the 2 × 61 note keyboards to any interested constructor. I accept w.h.y. A. Johnson, 1 Babbacombe Road, Styvechale, Coventry CV3 5PE. *P502*

Have 11ft sailing dinghy, sail, oars, boat rack and straps, etc. Would exchange for Trio general coverage receiver. Roger Barnes G8DWE, 7 Maycroft Close, Ipswich, Suffolk. Tel: Ipswich 40569. *P504*

Have Worldsound PT40 CB rig, Sirtel GT-417 CB walkie-talkie plus homebase and mobile antenna, two "rubber ducks", coaxial cable, two slide mounts, s.w.r. meter, matcher and mains p.s.u. Would exchange for Yaesu FT290R, or Standard C58, or Trio TR2300, with NiCads, charger and mobile antenna. R. G. Meal, Bron-y-Garth, Hendre Road, Llangennech, Llanelli. *P505*

Have Francesco Moser lightweight road racing cycle 21½in frame valued at £400 plus tools. Would exchange for 144MHz multimode mobile e.g. FT-480R, TR-9000, IC-290E etc., must be in good condition, plus rotator. Tel: 0632 711236. *P515*

Have 3-speed lathe with 3- and 4-jaw chucks and electric motor plus Yashicamat 2¼in camera. Would exchange for communications receiver AR88D or similar, can deliver. Tel: Huddersfield 0484 653549. *P516*

Have intelligent chess computer, 13 levels of play with many other features, can be used on TV, cost £240. Would exchange for second-hand SX200N, Bearcat Scanner or similar equipment. Tel: Rickmansworth (0923) 775451. *P517*

Have FTDX560 h.f. transceiver, good runner but 28MHz band receiver requires re-alignment. Would exchange for good general coverage receiver. Your suggestions welcome. R. Leask, 27 Edward Road, Bedford. Tel: Bedford 214043. *P531*

Have mint tunable converters covering 1·2·6GHz, 2·3-4·45GHz, 4·3-7·35GHz, 7·05-10·75GHz with pre-amp and schematic diagrams, also have a Marconi Universal Bridge. Would exchange for general coverage receiver or v.h.f. receiver, w.h.y. Tel: 0942 55948. *P532*

Have fine, working reproduction of 1923 crystal set, similar to Gamage Broadcaster. Would exchange for anything vintage, e.g. 1920s wireless books, magazines, equipment, w.h.y. Eric Westman, 12 Tennis Court Avenue, Paulton, Bristol BS18 5NA. Tel: 0761 415379. *P533*

Have Harrier CBX f.m. 40 channel CB, Ham Master base microphone, s.w.r. and patch. Would exchange for ZX81 or ZX80 with either 16k RAM or printer. G. Richardson, 10 Winslow Crescent, Westlea, Seaham, Co. Durham SR7 8JU. *P540*

Have IC-240, good condition, mobile bracket, box etc. Would exchange for good h.f. receiver FRG-7 type or similar. I. M. Davis G8XCL, 109 Station Road, Lydd, Kent. Tel: Lydd 20403 ext 4 anytime (long rings please)! *P556*

Have TRS 80 computer, 16K Model I, level II, keyboard/CPU, monochrome monitor with green filter, CTR80A cassette, 80 column dot matrix printer, manual and self teaching guide — 12 months old. Would exchange for good quality 144MHz (2m) multimode and linear or other equipment. Tel: 0704 893803 (Lancs). *P566*

Have Acorn Atom, 8K ROM, 3½K RAM, 6522VIA, bus socket, all leads, p.s.u., software and slushware. Would exchange for CB or amateur transceiver or receiver. Pete Stephens, 49 Kings Court, Bishop's Stortford, Herts. CM23 2AB. Tel: (0279) 52719 after 9 p.m. and weekends. *P576*

Have HRO excellent condition complete with six coil packs. Would exchange for MR1000A v.h.f. scanner or TVDX gear, Band I-III antenna and pre-amp, Colour King u.h.f. antenna. Borthwick. Tel: Lilliesleaf 08357 314. *P577*

Have Searcher 9 2m receiver, Borg Warner autogear box (v.g.c.), also small arc welder. Would exchange for any amateur radio gear including antenna rotator or transverter. Tel: Harpenden 64349. *P588*

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.

swap spot

Have Hallicrafter S27 v.h.f. receiver, crystal set type 449 BBC type, 2 Ex-WD RF 26 units new, 12 radio and television servicing books. Would exchange for CB radio. G. Whiteside, 45 Mossfield, Glenanne, Co. Armagh, N. Ireland BT60 2JF. Tel: Glenanne 436. *P589*

Have Trio stereo integrated amplifier KA3700 (swapper must collect). Would exchange for Sinclair Digital Multimeter. R. H. Reid, 87 Whitehaugh Avenue, Paisley, Scotland PA1 3SS. Tel: 041 887 7396. *P606*

Have new boxed Triumph CR-1000 battery cassette recorder and Philips f.m./a.m. digital alarm clock. Would exchange for anything to do with s.w. radio or legal CB. D. Gobourne, 53 Burland Ave, Tettenhall, Wolverhampton WV6 9JJ. *P640*

Have Belcom FS-1007P 2m f.m. scanning transceiver 10W (perfect). Would exchange for 25W linear amplifier and suitable power supply unit. D. M. Aldridge G4NCH, 57 Otto Terrace, Sunderland, Tyne & Wear SR2 7LP. Tel: 51786. *P642*

Have Hammond Organ Leslie Speaker Amplifier, solid state model 760, black vinyl with slight damage to case, 90W undistorted output. Would exchange for FT480R transceiver or FRG7700 receiver plus FRT7700 a.t.u. E. Hagger, 3 Minsmere Way, Great Cornard, Sudbury, Suffolk. Tel: Sudbury 71086. *P625*

Have Heathkit (IG 5280) r.f. oscillator, SS, ideal for radio/TV alignment. Would exchange for 2m linear with 10W or better output, suitable for use with hand-held transceiver. Tel: G5AER 0249 890 303 evenings, weekends. *P654*

Have Yaesu FT-200 h.f. transceiver with FP-200 speaker and power supply, excellent condition, plus 2m transverter with all connecting leads, relay etc. Would exchange for Yaesu FRG-7700 receiver. V. T. Brown, 242 Little Wakering Road, Wakering, Southend, Essex SS3 0JN. *P663*

Have C-Scope metal detector VLF-TR 750D discriminator, used once only — unwanted gift. Would exchange for receiver, w.h.y. Bishton, 2 Edgar Street, Ramsbottom, Bury, Lancs. Tel: Ramsbottom 4598. *P666*

Have Avo DA116 multimeter. Would exchange for blank E-180 VHS tapes or metal detector or home microcomputer. Also needed any data for Acorn System 1 Hex keypad type micro. Jain, 17 Taylors Lane, London NW10. *P667*

Have Heathkit HW12, 3·5MHz band 200W s.s.b. transceiver with mic, speaker, power pack mobile and base, spare valves. Manuals all in good condition. Would exchange for 144MHz gear or good general coverage receiver, cash adjustments. Bill Ball. Penketh 2381 (Cheshire). *P673*

Have oscilloscope C8-1 low frequency storage unit with transfer function analyser (Servo Consultants Ltd.), and LTV Servo analyser model 301 (Ling Electronics), oscilloscope has memory feature. Would exchange for Grundig Satellit 3400 s.w. or similar. K. Newham, Whitehouse, Kingsley, Warrington. Tel: 0928 88446. *P684*

Have Eddystone EC10 MkII and active antenna Type LP3382, Codar PR40. Would exchange for Commonwealth stamps. D. Bradney, 61 Tomline Road, Felixstowe, Suffolk IP11 7PA. *P685*

Have Pentax S1a with light meter, Weston Master III, electronic flash, 2X multiplier, F3·5—35mm WA, 135mm F2·8 tele, cable release. All in zip holdall. Exchange for Eddystone EC10. R. Eldridge, 82 Lowestoft Road, Worlingham, Beccles, Suffolk. Tel: Beccles 712129. *P686*

Have TR-7200G mobile f.m. transceiver 10W output, 13 channels fitted out of a possible 22, still boxed. Would exchange for 432MHz transceiver or rotator. Lee, 29 North Town, Maidenhead, Berkshire. Tel: 38671. *P695*

Have BC221 wavemeter with p.s.u., calibration charts and handbook, also Solartron CD1400 5in d/beam 15MHz oscilloscope with handbook. Would exchange for any of the following, Eddystone 990R or similar, or ZX81 + 16K RAM, or zoom lens 80–200mm Pentax bayonet mount. Bristol 565485. *P696*

Have Japanese Astronomical Telescope, 78mm complete with tripod and accessories, used once, type OKT-122, maximum magnification ×312. Would exchange for Eddystone communications receiver a.m./f.m. E. Ogilvie, 33 Cliff Gardens, Minster, Sheppey, Kent ME12 3QY. Tel: Minster 875973. *P697*

Have Realistic DX302 communication receiver 10kHz–30MHz, digital frequency display, u.s.b./l.s.b., a.c./d.c. Would exchange for SX200N receiver or Pentax ME Super camera or pair KEF 101 speakers. Tel: Bristol 0272 22850. *P706*

Have two Pye Westminster mobile radio telephones, 15W 72·375MHz a.m. (rally frequency), complete with mics, speakers and brackets. Full working order, HO approved. Would exchange for good quality communications receiver, cash adjustments either way. Tel: 0780 740104. *P707*

Have Realistic DX200 one month old, cost £169. Would exchange for 144MHz or marine receiver. D. Sharpe, 2 Caithness Court, Buchan Street, Cambridge. Tel: 0223 522542. *P714*

Have Pye PF2UB 432MHz handportable transceiver, with circuit, 12V vehicle adaptor/charger, 3 spare batteries, also Pye PF1 432MHz receiver all on SU8. Would exchange for a digital frequency counter, or h.f. TX or RX. G4GCB. Tel: Belper (Derbys) 6851. *P715*

Have general coverage receiver 3·5–28MHz, m.w., l.w., plug-in coil bandswitching, homebrew to very high constructional standards and working. Would exchange for transceiver gear, any band(s), Morse tutor or w.h.y. Tel: Ken, Sheffield 660967. *P716*

Have SX200N scanner as new complete with wide band antenna. Would exchange for a dual trace oscilloscope 20MHz Hameg or similar, must be in mint condition. C. W. Woodward, 4 Fallows Road, Sparkbrook, Birmingham B11 1PQ. *P717*

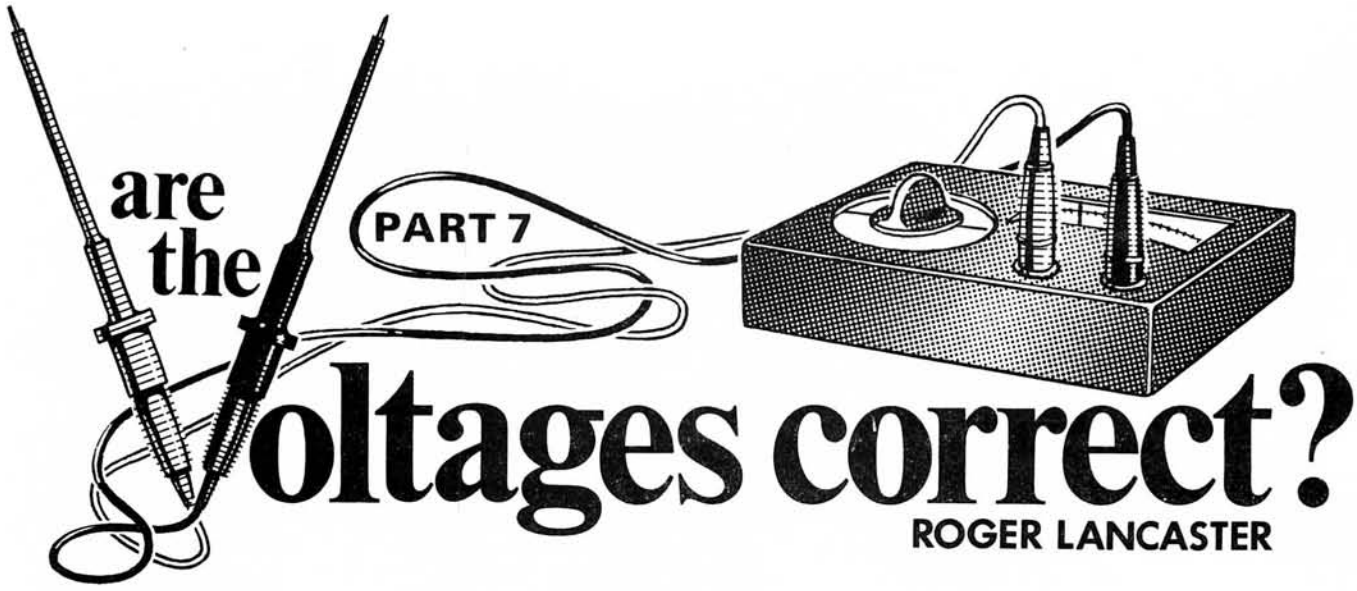
Have Pye Cambridge front mount converted 144MHz f.m. Would exchange for any 16–8mm sound/silent films. Also boot mount versions being converted to 144MHz or marine 156MHz. Would exchange for SR9 receiver or similar. G8BSK, 290 Priory Road, Southampton SO2 1LS. *P718*

kindly note!

Overvoltage Trip, November 1982 Supplement page SIX

The transistor Tr1 is a BC177. The unit is inserted in the p.s.u. output with Terminal A towards the supply and Terminal B towards the load.

In the third paragraph the references to Terminal B and Terminal C of the p.c.b. are incorrect and should read Terminal A and Terminal B respectively.



are the PART 7 Voltages correct?

ROGER LANCASTER

Solution to last month's problems: The circuit is reproduced here in Fig. 7.1.

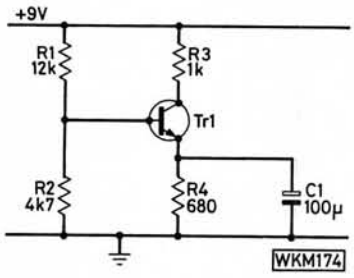


Fig. 7.1

No. 1: You were asked to find the most likely component fault, given that the transistor was all right and the following quoted readings were obtained:
(a) e = 0V, b = +0·8V, c = +0·1V (with the transistor out of circuit e = 0V, b = +2·53V, c = +9V).

The transistor out-of-circuit readings are as normal, indicating that the potential divider R1, R2 is correct and that there is continuity of some sort between collector and the +9V line and between emitter and the earth line. The transistor in-circuit readings are incorrect, base and emitter both reading very low, but the 0·8V worth of forward bias would indicate that the transistor is conducting heavily and this is confirmed by the maximum voltage dropped across R3 (+9 − 0·1 = 8·9V). There is no voltage at all across R4, however, yet a large current must be flowing between earth and the emitter. This can only mean a short circuit R4 or (much more likely) a **short circuit C1.** The equivalent circuit is shown in Fig. 7.2.
(b) e = +0·3V, b = +1·1V, c = +0·5V (with the transistor out of circuit e = 0V, b = +2·53V, c = 0V).

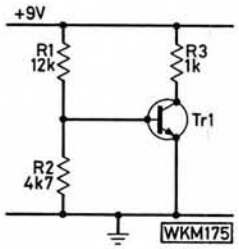


Fig. 7.2

The transistor in-circuit readings may appear very confusing. It is the transistor out-of-circuit readings which show up the fault in this case, emitter and base potentials being as expected but the 0V at the collector indicating no continuity between the collector and the +9V line, i.e. **R3 open circuit.** The reason for the low base and emitter potentials can be seen from the equivalent circuit of Fig. 7.3. Current through R4 is low because this is purely base current, no collector current flowing through it because R3 is open circuit.

$$I_{R4} = \frac{V_{R4}}{R4} = \frac{0{\cdot}3}{0{\cdot}68} = 0{\cdot}441\text{mA}$$

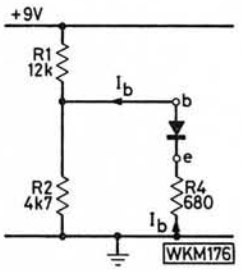


Fig. 7.3

This flows through the base-emitter junction, whose **resistance** under these conditions is

$$\frac{V_{be}}{I_b} = \frac{1{\cdot}1 - 0{\cdot}3}{0{\cdot}441}\,\text{k}\Omega = \frac{0{\cdot}8}{0{\cdot}441} = 1{\cdot}8\text{k}\Omega$$

See the further equivalent circuit of Fig. 7.4. Thus, total resistance between base and earth is

$$\frac{4{\cdot}7 \times 2{\cdot}48}{4{\cdot}7 + 2{\cdot}48} = \frac{11{\cdot}656}{7{\cdot}18} = 1{\cdot}62\text{k}\Omega$$

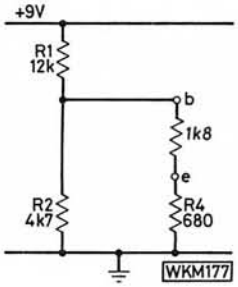


Fig. 7.4

Thus the base potential equals

$$\frac{1{\cdot}62}{13{\cdot}62} \times 9 = 1{\cdot}1\text{V}$$

The reason for the low collector voltage is that when the meter resistance is placed between collector and earth the base-collector becomes a **forward biased** junction. See the equivalent circuit of Fig. 7.5. Because the meter is such a high resistance (20kΩ/V on the 10V range), the junction will conduct less than the base-emitter junction, so 0·6V across the junction will leave 0·5V across the meter.

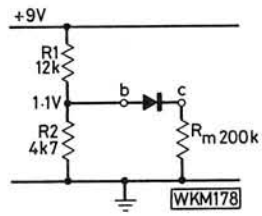


Fig. 7.5

If the above reasoning is too laborious for you, don't worry about it! The examples only serve to show that if the fault is not obvious from readings taken with the transistor in circuit, it will probably be obvious with the transistor removed (if this is possible).

No. 2: You were asked to estimate the e, b and c potentials of an i.f. amplifier, the circuit of which is reproduced here in Fig. 7.6. Base potential is provided by potential divider R1 and R2. Neglecting base current, base voltage will therefore be

$$\frac{4{\cdot}7}{26{\cdot}7} \times 9 = +\mathbf{1{\cdot}6V}$$

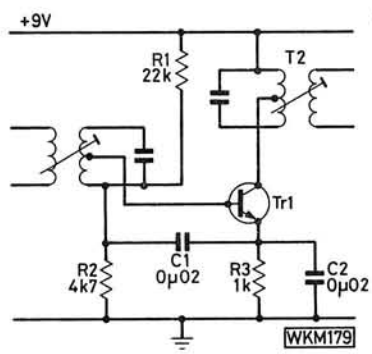


Fig. 7.6

Emitter potential will be about 0·6V less than this, i.e. **+1V.** There is no need to bother about junction currents at this time: since there will be virtually no voltage dropped across the primary of T2, collector potential will be **+9V,** irrespective of collector current.

Now let us look at the problems outlined in Part 1 of this series (June 1982). The circuits are reproduced in Figs. 7.7 and 7.8.

In Fig. 7.7, the potential at "A" was accurately quoted as being +2·7V (base current obviously being of some significance here), yet the meter indicated +1·3V. Suppose the meter used was a cheap 1000Ω/V model, used on its 10V range, giving it a resistance of 10kΩ. When placed in parallel with the 22kΩ resistor as shown, the resistance between base and earth becomes

$$\frac{22 \times 10}{32} = 6{\cdot}875\text{k}\Omega$$

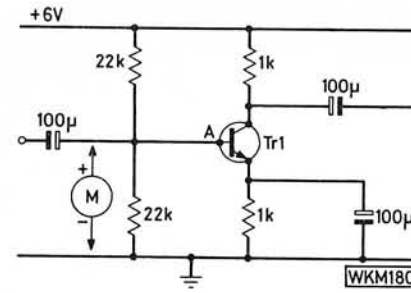


Fig. 7.7

Neglecting base current, the junction potential would be

$$\frac{6{\cdot}875}{28{\cdot}875} \times 6 = 1{\cdot}43\text{V}$$

The (lower) base current flow will reduce this to about 1·3V.

In Fig. 7.8, with the transistor cut off (no forward bias voltage), the meter reads +19·5V. Suppose a good quality 20 000Ω/V meter were used on its 30V range, giving it a resistance of 600kΩ. The equivalent circuit would be as shown in Fig. 7.9. We can calculate the actual value of the collector resistor R from:

$$\frac{600}{(R + 600)} \times 20 = 19{\cdot}5$$

$$\frac{12000}{(R + 600)} = 19{\cdot}5$$

$$\frac{12000}{19{\cdot}5} = (R + 600)$$

$$615 = R + 600$$

$$R = 615 - 600 = \mathbf{15k\Omega}$$

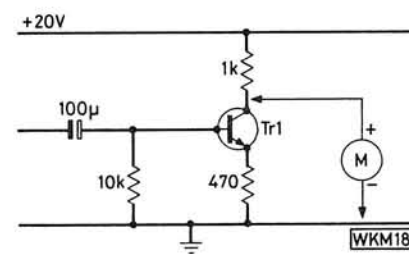


Fig. 7.8

So this apparently small discrepancy of 0·5V shows that the collector resistor has increased in value **fifteen times!** The correct voltage should have measured

$$\frac{600}{601} \times 20 = \mathbf{19{\cdot}97V}$$

If the transistor in the last example had been one which was normally conducting and we had suspected the collector resistor we could have cut off the transistor by shorting out its base and emitter with a small screwdriver blade and performed the test while this was done. This is a useful

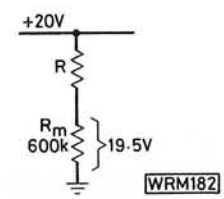


Fig. 7.9

trick which can sometimes show up the fault before the transistor is removed. We could have done this in example **No. 1** (b) at the beginning of this article: with base and emitter shorted collector current should cease and the collector potential should rise to the supply voltage, but under these fault conditions it would have remained low.

Effects of Signal Voltages on DC Measurements

Throughout this series I have emphasised the fact that we are looking only at d.c. potentials measured with a d.c. multimeter, on the basis that this technique will show up the fault in the vast majority of cases in practice without the need for unsoldering.

The presence of signal voltages (a.c.) in the circuit under test may or may not affect the readings taken on our d.c. voltmeter. The voltages present at any point in the signal path will now be complex, comprising a **d.c. component** and an **a.c. component.** The d.c. voltmeter will respond only to the d.c. component, but this may not be the same potential as measured under no signal conditions.

In many cases, of course, we can eliminate the a.c. component by removing the signals—by de-tuning the receiver or turning down the volume control, for example, depending upon the point under test. However, we may not always be able to do this. The local oscillator of a receiver will run continuously, regardless of the position of the tuning or volume controls; the master oscillator of a transmitter will probably be running continuously.

In many radio circuits the a.c. component will consist of undistorted sine waves, and here there is no problem: the d.c. component will be the same as the d.c. potential measured under no signal conditions. For example, the no signal potential at the collector of a Class A transistor amplifier may be +5V. Under distortionless signal conditions, the complex voltage at the same point may look like that of Fig. 7.10. Since the positive and negative half-cycles always balance, the **average** potential is always +5V, so we shall record the same measurement under both conditions.

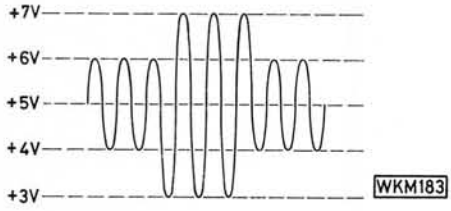


Fig. 7.10

If distortion of the waveform is present, however, upsetting the balance, the average potential will change and so also will the potential recorded on the meter. (n.b. waveform distortion does not necessarily imply a fault.)

As an extreme example, take a Class B amplifier with resistive collector load, which is non-conducting under no signal conditions and therefore has a collector potential equal to that of the supply, say +10V. When signals are applied, the transistor will only conduct every other half-cycle to produce a complex waveform like that of Fig. 7.11. The d.c. component (average potential) will now be something like +5·5V and this is what the meter will show.

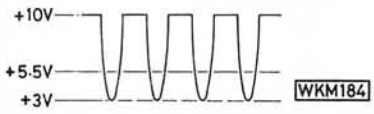


Fig. 7.11

So the procedure is to eliminate signal voltages wherever this is easy to do. Where it is not, the signal voltages present may not affect the d.c. potentials measured, but you should be aware of the conditions which can arise to change the potentials measured.

Another situation can arise in oscillators which use a certain amount of **self bias**—where a proportion of the bias is produced by the oscillatory signal itself. With these circuits, the conduction of the transistor changes when the oscillator is running, consequently producing changes in the d.c. potentials around the transistor.

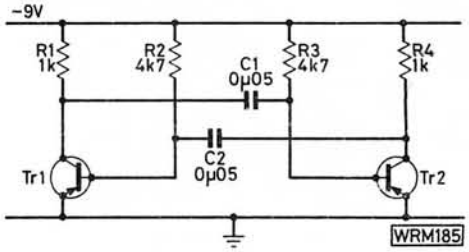


Fig. 7.12

A common circuit (not in radio but in allied electronic equipment) is the square-wave multivibrator. The example shown in Fig. 7.12 would produce collector waveforms as shown in Fig. 7.13(a) and (b). This circuit produces **symmetrical** collector waveforms, i.e. positive and negative half-cycles of equal duration, and therefore the average collector potential for both Tr1 and Tr2 is −4·5V and the meter will show this.

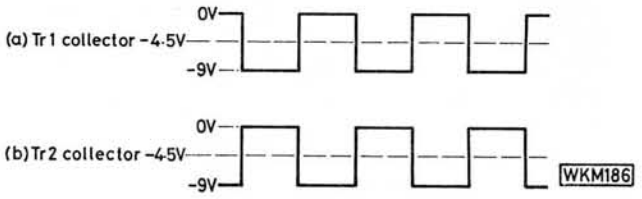


Fig. 7.13

If C1 were to be increased in value to 0·1μF, however, the collector waveforms would be as shown in Fig. 7.14(a) and (b). These waveforms are now **asymmetrical:** the average potential at Tr1 collector is now −3V and that at Tr2 collector is −6V. The d.c. meter will record a potential of −3V at Tr1 collector and −6V at Tr2 collector.

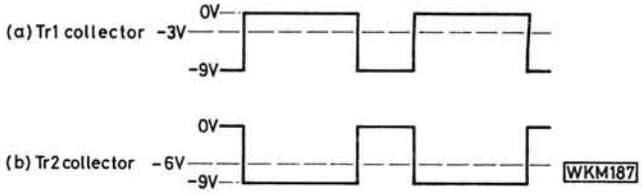


Fig. 7.14

For those of you who would like to be able to calculate average potentials of rectangular waveforms, see Fig. 7.15. Voltage V_H is the high level potential, V_L the low level. Voltage V_A is the amplitude ($=V_H - V_L$). P is the time duration of the positive-going part and T is the time for one complete cycle (i.e. the period = 1/frequency). The average potential is given by the formula:

continued on page 52▶▶▶

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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

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1332	R-1000	Gen. cov. receiver, digital	295.00
1333	DCK-1	DC operating kit for R-1000	8.25
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1337	TR-2400	2m FM hand portable transceiver	195.00
1338	TR-7625	2m FM 25W TCVR + memory	215.00
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The CQ Centre in Merton Park were recently found guilty of paying excessive prices for second-hand radio equipment. Roads in the district were totally jammed as eager customers flocked in to take advantage of the generous prices being offered. A spokesman for the company would only comment that this was a firm policy and would be continued in the future. Further investigations revealed that there was a sale or return service in operation for which the charges are only 10%. It was also found that copious amounts of tea and coffee were being served on the premises.

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NEWS NEWS NEWS

UOSAT Update

The attempts so far to re-command the UOSAT (UO-9) satellite make fascinating reading and hopefully by the time you read this they will have succeeded.

The 46m dish antenna at SRI International (formerly Stanford Research Institute) had to be brought back into full operation for the attempt. This involved extensive electro-mechanical engineering work by the team of US amateurs under the guidance of Dr. Bob Leonard KD6DG. Azimuth and elevation tracking had to be computed for the giant antenna, which has a beamwidth of 0·6° at the −3dB points, not helped by the fact that a vital element of the peripheral computing hardware had been scrapped some years ago!

As reported in *PW* initial attempts to re-program UOSAT used the 144MHz command input with an estimated 9·5MW e.r.p. This was unsuccessful and attempts were then made to use the 432MHz command input—12MW e.r.p. being quoted. Access was attempted when the satellite was well out over the Pacific ocean and under minimal influence of stray 144MHz terrestrial signals that would desensitise further the satellite's receiver.

At the time of writing, 10 September, the initial azimuth drive motor had burnt out and its replacement also failed. These have been replaced and current attempts to access UO-9 are using, once again, the 432MHz input. The team at Stanford are also building a very QRO 144MHz p.a. The best quote seen so far from one AMSAT pundit was "At these flux levels UOSAT will respond to command or incandesce . . . or both. The only real question is which will occur first". That comment related to the e.r.p. obtained from the first p.a.!

Don't forget you can get the latest update and orbit predictions by ringing **0483 61202.**

Stop Press

Success! We are pleased to report that efforts of the US team at SRI International have at last succeeded, resulting in the v.h.f. data beacon being switched off at 2345hrs on Monday, 20 September 1982. This allowed the University of Surrey command control station to turn off the u.h.f. beacon on the following day, and subsequently re-program the spacecraft. The v.h.f. beacon was then reinstated.

Preliminary checks, carried out up to 22 September, indicate that all subsystems are performing within specified parameters, with the single exception of the EHT radiation counter. It also appears that the c.c.d. camera onboard the spacecraft is fully operational, and when AMSAT-UK receive a positive series of pictures, they will put the p.c.b.s for the receiver imaging station onto the market. This will probably be about one month after the pictures are received from UOSAT.

For those who like even bigger figures (who doesn't?) the SRI system that finally cracked the UO9 de-sense problem, comprised a 16kW output 432MHz p.a., loaned by Eimac-Varian, feeding the 42dBd gain antenna = 253·6MW e.r.p.

Once again, for the information, *PW* thanks Ron Broadbent G3AAJ, Hon Sec of AMSAT-UK, who would publicly like to congratulate the team at the Stamford Research Institute, California, and also offer any of them, should they come to London, a pint of the fluid England is famous for.

OSCAR 7 Returns?

Still on the space scene a recent news item in the bi-weekly *AMSAT Satellite Report* (available in the UK via AMSAT-UK at £14·00 per annum) suggests that OSCAR 7 may be returning to life. Amateurs in both Australia and the US have heard the 28 and 432MHz beacons. Approximately 4 years ago OSCAR 7 developed problems with the battery system, restricting operations to direct sunlight periods only. These latest signals seem to indicate the self-healing of the open circuited cells. AMSAT-UK would welcome any further reception reports.

TV Bands I & III—Future Uses

The 43-page interim report of the Independent Review of the Radio Spectrum (30–960MHz) was published on 22 September 1982. The committee's first objective was to produce recommendations for consideration by the Home Secretary in respect of the future use of the vacated TV bands I & III (41–68 and 174–223MHz).

Allocations for a combination of mobile radio and broadcast ancillary services use, form the main recommendation of the committee, chaired by Dr James H. H. Merriman. Where necessary, the priority should go to land mobiles.

Further recommendations include (i) The accelerated closure of the 405 line service to allow implementation of service changes from the beginning of 1985. (ii) Provision of an allocation to the Radio Amateur Service within the range 50–54MHz, if possible.

Amongst the 47 organisations and individuals who submitted written evidence to the committee were *PW* and the RSGB. The request for an allocation in the 50MHz region was common to all submissions relating to the amateur service. It is at least very encouraging to see the amateur case specifically acknowledged in both the interim report and the accompanying Home Office News Release.

Of further specific relevance to the amateur service the future considerations of the committee will include "the desirability of aligning spectrum usage as far as possible with that of neighbouring Administrations" and "the adequacy of the existing machinery . . . for the assignment of frequencies, and to recommend any changes that might be made in the interest of public confidence in the system".

The Home Secretary received the Review's interim report on 10 September. He is considering it urgently and expects to announce his decision later this year.

Heard it on the Grapevine

It is rumoured that the giant Philips organisation, based at Eindhoven, in Holland, have placed an order for 500 000 spun pressed aluminium parabolic dish antennas. It would seem that Philips are obviously showing confidence in the future launch of NORDSAT, the 12GHz DBS (Direct Broadcast Satellite) serving Scandinavia. Spun aluminium parabolic dishes—now that seems an EXEceedingly good idea.

NEWS NEWS NEWS

432MHz—The Beginning of the End?

Whilst you are recovering from the euphoria created by the availability of the four new microwave bands (can anyone adept at microsurgery techniques and in possession of an electron microscope contact me about *PW*'s 248GHz Super X transceiver project), the prospect of the future withdrawal of all, or large parts, of the 432MHz band must be somewhat sobering.

As the Gazetted statement confirms "amateur access to the whole band is in a secondary basis to all other users". The MOD repeater system now beginning to encompass the UK is not going to disappear/QSY or be the "small beer" that you may have been led to believe. The Syledis navigation system, once regarded as the scourge of the 432MHz band, may be one of the few reasons that the band is still available for amateur use. Apparently MOD repeaters object to Syledis pulses as much as the 100-odd hard won amateur repeaters. Once again a parallel can be drawn with the situation in the US, which must surely have the most staunch of representatives in the halls of the legislature. Recent reports tell of increasing pressure to grab back large chunks of the 20MHz still available to the US amateur and the arrival, like the Pilgrim Fathers, of Syledis on the US East Coast.

Cable TV—The End of the Beginning?

As a licensed and operational amateur or CB station will the arrival of high level composite video and audio signals across the complete 5–440MHz range worry you?

If it hasn't been brought to your attention before, the following "trade" information extracts may well make you, rightly, very concerned.

The Hunt Committee was scheduled to complete its report on the format for the UK cable TV system for submission to the Government by 30 September 1982, with a view to the HO releasing operating licences by early 1983.

"IEC/BSI Specification for cabled distribution systems. Radiation and immunity measurement methods and performance requirements.

Radiation Limits: Maximum permitted equivalent radiation level from individual components within non-broadcast bands equals +11dB/μV/m at 10m or a radiated power of 2·5 $\times 10^{-11}$W (25pW)."

A footnote to this spec is probably prophetic. "This is a compromise value and **may not** protect from system interference all services operating within the bands specified."

It is the considered opinion of Chris Morcomb G3VEH, of the University of Bath School of Electrical Engineering, and John Wilson G3UUT, the author of the RSGB report submitted to the Hunt Committee, that radiation from "leaky coaxial feeder cables" at anywhere near these levels will lead to the end of amateur radio, 27MHz CB and any other similarly sensitive systems in locations provided with such a distribution scheme. This view is echoed by many other users of this part of the radio spectrum and has an existing parallel in the US where amateurs have been forced to close permanently due to their interference with cable TV systems and the reverse.

It is believed that there are two basic systems under consideration for the UK. The first is based on the US system and would use coaxial cable for distribution of TV and radio broadcasts, with the possibility of being two-way interactive. Outgoing broadcasts would employ 30 harmonically related carrier TV channels, probably with 8MHz spacing, in the range 30–440MHz. In addition, the system would be engineered to allow a return path capability, from the individual home terminal, within the range 5–30MHz.

The Information Technology Advisory Panel has already published a £2000 million plan to provide cable services in urban areas serving half of Britain's homes.

The second system is a hybrid fibre-optic/cable system, using a fibre-optic distribution system installed by British Telecom, feeding a street distribution point. Connection to individual properties would then be made via the aforementioned coaxial cables. From an e.m.c. point of view this scheme would be the lesser of the two evils, reducing the potential QRM to more meaningful proportions—probably only the neighbouring street!

The question that must be asked is why, when we have the available fibre-optic technology, possessing a relatively massive bandwidth capability and virtual zero radiation, must we rush headlong into what can only be a limited life stop-gap system? Could it be because the complete range of system components is readily available from the US and that we aren't interested in our own manufactured and developed world-beating technology? I for one would rather be a communication Luddite than an Informational Technology Lemming!

QRV on 934MHz OM?

A recent telephone conversation with Jeff Smith of Reftec Technology Ltd., who amongst his many accomplishments is a 1949 licensed G3+3, has revealed the interesting information that 934MHz CB is alive and very nearly with us.

Reftec have been developing a suitable transceiver for some time (see Production Lines, Dec. 1981) and have recently released to their national dealers 200 pre-production working samples for field evaluation. Full production is scheduled to start in mid-October.

PW were contacted by Richard Bird (GU6 in the post) of Guernsey, based with Custom Communications Ltd. Apparently excellent signals were exchanged on Friday 10 September, using the Reftec 934 equipment, between Guernsey and Dawlish on the mainland.

Antennas in use were $\frac{1}{2}\lambda$ over $\frac{1}{4}\lambda$ colinears and the tests included base to mobile over the approximately 95 miles, mainly sea path. Reftec's own trials in heavily built-up areas in London, so far indicate reliable mobile-to-mobile ranges of up to $1\frac{1}{2}$ miles, increasing appreciably when moving into less built-up areas and in the countryside. We hope to bring you full details of the Reftec transceivers in the near future and also hope to publish constructional details of suitable omni-directional vertical and beam antennas.

Finally, we understand Jeff Smith is meeting the HO in the near future to investigate *the licensing* position in respect of a 934MHz Repeater system. As a point of information, Australia has several u.h.f. CB repeaters operating at present.

NEWS NEWS NEWS

You've Asked For It!

See our next issue for news of the reprint of our popular series "Passport to Amateur Radio".

144MHz Ring Base Antenna

In response to numerous enquiries we are pleased to announce that Blandford Wells Ltd. has been appointed as the exclusive supplier of kits for the 144MHz Ring Base Antenna—published in September and October issues of *Practical Wireless.*

The products available are: Kit A—Mobile for gutter mount, £5.60; Kit B—Mobile for use with ASP type mag. mount, £5.60; Kit C—Base station version, £6.50; Bracket and mast clamp for base station version, £3.75. Prices quoted include VAT and carriage.

Would readers please ensure that orders and enquiries are sent only to: *Blandford Wells Ltd., 2 Station Road, Reedham, Nr. Great Yarmouth, Norfolk. Tel: (0493) 700245.*

Repeater News

GB3TR Returns: The Torbay 144MHz (2m) repeater GB3TR on R2 returned to full operational status in September 1982.

During an absence of some 12 months, the machine has been re-engineered and installed at a new, 152m a.s.l., location between the population centres of Torquay and Newton Abbot.

The repeater is currently using separate coaxial dipole antennas for receive and transmit mounted, respectively, at the top and 15·24m up a home constructed 21·34m high mast. The transmit and receive sections of the repeater are based on modified Icom IC-22A boards complete with an outboard p.a. stage producing 5W of r.f., to feed the UR67 antenna feeds. Logic functions are looked after by a GB3US designed board.

Future developments will include a complete rebuild of the G8CKN cavity diplexer (currently not configured as the original design notes) which will allow *single antenna* working and increased r.f. output.

The group thank all those responsible for the recent engineering effort and in particular Andy Endacott G3TLK for building the mast and providing the new site.

All reports will be welcomed by the Group Sec. Colin Coker G4FCN, QTHR.

Scottish R4 Problem Resolved: Following a meeting between the Central Scotland FM Group and the Scottish Borders Repeater Group in late August, a formula has been derived that will at last solve their outstanding "R4 Problem". This was due to occasional severe co-channel interference from portable and high-power mobile stations, using GB3HI on the Isle of Mull and GB3FF at Burntisland.

The plan, which involves the two repeater groups mentioned, three repeaters and a lot of inter-group co-operation, is for a three-way channel-swap which will put GB3FF (R4) onto R0, GB3BT (R2) onto R4 and GB3SB (R0) onto R2. HO ratification for the plan has been obtained and the big switch on day for the new allocations will be Saturday 30 October, 1982.

Wharfedale Loudspeakers

Tradewest Limited, a newly formed British company, is pleased to announce the acquisition from the Rank Organisation of the major assets of the "Wharfedale" hi-fi loudspeaker manufacturing operation which was closed by Rank on July 23. Mr Kenneth Lasky of Avenue Trading, well known in the UK hi-fi industry, introduced the two parties to the deal.

The assets have been acquired for an undisclosed consideration and include the trade name "Wharfedale", the factory in Bradford, Yorkshire, including the research and development facilities, and all plant and stocks.

The new company will trade under the name "Wharfedale Loudspeakers" and is planning to restart the business on a radically restructured basis, but continuing the Wharfedale tradition of strong technical development in acoustic engineering. It will continue worldwide distribution of the present range of Wharfedale loudspeakers and the ongoing technical development of future models. A full after-sales and warranty service for Wharfedale speaker products will be given by the new company.

Technical Book Catalogue

Bernard Babani (publishing) Ltd. announce the availability of their new illustrated 1982/3 catalogue of Radio, Electronic and Computer books.

Readers who would like a copy of this 28-page catalogue, completely free of charge, should send, to the publishers, details of their name and address and a copy will be sent to them by return of post.

Bernard Babani (publishing) Ltd., The Grampians, Shepherds Bush Road, London W6 7NF. Tel: 01-603 2581/7296.

RAE in the Ipswich Area

Earlier this year it came to the notice of the Ipswich Radio Club that the Suffolk College of Higher and Further Education, Rope Walk, Ipswich, would no longer accept external candidates for any examinations at premises under their control.

This action left a very large area of Suffolk, centred on Ipswich, with no centres available for students to take their examinations. However, Ipswich Radio Club is pleased to announce that, with the help of the County Education Authority, arrangements have been completed for students to sit the Radio Amateurs Examination at the *Kesgrave and Clayton Adult Centre, The High School, Kesgrave, Ipswich IP5 7PB. Tel.: Ipswich 624386.*

Candidates should make their own arrangements with the Centre, being careful to ensure that they complete enrolment by the date applicable to the examination they wish to sit.

At the Rallies

Sunday, 12 September saw the 1982 Telford Amateur Radio Mobile Rally and Exhibition. This event, held annually in the Malls of the Telford Shopping Centre, proved extremely popular.

Practical Wireless was there, acknowledging yet again the fact that, as one visitor put it, "there is life north of Watford", and we thoroughly enjoyed our day. Certainly it had one of the best displays of components and second-hand gear we've seen this year, and all in a very pleasant and convenient venue.

2m FOX-HUNTER

D.O.WHITE G3ZPA

Amateur bands radio direction finding (DF) contests in the 144MHz (2m) band are increasing in popularity. This article describes the equipment required to allow you, the Foxhunter, to participate in locating the hidden Fox station.

After many years of participating in DF foxhunts which were run by our local amateur radio club, I realised it wasn't quite as easy as I first thought. After coming in last on one occasion I decided to try and improve my performance! Initially I settled on the home-made antenna equipment shown in Figs. 1, 2 and 3, which was built at minimum cost to try and make me competitive.

The Antenna

My first step was to obtain one of the old BBC TV Channel 1 v.h.f. "H" antennas, which was being discarded by a neighbour. I then proceeded to saw the ends off the driven element until it was exactly 965mm long; the reflector was cut next to an overall length of 1016mm. The element clamping bracket bolts were unscrewed and the reflector slid along the boom to a distance of approximately 406mm from the driven element. Sawing off the excess boom left a total length of 457mm.

To test this antenna I used a system which can also be used for those summer antenna gain measuring contests so beloved of hams in the USA. This will be described later in this article. As I considered the front-to-back ratio to be more important here, especially for close-in work, I tried sliding the reflector towards the driven element. As the distance between the two elements closed I noticed the beam width was being reduced somewhat; this was fine. At the end of my adjustments I had managed to get nearly 1dB of extra gain in this way but the front-to-back ratio dropped slightly and when tried on transmit the v.s.w.r. had gone up, resulting in the antenna being somewhat mismatched to the coaxial feeder. I eventually settled on a reflector to driven element spacing of 406mm, at which point the gain was observed to be 3dB. The front-to-back ratio had improved to 22dB and the beamwidth had broadened again with only a slight mismatch.

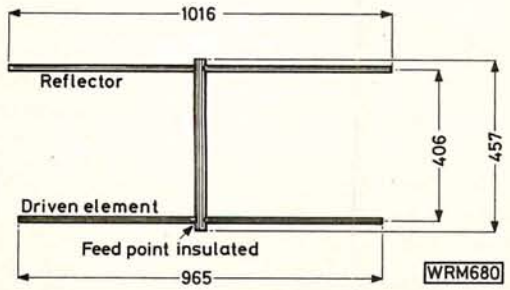

Fig. 1: The layout and dimensions of the modified Band I TV antenna

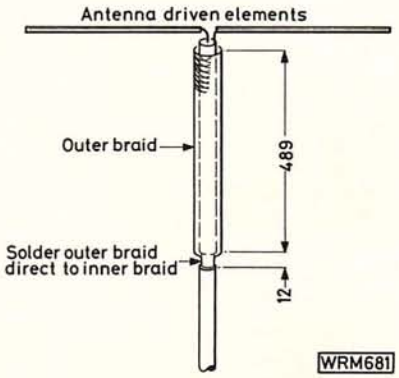

Fig. 2: Details of the λ/4 "Bazooka" 1:1 balun. The additional outer braid was obtained from a length of larger coaxial feeder

Upon checking the aim of the beam, I was at first surprised to find that signals peaked up highest when the beam was turned about 10° away from the other antenna which I was using as a signal source. Then it clicked! The driven element was, of course, unbalanced. I next slid a 489mm length of UR67 coaxial cable braiding over the antenna feeder and soldered the end furthest away from the driven element direct to the braiding of the coaxial antenna feeder. This arrangement formed a quarter wave "Bazooka" (1:1) balun, as shown in Fig. 2.

Checking the aim of the beam again I found that the previously noted squint of the beam had now been almost totally removed. By trial and error a feeder length of 3·65m was found to be the right length so that I could get sufficiently far away from my vehicle to minimise false readings by reflections.

Signal Attenuator

One of the problems encountered when getting very close to the fox station was that the signal level was so strong that it swamped the receiver, regardless of which way the beam was turned. As most of the participating stations have commercial 144MHz receivers and transceivers, which are not normally fitted with an r.f. gain control, some form of attenuation became necessary.

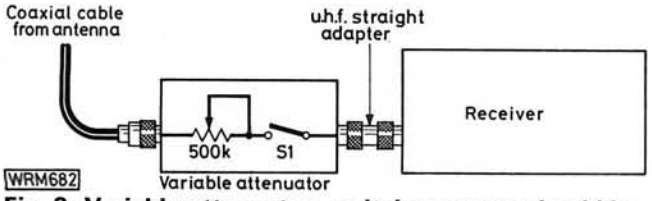

Fig. 3: Variable attenuator; switch contacts should be fairly close together when open to ensure capacitive coupling

In my "bits and pieces" cupboard I found a small tin box and an old carbon tracked volume control of the type which incorporates an ON/OFF switch; this was rated at 500kΩ. This control was fitted as shown in Fig. 3, the attenuator box being fitted right against the antenna socket of the receiver. The reason for doing this was to eliminate as much as possible the signal pick-up of the coaxial feeder cable itself. The receiver must also be kept inside the car for the very same reasons.

Using this method I have been able to get within 180m of a transmitter running 10 watts where the "S" meter reading was greater than 60dB over S9. Rotating the variable attenuator control and finally switching the control to OFF (open circuiting the antenna), I was able to reduce the signal down to S8, which meant I could still determine the direction of signals by observing the receiver "S" meter. One final tip, try disconnecting the receiver "S" meter and run a length of twin pvc wire out to an external meter which has a larger dial and more graduations marked on its scale. This alternative meter can be clamped to a short wooden support handle used to hold the beam above your head. You can then easily see slight changes in signal as you rotate the beam above you with the meter in front of your eyes.

I find that I am now very competitive in these contests and have even won on a couple of occasions, although I must admit that I have yet to find a way of improving my road navigation!

Antenna Adjustment Technique

A look at Fig. 4 will show you the method of setting up DF antennas for best performance.

First of all beg or borrow a switched attenuator, which preferably provides selectable, 1dB, switched steps. Thus equipped, adjust the attenuator for a reference signal level on the receiver whilst using the reference dipole. For example, a reading of seven on the signal strength meter would be fine. Write down the number of dB (decibels) used on the attenuator to obtain this signal level. Next turn the coaxial switch to the antenna you wish to evaluate.

Adjust this antenna for either maximum gain, as previously described, or by turning it around 180°, for the minimum signal, providing a measurement of best front-to-back ratio. Now adjust the attenuator to obtain the same "S" meter reading as obtained before. Using the reference antenna record the new dB reading of the attenuator. The difference between the two attenuator readings corresponds to the amount of gain (or loss) between the two antennas.

Alternative Systems

Having outlined a system that has worked well for me in DF contests which were held on the 144MHz v.h.f. band I would next like to discuss the other types of antennas used by the many participants in these contests.

Firstly size; with today's small modern car it is difficult to carry large arrays that can be used repeatedly during a two hour period, unless you have a suitable clamp that can be attached to a roof mounted luggage rack. If a rack and mount is available then a three or four element beam that can be pivoted easily is ideal, providing it can be prevented from swinging around during the journey.

For those without a luggage rack then a much smaller two element beam would fill the need nicely. This can be either a parasitic or phased type such as the HB9CV. The latter has the advantage in sheer size as the elements are spaced only about 250mm apart. Many DF foxhunt participants have a preference for the two element quad as this also has small dimensions and is easy to get in and out of the car without poking somebody's eye out. All the mentioned antennas are used for determining the all-important initial beam heading of the hidden transmitter, and the hounds can now set off in hot pursuit.

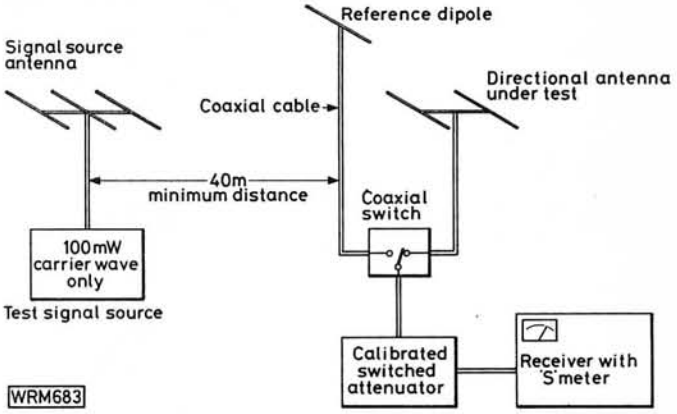

Fig. 4: Test set-up for optimising DF antennas. The arrangement of equipment on the right also forms the basis for a good operational DF system

Operating Techniques

In the contests that I have participated in it is interesting to observe that the majority of participants (hounds) will now drive to a point approximately 90° to one side of the original beam heading so as to get an accurate fix by cross reference. Many others still prefer to try and save time by heading along the original plotted direction until the signal strength indicates they must be fairly close to the transmitter.

Once all the hounds are getting close in to the fox it starts to get difficult, mainly because the signal level now starts to reach saturation point. At this time those using beams will put them away and bring out single element folded dipoles, ordinary dipoles, one element quad loops or shielded loops.

Instead of going for the maximum signals what we have to do now with the single element antenna is to rotate it slowly until a point is reached whereby the signal is at a minimum and the noise level is at a maximum. This is known as the null and is extremely sharp in comparison to the maximum signal level, which can be very strong over much of the angle of rotation of the antenna. Plottings of beam headings can be very accurate using the null of the

signal and the only problem remaining is to decide which of the two possible directions shown is the correct one to proceed in.

The 144MHz band is a very popular part of the amateur spectrum and the problem of interference arises here. Horizontal polarisation has certain advantages over the more usual vertical polarisation, which is used particularly on the f.m. simplex channels. One of these advantages is that interference is kept to a minimum by adopting horizontal polarisation for DF contests. Another is that single element antennas are not suitable for use with vertical polarisation due to the electric field being upright (which is the bit that the antenna responds to) and the magnetic part of the field being on its side.

Shielded Loop

If vertical polarisation is being used at any time there is one form of antenna which is extremely effective, especially for difficult close-in work, called the balanced shielded loop. The name is derived from the fact that the active element of the antenna is almost completely shielded by an r.f. screen placed around it, allowing it therefore to respond to strong signals only.

There are several ways of constructing these loops and details of most of these are readily available in the antenna handbooks. One type which is particularly effective and not so well known is the unbalanced shielded loop, shown in Fig. 5. This will be suitable for vertical polarisation, reception only, but being non-resonant it can be used on the 27, 28, 70 and 144MHz bands, providing the dimensions shown are used.

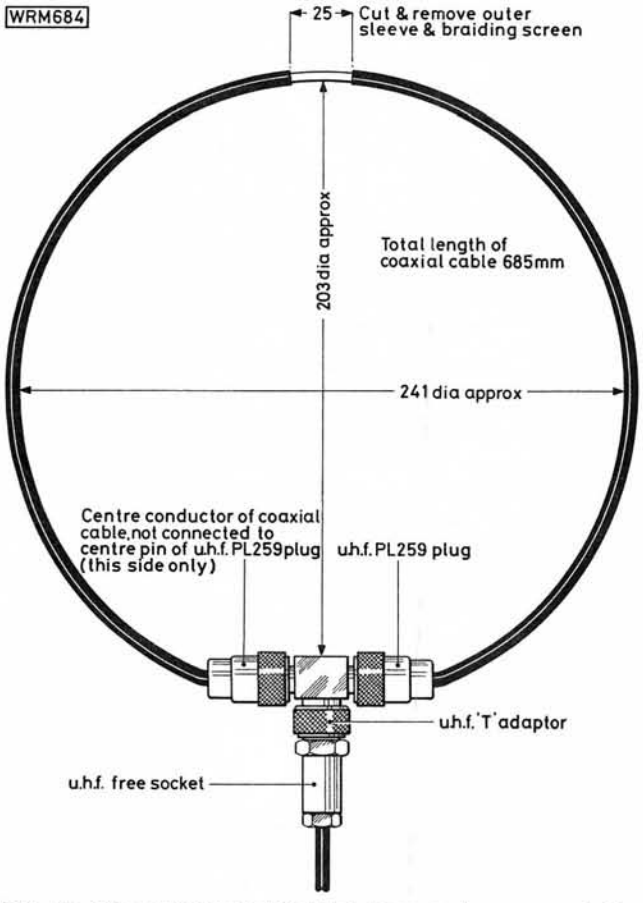

Fig. 5: The untuned shielded loop antenna used for "close-in" work. This layout works well at 27, 28, 70 and 145MHz, peaking at 60MHz and with reduced efficiency on other frequencies

Contest Day

The competitive foxhunter will need a two or more element directional antenna to find the initial direction of signals, together with a single element loop, or dipole, for more accurate beam headings. In addition a receiver with an "S" meter (but not the bar type l.e.d.s which are now becoming popular) is required. Also used will be some form of variable attenuator with at least 80dB of attenuation together with a good compass and an Ordnance Survey map of the hunt area.

A good set-up is shown in Fig. 4, but let me stress that when taking bearings on the signal, do not stand too close to the car as reflections will cause bearing errors. The compass also must be used well away from the car as the metal will affect the needle and cause several degrees of error.

For those who construct their beams, dipoles, loops or whatever note that it is essential to fit a balun of some kind. Failure to do so will cause, as previously noted, a seven or eight degree squint to one side of the transmitting antenna. If you are not convinced about this, try checking the null point of an unbalanced dipole when the tips are pointing towards a visible transmitting antenna.

Remember that signals at v.h.f. can easily be reflected by nearby objects or obstructions and can give rise to false bearings from your antennas, so when taking a reading of the signal make sure you are some distance away from buildings or metalwork etc.

The following types of antenna can be used with horizontal polarisation during the DF hunt.

1) A two or more element parasitic type (Yagi)
2) A two or more element cubical quad
3) An HB9CV phased type beam
4) A ZL Special

All such types are normally used to determine the initial direction of the fox by utilising the maximum signal.

The following antennas are used on the minimum signal or null.

A) Single quad loop
B) Dipole

During recent tests, a *PW* Slim Jim was evaluated in the horizontal plane and gave an incredibly sharp null off the top of the antenna when aimed like a rifle at the transmitter.

With regard to antenna 1, it is well worthwhile to fit a trigonal type reflector as this improves the front-to-back ratio, remembering that gain is of no importance here.

When embarking on a DF hunt which is utilising vertical polarisation the choice of antennas to use is now extremely limited because single quad loops and dipoles are practically omni-directional when used with this kind of polarisation. The choice now becomes either a balanced loop, ZL Special, balanced (shielded) loop or four element Yagi (any less elements than this and the beamwidth becomes too broad for other than knowing which general direction the transmitter lies in).

Foxhunt Format

For clubs who have never held a DF hunt before there are two ways of going about it. The first method uses two or three separate teams who advise each other over the air of the beam headings that they are obtaining and also their location. When this information is co-ordinated, the resultant plottings on a map should cross at a certain point.

The second method leaves each person or persons in one vehicle to work entirely on their own, without any talk back allowed on the air. This is more difficult, but also more satisfying, as the eventual winner is left in doubt until the last moment.

Finally for those of you using the older types of equipment which are not fitted with "S" meters such as the Pye Cambridge AM10, Garex Twomobile etc., a signal level change meter (not an "S" meter) can easily be hooked in, Fig. 6, by using an extended wire attached to your volt-ohm multimeter. Place the negative lead to the a.g.c. line at

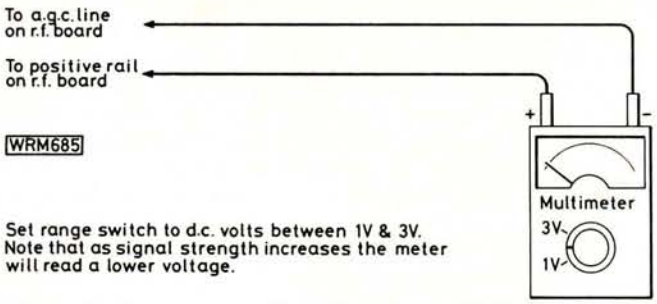

Fig. 6: Increased directional resolution can be obtained by using a larger scale meter

any convenient point, and the positive lead to the positive supply rail. Set the range switch to read d.c. volts, up to about 3V level. The meter will now read in reverse as the signal level increases, the large dial showing clearly the smallest change in actual signal level. ●

References

1) Compact 2m beam aerials. *PW Out of Thin Air*
2) The VHF Balanced Loop *PW October 1979*

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. 18

Once again I must apologise for the intermittent appearance of the Mods column. The last few issues of *PW* have been so full that some of the regular features have had to be dropped. Unfortunately, Mods was one of them but as I have been moving home, I welcomed the breathing space. Many readers write to me at my home address and several have telephoned me there so please note that I am no longer at the address in the call book.

This month, as promised many moons ago, I start on a multitude of mods for the multimode **Yaesu FT-290R.**

Frequency Extension

Most of today's 2m rigs can be made to operate on any of the various national standards because the manufacturers have found that it is better to make one set that can be easily modified than it is to make several different models for different countries.

Graham Packer G3UUS, of Packer Communications, has sent in details of a modification for the FT-290R that gives 144–148MHz with 10/20kHz steps. Start by removing the battery pack and undoing the four screws to remove the printed circuit board at the top of (PC1). Chip Q04 should now be visible on PC2 and next to it four link positions, with wire links already across the top and bottom ones. Graham suggests running a wire from the left-hand side of the second position from the top, across to the NOISE BLANKER switch. The wires that were on the switch should have been previously cut off and permanently wired together. The other side of the switch should be connected to earth and the link that is across the lowest position must then be cut. Then, whenever the NOISE BLANKER switch is pressed, position 2 becomes earthed, extending the frequency range to 144–148MHz. There is also a sort of bi-stable action that causes the set to switch between 25/12·5 and 20/10kHz channel spacing when the rig is switched off.

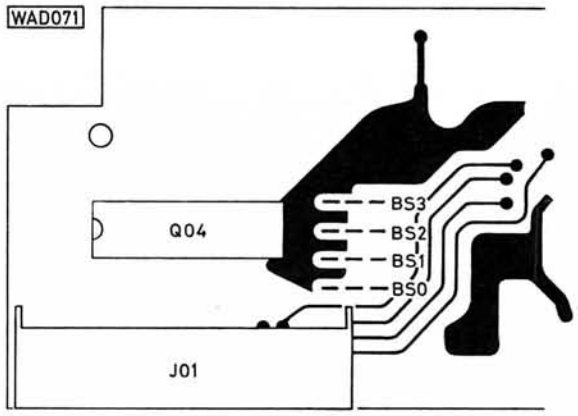

Fig. 1

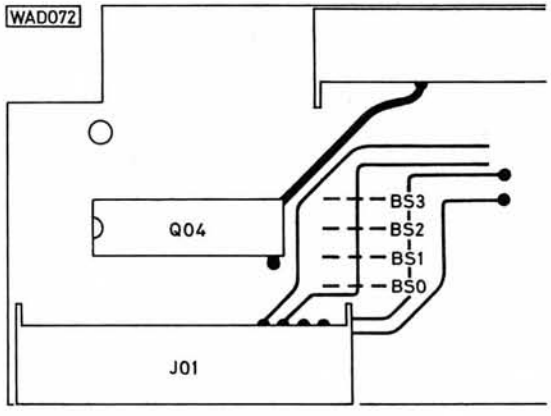

Fig. 2

Amateur Electronics UK Ltd. have issued a technical bulletin (No. 37) that gives a table of all the possible permutations of channel spacings and band edges that are available with the FT-290. That table is reproduced here as Table 1 and in order to change the specifications, wire jumpers should be installed on the component side of the board in the positions marked with an "0" in the table. It is worth noting that the channel steps referred to are for f.m. and Type A transceivers can have their range extended to 143·5–148·495MHz by removing the jumper at BSO (see Figs. 1 and 2). Type B is the one that is usually supplied in the UK and Type C has the same channel steps but a frequency coverage of 4MHz. By inserting the appropriate jumper leads, it is possible to programme this set to work in any part of the world.

Lots more for the FT-290R next month

Table 1: Frequency Range Modifications

	Type A	Type B	Type C	Type D	Type E	Type F
Band (MHz)	144·0-147·9999	144·0-145·9999	144·0-147·9999	144·0-147·9999	144·0-147·9999	144·0-145·9999
Preset (MHz)	147·0	145·0	145·0	145·0	147·0	145·0
Ch. Step (Hz)	5k/10k	12·5k/25k	12·5k/25k	5k/10k	5k/10k	10k/20k
BSO	X	O	X	X	X	X
BS1	O	X	X	O	O	X
BS2	O	X	X	X	O	O
BS3	O	O	O	O	O	O

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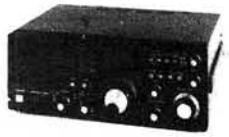

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PRODUCTION LINES

ALAN MARTIN G8ZPW

TVI?

Two recent additions to the AKD Blackline range of in-line TVI suppressors, is the HNF2 high-pass filter with tuned braid notch, and the TNF2 (Deluxe) notch filter. Both products are designed specifically to eliminate the effects of antenna/feeder borne interference from close proximity r.f. sources below 200MHz, which includes most amateur bands, CB, commercial and emergency service transmissions.

The HNF2 is particularly useful where the approximate frequency of the interference is known and remains constant within ±1MHz or so. The unit is stocked with two standard centre frequencies of 27MHz for CB, and the following amateur bands: 144, 28, 21, 14, 7 and 3·5MHz.

The braid notch can, however, be

centred to any frequency up to 200MHz to order, which incurs a 20% surcharge for this service.

The specification of the TNF2 is the same as the HNF2, except that there is a tuned notch on both the inner and outer antenna conductors.

Standard centre frequencies are as for the HNF2 and provision of units to other centre frequencies are on the same terms.

The HNF2 costs £7.25 and the TNF2 costs £7.50 (both prices include VAT and carriage) and are available from: *Telecomms, 189 London Road, North End, Portsmouth. Tel: (0705) 662145.*

UK World Leader

Recently announced and demonstrated at the British Amateur Radio Teleprinter Group's exhibition at Sandown Park on 29 August 1982, was a new terminal unit designed for error correcting amateur radio data transmission. Called the AMT-1 AMTOR Terminal Unit, it is manufactured in Britain by I.C.S. Electronics Ltd.

Designed to interface between a computer and an amateur radio transceiver, it is the world's first complete terminal unit to offer AMTOR (Amateur Teleprinting Over Radio), which is a microprocessor controlled error correcting data communications system that allows virtually error-free data transmission between suitably equipped stations.

In its primary mode the AMT-1 provides automatic error correcting action. The sending station transmits three characters as a block in 210ms, it then pauses for 240ms, during which the receiving station transmits a single acceptance code. If the information has been received incorrectly, a "request for repeat" (RQ) code is issued. On receipt of an RQ, the sending station repeats the three character block until the receiving station finally transmits an acceptance code, after which the next block of three characters is sent.

The AMT-1 Terminal Unit contains everything that is required to convert an amateur radio station and personal computer (or ASCII terminal) into a fully operational data communications system with optional error correcting facilities. It contains modem (AFSK modulator/demodulator) circuitry together with a microprocessor which handles AMTOR data transmission and also translates between AMTOR code and 8 unit, 110 Baud ASCII code.

An ASCII, RS232 interface has been chosen for the AMT-1 because of the extra CONTROL and ESCAPE code flexibility which this allows. Additionally, home computers and data terminals with ASCII interfaces are now available at very reasonable prices.

As well as its AMTOR capability, the AMT-1 also incorporates facilities to transmit and receive standard RTTY and to transmit CW (Morse code). A fourth "Transparent" or "Direct" mode is available, which connects the terminal direct to the modem. Using an ASCII terminal allows the AMT-1 to transmit and receive ASCII at any suitable Baud rate. This mode has wider potential, dependent upon the ingenuity of the user!

The modem incorporates an active 4-pole receive band-pass filter, feeding into an audio discriminator. It has a performance much higher than that normally offered by amateur RTTY terminal units. Transmit tones are crystal controlled and frequency shift is 170Hz, using the IARU recommended tone pairs: 1445Hz (Mark) 1275Hz (Space).

Full status indication is available via l.e.d. indicators on the front panel and in addition, an excellent 16 l.e.d. tuning indicator has been incorporated. In AMTOR mode, this acts as a gated frequency analyser and makes tuning extremely simple.

No switches will be seen on the front panel as all control is via ESC and CONTROL functions, sent from the terminal or computer.

Based on CCIR recommendation 476, and developed in Britain by Peter Martinez G3PLX, AMTOR is now permitted by many national administrations (approval is expected soon from the FCC, allowing US amateurs to use the system).

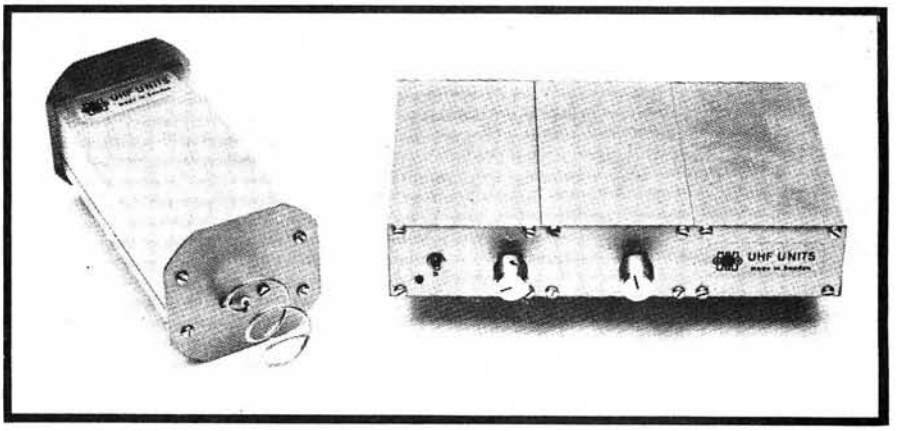
Using largely home-brew or kit built equipment, the system is currently being used by several hundred amateurs world wide, mostly on 14MHz (20 metres) where the characteristic "chirp" of AMTOR mode A signals may frequently be heard.

On the h.f. marine bands, SITOR (the marine equivalent of AMTOR) is used extensively for error-free ship-to-shore telex communication.

Priced at £245, which includes VAT, the AMT-1 Terminal Unit is available from: *I.C.S. Electronics Ltd., PO Box 2, Arundel, West Sussex BN18 0NX. Tel: (024 365) 590.*

4GHz Satellite TV Receiving System Package

One of the latest items of equipment to be introduced by Dorset based South West Aerial Systems is a complete 4GHz Direct Broadcast Satellite TV receiving system. The Swedish manufacturers—UHF Units—r.f. processing equipment consists of two basic elements—the 4GHz head unit, incorporating right hand circular helix dish feed element, provides amplification at signal frequency and down-conversion to a first i.f. in the range 880–1150MHz. The helix and head unit is located within a circular waveguide feeding the recommended 1·8m diameter parabolic dish antenna, which is mounted on a manually adjustable support structure, also included in the package.



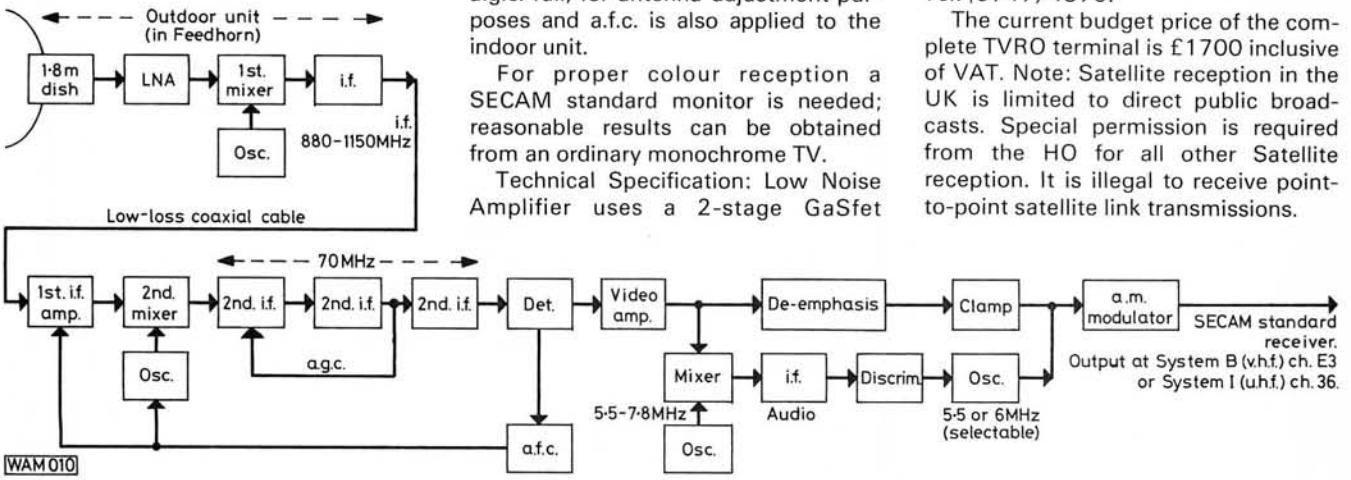
The output of the head unit feeds, via supplied coaxial cable, an indoor i.f. processing/down-converter providing various output options. These include system B Ch. E3, system I Ch. 36 or video/audio at Baseband (system B 5·5MHz or system I 6MHz). The audio sub-carrier offset is adjustable over the range 5·5–7·8MHz. A socket is provided to monitor the indoor unit a.g.c. rail, for antenna adjustment purposes and a.f.c. is also applied to the indoor unit.

For proper colour reception a SECAM standard monitor is needed; reasonable results can be obtained from an ordinary monochrome TV.

Technical Specification: Low Noise Amplifier uses a 2-stage GaSfet design; Overall head unit gain 38dB; Noise figure 1·3dB; First i.f. 880–1150MHz; Second i.f. 70MHz; Bandwidth 25MHz; Power supply 13·8V d.c.

Further details are available from: *South West Aerial Systems, 10 Boundary Road, Shaftesbury, North Dorset. Tel: (0747) 4370.*

The current budget price of the complete TVRO terminal is £1700 inclusive of VAT. Note: Satellite reception in the UK is limited to direct public broadcasts. Special permission is required from the HO for all other Satellite reception. It is illegal to receive point-to-point satellite link transmissions.



Block diagram of the complete system

HF Transceiver — Made in GB

Recently announced by Chris Moulding Radio Services, the Bolton based communications engineers, is the near availability of a wholly British designed and built h.f. bands transceiver, to be called the CM1000.

The transceiver is designed to cover the following frequency bands: 1·8, 3·5, 7, 10·1 and 14MHz (160, 80, 40, 30 and 20m). Modes available will be USB/LSB/CW wide/CW narrow (optional) and AM, with the operating frequency displayed on a digital l.c.d. readout.

Briefly, the major features of the CM1000 transceiver are:—

Receiver: Plessey SL6440C high-performance mixer i.c.; three stage bandpass filter for each band; novel dual rate a.g.c. system to minimise static QRM; 8-pole a.m. s.s.b. filter; internal front-facing monitor loudspeaker and, due to the advanced receiver design, no attenuators or r.f. gain controls are required.

Transmitter: 100W r.f. output power from two 6146Bs; pre-aligned tuned circuits, so, no preselector, anode or load corftrols; speech compressor on microphone audio; effective a.l.c. circuit using dual rate a.g.c. system and an r.f. drive control for QRP work or transverting.

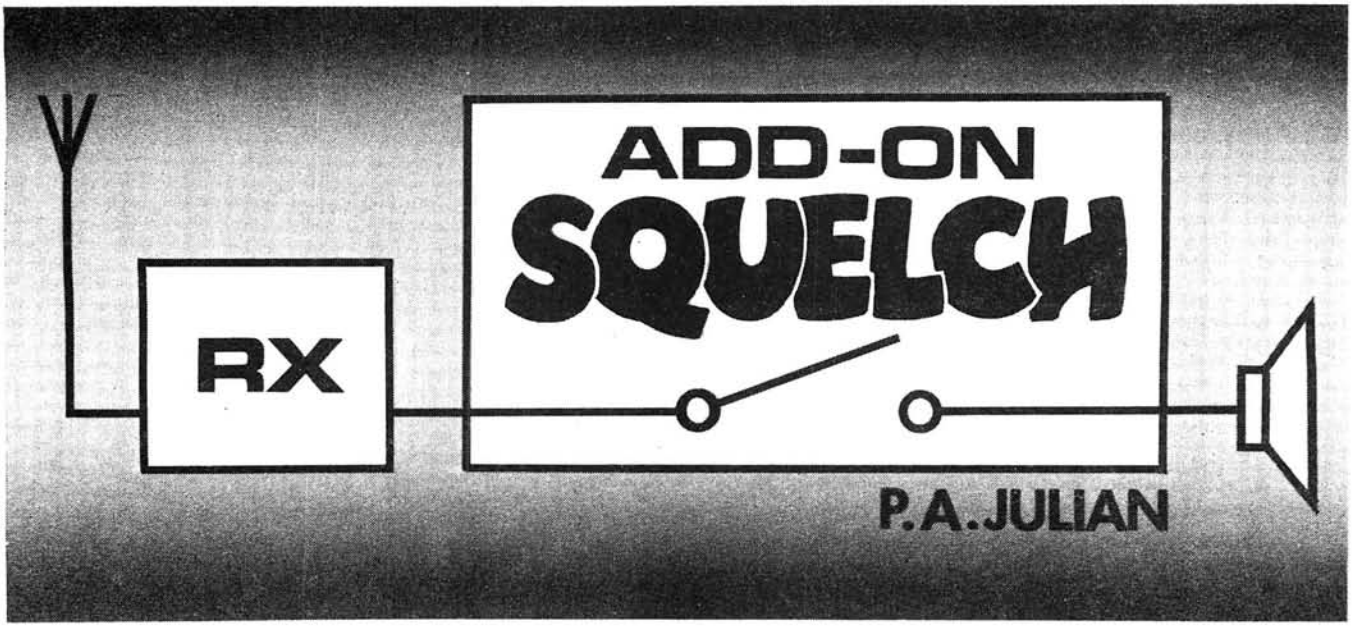
The CM1000 h.f. transceiver is provisionally priced at £399, with a design matched a.c. mains p.s.u./external speaker unit priced at £95. The manufacturers anticipate launching both the transceiver and p.s.u. at the Leicester Show in November 1982.

As soon as final product details and photographs are available, I will publish them. Hopefully, soon after we will be able to carry out a full "Radio Special Product Report".

Chris Moulding Radio Services, 276 Hulton Lane, Bolton BL3 4LE. Tel: (0204) 651348.

If you please

Please mention "Production Lines", when applying to manufacturers or suppliers featured on this page.



A squelch circuit is an electronic means of shutting down the audio stage of a radio receiver while no signal is being received. When a signal of a pre-determined level is received the audio stage is automatically switched on. This type of circuit is particularly useful in two-way radio applications where, under "no signal" conditions, background and ignition noise can be tiresome. Squelch can also be used in v.h.f. f.m. receivers to provide muting while tuning between stations.

The unit described here was designed with the following points in mind. The circuit had to be reasonably sensitive with low current consumption. It needed to be suitable for both positive and negative ground, be simple to install and have one control operation.

The basis of the circuit is a Schmidt trigger (Tr2/Tr3) which, aided by a common emitter resistor, turns ON and OFF sharply. Rectified r.f. voltage is applied to the trigger which switches an audio pre-amp.

Circuit Description

Transistor Tr1 is an r.f. amplifier which boosts the i.f. signal. The signal from this stage is rectified by D2 and provides positive bias for Tr2. When there is no signal Tr2 remains switched OFF and so Tr3 switches ON allowing negative current to flow through D3 and R12 to the base of Tr4 which, being *pnp*, conducts heavily, thus reducing the resistance between its collector and emitter and effectively switching C8/R15 across the audio path and muting the circuit.

However, it is sometimes necessary to turn on the audio when listening for a weak signal which may not be strong enough to activate the squelch circuit. For this reason bias for Tr2 is permanently provided by the potential divider network R5/R6 via D1 and D2. Potentiometer R6 is set so that when R7 is at maximum sensitivity Tr2 turns ON. As the wiper on R7 is moved towards the ground the current to the base of Tr2 drops until it reaches a point where Tr2 switches OFF. Any reasonable level of i.f. signal will be boosted by Tr1 and fed to D2 where it is rectified and added to the bias from D1. The sum of the two voltages switch on Tr2 which in turn causes Tr3 to switch OFF. No negative current then flows through D3, R12 to the base of Tr4. Transistor Tr4 therefore ceases to conduct heavily and acts as a normal a.f. amplifier. A *CR* time constant which sets the length of time the squelch takes to shut down after a transmission has ceased, is provided by C4 and R7. Fig. 2(b) shows in block form how the circuit fits between the r.f. and audio sections of a radio receiver.

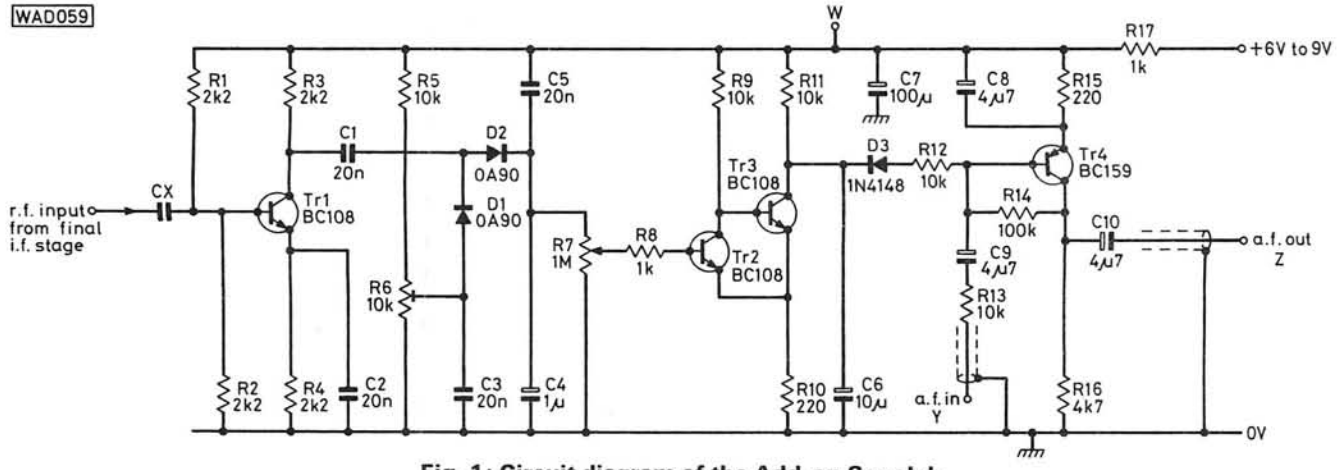


Fig. 1: Circuit diagram of the Add-on Squelch

CONSTRUCTION RATING Intermediate

BUYING GUIDE

All the components for this project are available from advertisers in the magazine and constructors should have no problem in obtaining them.

APPROXIMATE COST £2.50

★ components

Resistors

¼W 5% Carbon film

220Ω	2	R10, 15
1kΩ	2	R8, 17
2·2kΩ	4	R1, 2, 3, 4
4·7kΩ	1	R16
10kΩ	5	R5, 9, 11, 12, 13
100kΩ	1	R14

Miniature horizontal pre-set

10kΩ	1	R6

Potentiometer, miniature panel mounting

1MΩ	1	R7

Capacitors

Electrolytic p.c.b. type 10V

1µF	1	C4
4·7µF	3	C8, 9, 10
10µF	1	C6
100µF	1	C7

Polyester

22nF	4	C1, 2, 3, 5
33pF	1	Cx* (see text)
75pF	1	Cx* (seet text)

Semiconductors

Diodes

OA90	2	D1, 2
1N4148	1	D3

Transistors

BC108	3	Tr1, 2, 3
BC159	1	Tr4

Miscellaneous

95 x 30mm Veroboard 0·1in matrix.

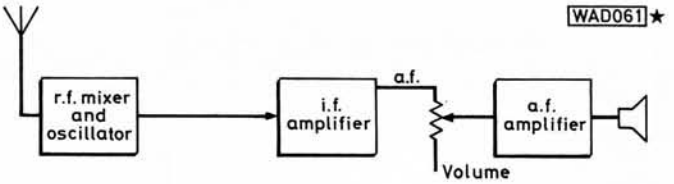


Fig. 2(a): Block diagram of a simple superhet receiver

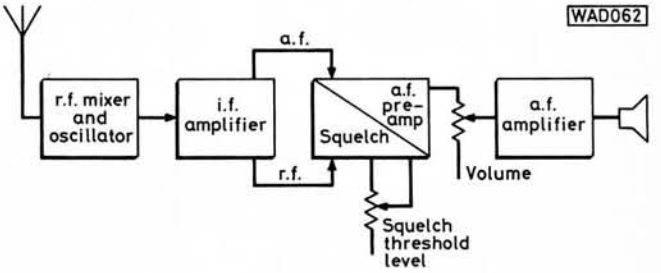


Fig. 2(b): Block diagram of the receiver with squelch added

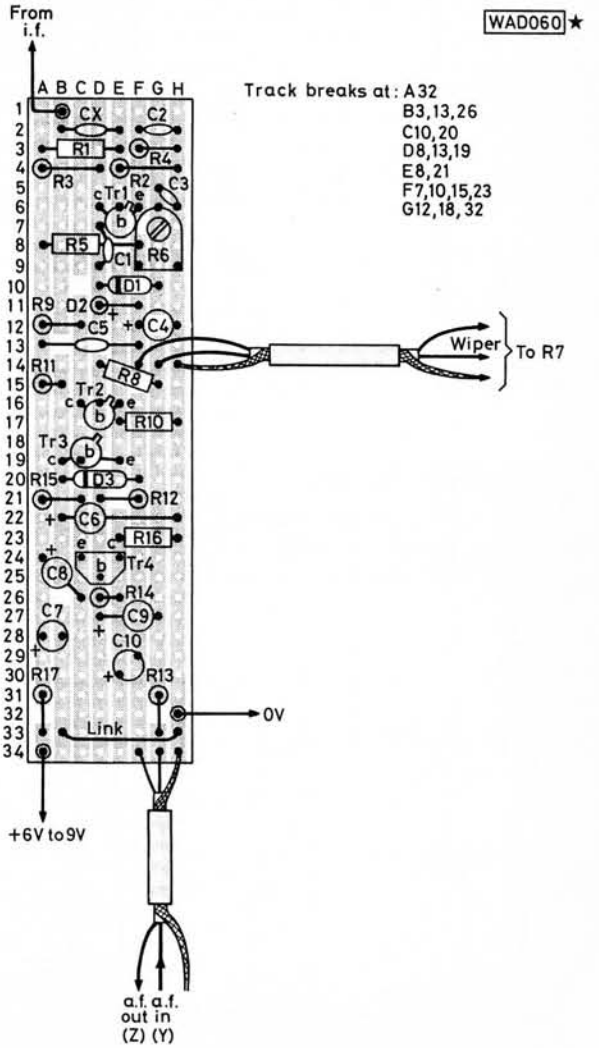


Fig. 3: The suggested Veroboard layout for the squelch circuit

Construction and Installation

The prototypes were made up on 0·1in matrix Veroboard and a suggested layout is shown in Fig. 3. It is advisable to keep the r.f. amplifier as compact as possible in order to avoid any r.f. instability. The rest of the circuit layout is not critical.

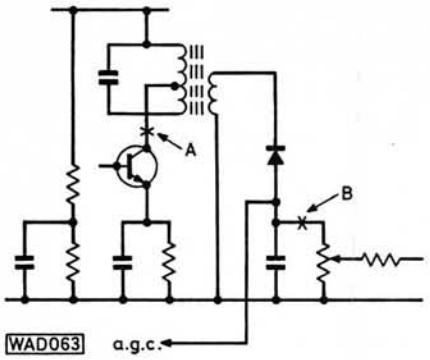
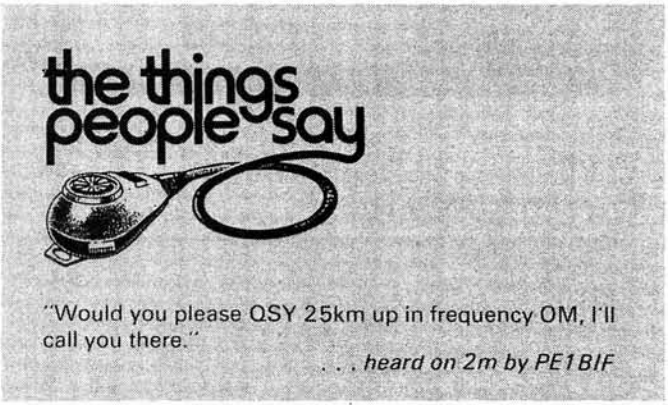


Fig. 4: Connections to the receiver

Capacitor Cx is connected to the collector of the final i.f. transistor (see point "A" on Fig. 4). For 455kHz the value of Cx should be about 75pF but lower, about 30pF, for 10·7MHz. After connecting the squelch circuit, the final i.f. transformer will need to be re-tuned slightly. On the audio side, the original connection to the top of the volume control at point "B" in Fig. 4 should be disconnected and the signal from the diode fed to the input "Y" of the pre-amp and the output "Z" connected to the top of the volume control. The positive and negative rails are connected at a suitable point to the receiver's own supply.

When the circuit is wired into the receiver there should be an increase in audio gain. If this is too great, R13 can be increased in value. With R7 set to maximum gain, R6 should be adjusted so that under "no signal" conditions the squelch is open and background noise can be heard. As R7 is turned down there should be a point where the audio switches off with a slight click. When a signal is tuned the squelch should then open. If the squelch keeps opening because of interference then R7 can be turned down even further so that an even stronger r.f. signal is required to trigger the circuit.

Potentiometer R7 can have a switch fitted and be wired in at point "W" in the circuit which can then be switched off when the wiper is at its furthest from ground. However, since current consumption is so low (2–4mA) another switch separate from the receiver's own main switch is hardly necessary. ●



"Would you please QSY 25km up in frequency OM, I'll call you there."

. . . *heard on 2m by PE1BIF*

ARE THE VOLTAGES CORRECT?—7

▶▶▶*continued from page 36*

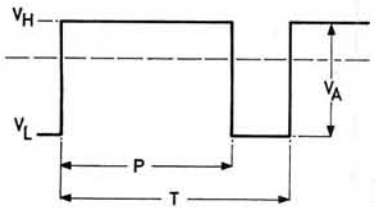


Fig. 7.15

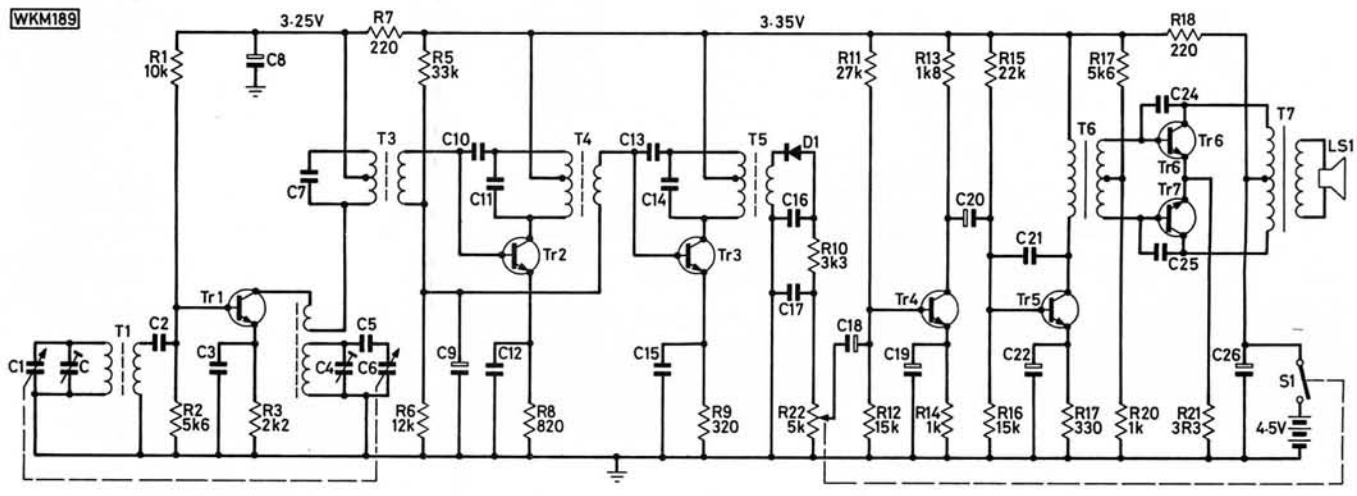
$$V_{av} = \left(\frac{P}{T} \times V_A\right) + V_L$$

This month's problem concerns the complete transistor receiver circuit of Fig. 7.16. Estimate the emitter, base and collector potentials of all transistors with respect to earth. Assume all transistors are silicon types and that any signal voltages are undistorted sine waves. Neglect any base currents.

Also, consider the following: R7 and R18 are equal in value. Why, then, is there 1·15V dropped across R18 but only 0·1V across R7?

A full solution will be given in next month's article.

Fig. 7.16



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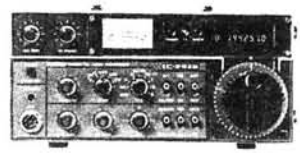

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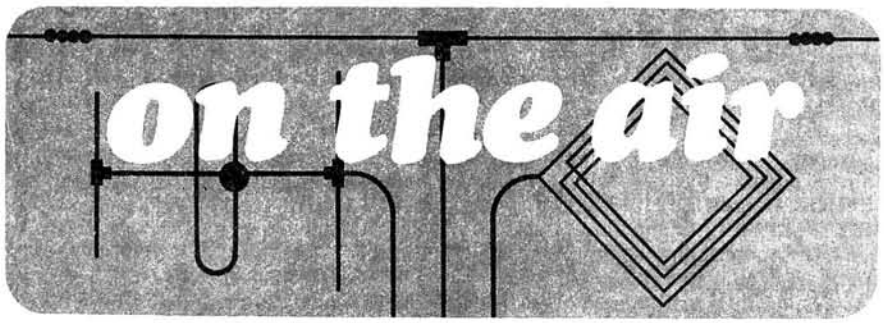


Amateur Bands

by Eric Dowdeswell G4AR

Reports to: Eric Dowdeswell G4AR
Silver Firs, Leatherhead Road,
Ashtead, Surrey KT21 2TW.
Logs by bands in alphabetical order.

One of the problems facing the tiro with his or her first h.f. bands communications receiver is, having found an amateur band, the difficulty of tuning in a station properly so that the speech can be understood. Virtually all amateurs now use single sideband (s.s.b.) telephony, so it is understandably frustrating if the result of spending over a couple of hundred pounds is the characteristic Donald Duck-like chatter that results.

A short explanation of s.s.b., albeit very abbreviated, should provide the answer and a better understanding of receiving techniques. The broadcast (BC) stations we hear on the long, medium and short wavebands all use amplitude modulation (a.m.) in which the speech or music is impressed (modulated) on to the carrier of a radio transmission forming a single signal. This is necessary because if the sound waves are converted into electromagnetic radiation, its range would be a matter of metres at best, whereas high frequency radiation can encompass the world.

In a receiver tuned to such a station the speech is separated from the carrier in a detector stage, the audio amplified and passed to the speaker or headphones. If the carrier were fully modulated by a single audio tone of, say, 2000Hz, the result could be displayed on an oscilloscope, looking like Fig. 1.

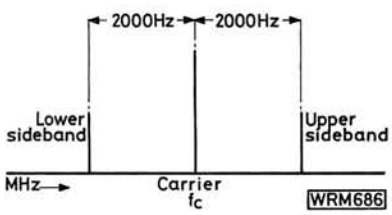


Fig. 1: In conventional a.m. signals the carrier and two sidebands are radiated as with a 2000Hz audio tone shown here. Several other components are produced by the modulating process but can be ignored here. SSB is only a variation of a.m.

Now, the detector in the receiver doesn't need both sidebands in order to function correctly, so suitable circuitry could eliminate one sideband in the transmitter before it was radiated. It can be seen that the remaining sideband is only 2000Hz away from the carrier so it has precisely the same propagation characteristics as the carrier, so why not eliminate the carrier too? Carriers only cause nasty heterodyne whistles by interacting with other nearby carriers.

We can do this provided we can arrange for an oscillator in the receiver to inject a suitable signal into the detector circuit to replace the lost carrier. It must be precisely the same frequency and, in commercial circuits, even the same phase, as the original carrier. In the transmitter, filters remove the carrier and one or other sideband after the modulating process. By convention, upper sideband (u.s.b.) is used above 10MHz and lower sideband (l.s.b.) below. The advantages of s.s.b. are many, but will not be described here.

Back to the receiver where the h.f. s.s.b. signal has been converted to the lower i.f. signal around 470kHz, assuming it's a straightforward superhet, before reaching the detector circuit, usually a product detector which makes a better job of demodulating s.s.b. than detectors for a.m. signals. It is at this point that the signal from the additional oscillator is introduced, otherwise known as the beat frequency oscillator (b.f.o.) used to enable amateurs to copy Morse signals (c.w.) by producing an audible beat note, long before s.s.b. appeared on the amateur bands.

The b.f.o. is adjustable about 5kHz either side of zero frequency, which should be the same as the i.f., or in this case 470kHz. This is where the trouble starts when the first attempts are made to copy s.s.b. signals because the b.f.o. must be set very carefully indeed in its role of replacing the missing carrier. Moreover, the correct side of the b.f.o. zero position must also be chosen depending upon whether the signal is u.s.b. or l.s.b. For example, one must change from one side to the other when going from, say, 14MHz (20m) to 3·8MHz (80m). Once this point is understood it takes only a moment to decide which side is correct and then to make a fine adjustment for best speech quality.

The "clarifier" found on s.s.b. CB rigs (illegal in the UK) is just another name for the b.f.o., and since the legal UK CB f.m. units are largely modified a.m./s.s.b. designs the clarifier still appears although it is quite pointless on f.m.! Again, back to the receiver, where the correct points for best u.s.b. and l.s.b. reception should be marked on the panel in some way, perhaps using a sticky label, for rapid reference.

To understand why the speech is distorted when the b.f.o. is tuned incorrectly, Fig. 2 shows that when it is set properly the difference in frequency is 2000Hz corresponding to the transmitted tone but if set incorrectly by 500Hz then the audio heard is 1500Hz and so on, affecting the whole balance of the speech in normal operation. The tuning error may be in the other direction, of course, but the distorted speech remains.

In more expensive equipment the variable frequency b.f.o. is replaced by two crystals, the correct one being switched in automatically when selecting the required sideband.

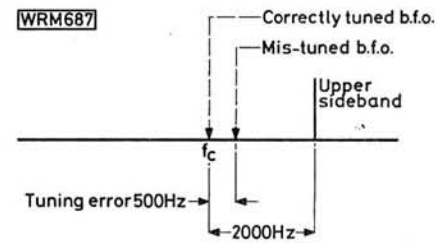


Fig. 2: Distortion of the modulation results if the carrier lost in generating an s.s.b. signal is not replaced in the receiver by a local oscillator of exactly the same frequency. In practice the injection is made after the signal has been converted to the i.f. and not at carrier frequency as shown here

Comment

It's congratulations to **Michael Jones** of Sherford, Taunton, with two distinctions in the May RAE and intentions of getting on with the code test. He reckons it will be cheaper to get on the air in a proper manner on the h.f. bands rather than v.h.f. Michael would like to see some "cheapo" transmitter and receiver projects in *PW*, finding past *PW* designs, transmitters in particular, a bit too advanced. From my own observations I am inclined to agree with him. *(But watch future issues. Ed.)*

Good news, too, from **Jim ????** in Birmingham, who kindly writes: "If you prodded me even indirectly in the direction of the RAE I am now grateful that I made the effort". He now has a credit and distinction after a diet of *So you want to pass the RAE?* for the last 15 months! Jim just happens to mark multiple choice question papers for a national examining body in a profession far removed from amateur radio and reckons that if one can develop a knack for this type of paper then it is possible to obtain higher marks than actual knowledge might justify. He believes the C&G RAE papers have a number of questions that overlap a constant theme far too closely. Anyway, good luck on the bands, Jim.

From Sheffield, **Brian Patchett** still bemoans the fact that there is not one purveyor of amateur radio gear in that city or a radio club. Nearest college at which he could study and take the RAE is 15 miles away. Anyone know of any facilities that we haven't been able to uncover? In Porthcawl, Mid-Glamorgan, **R. J. Squires** is just starting in the hobby with a DX100L receiver plus a Grundig 850 Mariner and a CB antenna to which, I am glad to say, he has added a few metres of wire.

Compliments on the revised image of *PW* in recent times from **Brian Fletcher** who resides in Westhoughton, Lancs, who started buying it again after hearing praise of *PW* on the 3·5MHz band! He is contemplating building a receiver to replace his old R107 but I have suggested that it might be better to build a converter for 28/21MHz and use the 107 as a tunable i.f. Brian then tells me he is really G8LTO, lapsed, but about to be revived, with a move to a G4+3 on the cards. Thank you, *PW*!

Now, an important note on RAE matters from **Jack Toothill** G4IFF, hon sec of the Ipswich RC. Seemingly, the Suffolk College of Higher & Further Education in Ipswich no longer accepts external candidates for any exam at premises under its control, four potential RAE candidates having already been refused. The club, with the help of the County Education Authority, has arranged for such candidates to take the RAE at Kesgrave and Claydon Adult Centre, The High School, Kesgrave (Ipswich 624386). Candidates must make their own arrangements with the Centre, ensuring enrolment before the cut-off dates for the exam, usually mid-October for the December exam, mid-January for March, and late January for the May RAE. Well done, all concerned at the Ipswich club.

On the Bands

Don't expect many more logs from **John Hayes** of Edmonton, London N9, who reports passing his RAE with two credits, intending to get a G6 while swotting up for the G4 before long, promising some c.w. reports. That would be a nice change! Congrats, John, and on to the log with just D44BC on 28MHz, generally agreed to be pretty dead now most of the time. On 21MHz came EC9FC (QSL Box 7, Melilla), FP8AA, 5N6ATT, 9J2TJ, 9Q5VT (QSL W2TK), 9V1VG, and strangely, only FP0JA on 14MHz. From 7MHz EA9IB, ZD7BW and 6Y5IC. Rig is FRG-7700, a.t.u. and long wire antenna.

In Edinburgh, **Anne Edmondson** relieved the tedium of RAE studies by eventually re-stringing the tuning dial of her Realistic DX200. She'd really like to have a go at the *Radcom* RX80 project, if she had nothing else to do! The indoor wire brought in PY1RR and PY5AJK on 3·5MHz (80m), on to 7MHz (40m) for FC0GAG, SV8QJ, ZD7BW and ZP6EM, while 14MHz (20m) provided Anne with a couple of JYs, and YK1AO who wants cards to Box 245, Damascus, 4S7EA and 7X5ST.

Antony Pinnell BRS50886 reports from Reigate, Surrey, with A92P, CE6COR, CP6EL, FH0FLO, FY7BC, HR3JJR, PJ9EE and ZI4AP, all on 3·5MHz s.s.b., and then AP2ZR, FY7BC, VP2VD, VP9JT and old reliable ZD7BW on 7MHz. Goodies on 14MHz (20m) were HH5CB, KG4GN, KH6LW/KH7, T30DB, VK2AGT/LH on Lord Howe Is, 4K0A, 7Q7LW and 9Y50CR, which has just got to be a 50th anniversary of something! F6FIC/T2 was logged on 21MHz (15m) together with FH0FLO, FR7CG/T on Tromelin Is for an excellent one, JW7FD, TA2BK, VB6TC, YJ8RG, 4S7FG, 5W5DQ and 9N1MM.

A tidying-up of his long-wire antenna seemed to work for **Paul Williams** of Whitehaven, Cumbria, who promptly copied FY7YE on 21MHz c.w. on his Realistic DX100L, together with HC1JL and KP4EQO, with just ZS6BYI on 28. The 14MHz band was much more productive with AX3BZT (Commonwealth Games prefix for VK), C31ZJ, FM7BH, FY7CG, ZL2ZG, 6Y5SG, all in the c.w. mode. From Berkhamsted, Herts, **Jon Kempster** BRS45205 reports another four "O" levels to his credit, so, relaxing, he found a few worthwhile calls on 21MHz, like HS1BV, YC1CHG, VS5GA, 4N9I, P29GO, FH0FLO and JY6ZZ (QSL to GW4OZB) with his FR-400 and 40m-long horizontal loop.

Another FRG-7700 and a.t.u. and long wire works well for **Viv Doidge** residing in Callington, Cornwall, whose masterpiece on 3·5MHz was S1AS reported to be in the Principality of Zeeland which could be an old wartime gun platform in the North Sea, with QSLs to DL2NO. Doubt whether it will make the DXCC listing! Up to 7MHz and VP2KBV, VQ9GD on Chagos Is, ZD7BW, ZL2AX and ZI4IG. On to 14MHz for C53CC, C6ARD, and that F6FIC/T2 on Tuvalu with QSLs to F6CRS, HS0HS, KG6RN, VS5GA, plus 4K0A said to be a North Pole expedition. Viv did equally well on 21MHz with J28DP, HS1AMH, J6OHY, VQ9CI on Diego Garcia, 4S7FG and 9X5KE, DF3NZ/ST2, and FR0FLO.

Something of interest for Top Band fans is C30MD in Andorra reported by **Stephen Pearson** of Arundel, W. Sussex, with his BC348, a.t.u. and long wire. OJ0MA was popular on 7MHz while 14MHz came up with VP8MY, 8P6OR, VP8AIB, HL7EJ, VP2KK, KW8M said to be on Wake Island. **Andy Durrant** of Colchester, Essex, has also been playing with his antenna, ending up with a 20m-long job into his AR88, with an a.t.u. promised, otherwise it will be a mismatch on most bands! Interesting on 14MHz was G3RSJ/HP0 plus HP9AOG, JW7FD and a string of VKs.

Anyone who might still want Pitcairn Island can always find VR6TC around 14·178MHz in the mornings around breakfast time, 0700GMT, reports **Dave Coggins** from Knutsford, Cheshire, where he uses an FRG-7700 coupled to a two-element antenna on 28MHz and a 25m-long wire for the l.f. bands, like G4IWA/OH0 plus LX1PD on Top Band. He did come up with something on 28MHz, FM7CO, VQ9CI, Z21GC, 5Z4GX, 7Q7LW and 8R1J. Skipping to 7MHz, Dave caught CE6COR, YB0WR, TN8AJ (QSL Y25LO), VQ9GD, ZD7BW, ZL1ANR and, could it be the best catch of the month, ZL4PO/C on Chatham Island.

From Ramsgate, Kent, **A. Magrath** BRS48064 reports he intends to build a receiver as a winter season project, although he already has a Trio R-1000. A good idea, although I did suggest some ancillary equipment or a v.h.f. converter might be more profitable. He'll be creating something and that is the important aspect. His log is short but good, with just 3V8AL on 14MHz, FP8AA (QSL K2RW), 9M8PW (QSL G4DXC), OJ0MA, 8P6OL (QSL VE3AMJ), 9Q5VT (QSL W2TK), VS5GA, 9V1VG, FH0FLO, all on 21MHz s.s.b. Ten metres managed to produce just CX4HS. Antenna in use is a long wire plus a.t.u.

By the time this appears in print the first QSOs will have been made on our new 18 and 24MHz bands, so reports on activity there will be appreciated. This month there was not one report on the recently-activated 10MHz band! Agreed that it is c.w.-only but surely someone out there can oblige?

Club Round-up

Not only do clubs frequently report a steady increase in membership as a result of the free publicity in *PW*, but there are new clubs being formed at a steady rate and we are always glad to hear from them.

Abergavenny and Nevill Hall ARC Club meetings every Thursday at Pen-y Fal Hospital, Abergavenny at 7.30pm, with RAE course classes every Tuesday at 7.15 at Nevill Hospital, Abergavenny. December 16 is Christmas Dinner day at the Abergavenny Hotel in, guess where? Hon sec is D. F. Jones GW3SSY, 2 Dalwyn Houses, Llanover Road, Blaenavon, Gwent.

Acton, Brentford & Chiswick ARC G3IIU Clubroom at the Chiswick Town Hall, High Road, Chiswick, London W4, where there will be a demonstration of the BBC microcomputer by G4FVE on Tuesday Nov 16 at 7.30, so get there early. New members and visitors very welcome, says W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London W3.

Bedford & District ARC G3WTP It's the Club House, Ravensden, which is only 100 yards or so from the *Case is Altered* with gatherings every Wednesday at 8pm, or try talk-in GB3BD on RB4. On Nov 10 G8ELA will, in fact, be revealing the secrets of the 434MHz repeater GB3BD, followed on the 24th by

G4KWH talking about transistors. All welcome, says Jane Ferguson G6JJT, whether s.w.l.s, RAE candidates or newly-licensed amateurs. She can tell you more from 4 Hotch Croft, Cranfield, Beds. (Bedford 751397).

Chesham & District RS Very briefly; meets second Wednesdays at the Stable Loft, Bury Farm, Pedmor Road, Chesham, Bucks, which is a new venue for the club. New members are being sought and anyone interested can get full details of the club's activities from J. Alldridge, 15 Wichcote Gardens, Chesham, Bucks. Or ring Chesham 786935.

Cheshunt & District ARC G4ECT G6CRC Church Room, Church Lane, Wormley at 8pm every Wednesday. Reminder may not be too late for the G3AAJ chat on AMSAT UK and RSGB matters on Nov 3. Otherwise it is natter nite on the 10th, AGM on the 17th with an RAE revision meeting on the 24th. Get your booking in now for the grand Christmas dinner on Friday, December 17. Bob Gray G6CNV, 2 Sacombe Green Road, Sacombe, Ware, Herts it is, or Dane End 254.

Crawley ARC Second and fourth Wednesdays, usually, at the Trinity Church Hall, Ifield, Crawley, Sussex, but sometimes at the QTH of a member. Morse code classes are going on apace thanks to G3OUV, at the ATC Hall, Ifield. DF hunts are held from time to time on both Top Band and 144MHz. Highlight in November is a visit to Bredhurst Electronics on the 24th, so you have plenty of time to make arrangements not to miss it. Mrs D. Davis G3MER is waiting for your call at 16 Newmarket Road, Furnace Green, Crawley, W. Sussex. Crawley 26316.

Cunningham & District ARC Very new, the club meets on Thursdays at 7.30 at the Community House, 1 Bonnyton Row, Girdle Toll, Irvine. Club call is GM3USL, and an RAE class meets at the same spot on Tuesdays. Everyone welcome, licensed amateurs or s.w.l.s. Roger Bryce GM3JOB, 3 West Bowhouse Way, Girdle Toll, Irvine, Ayrshire, or Irvine 215728.

Echelford ARS I got it all wrong in the October issue as far as meeting times are concerned. It ought to be second Mondays and last Thursdays, at The Hall, St Martins Court, Kingstan Crescent, Ashford, Middx. Apologies to all concerned. Details of latest happenings from sec Anton Matthews G3VFB, 13a King Street, Twickenham, Middx (01-892 2229).

Edgware & District RS Edgware Ham News reports meetings on Nov 11 and 25 at 145 Orange Hill Road, Burnt Oak, Edgware, Middx at 8pm, which makes it the second and fourth Thursdays. An "Emmett Key" evening brought in seven entries including a pneumatic device, but the winner was G4GYS with a "cock and ball" design. If you want to know more, try G4HMD Howard Drury, 11 Batchworth Lane, Northwood, Middx (N'wood 22776).

Farnborough & District RS Second and fourth Weds at the Railway Enthusiasts Club, Access Road, off Hawley Lane and near to the M3 bridge, Farnborough, where on Nov 10 a surplus gear sale will prove very popular. Don't neglect your duty by not going along to the AGM on Nov 24. PRO C. J. French G8ZAJ is on Aldershot 29469, or try the sec Ivor Ireland G4BJQ, 118 Mychett Road, Mychett, near Camberley, Surrey (F'boro 43036).

Hastings Electronics & RC G6HH Club meets on Fridays at Ashdown Farm Residents Assoc., Downey Rd, St. Leonards on Sea. Two meetings worth mentioning on Wednesday 17 Nov about Cassette Mechanisms and 15 Dec the Christmas Social, both these meetings at Westhill Community Centre, Priory Rd, Hastings. Secretary George North G2LL, 7 Fontwell Avenue, Little Common, Bexhill-on-Sea, or Cooden 4645, will give the latest position and news.

Horsham ARC Unable to tell you last month of visit of Pat Hawker G3VA scheduled for Nov 4 and intriguing subject of Direct Broadcasting Satellites but you may still be able to get in! Normally at Girl Guides HQ, Denne Road, Horsham, on first Thursdays of the month at 8pm, but AGM will be held at a place to be decided. Much more from Nancy Hubbard G6DHH, 33 Amberley Road, Horsham, Sussex.

Leeds & District ARS G4LAD G8WYR Every Monday night at the Pudsey Civic Centre plus code classes in earnest with the club having got an almost 100 per cent success in the last RAE. Special mention for the Christmas Rally at the same venue on Sunday, December 12, seemingly a very successful event last year. Secretary Alex Alexander G6CJI, 22 Lichfield Road, Dewsbury, W. Yorks, can fill in the details.

Lothians RS A surplus equipment sale is main event in November on the 11th with a superquiz night on the 25th, so you see it is second and fourth Thursdays at the Drummond High School, off Broughton Street, Edinburgh, at 7.30. In addition, RAE classes are held every Wednesday at 7.30 at the same spot. Mel Evans GM6JAG, 4 Burdiehouse Street, Edinburgh (031-664 5403).

Marconi RS Formed earlier this year at the HQ of the Marconi company, it is hoped that G3GEC and G6MRS will be the club calls very soon. More details from hon sec R. B. Purdy (awaiting G4), The Grove, Warren Lane, Stanmore, Middx (01-954 2311).

Maidenhead & District RC First Thursday and third Tuesdays (some people are awkward!) at the Red Cross Hall, The Crescent, M'head, Berks, at 7.30. Nov 4 has G4NNS on his DX-pedition to Andorra, with G3FVC telling all on the history of the club on the 16th. Don't forget the home-brew contest on Dec 2 or the Christmas social on the 21st. Roger Hemmings G3VCT, 107 Chalklands, Bourne End, Bucks (06285) 21036.

Maidstone ARS At the YMCA Sportscentre, Melrose Close, Cripple Street, Maidstone, on Fridays with a bring-and-buy plus RSGB bookstall on Nov 12, while the 26th has G6HXR giving a layman's guide to air traffic control. Other meetings mainly concern RAE classes. Dates to note for December are the construction contest for the VK5QG trophy for home-brew and modified equipment on the 10th and Christmas social on the 17th. More from J. King G4EMC at the Sportscentre.

Meirion ARS GW4LZP First Thursdays at 7.30, the Nannau Country Club, Llanfachreth, near Dolgellau. Nov 4 is surplus gear sale (not junk, they add!) night. The illustrated talk on December 2 is entitled Dirty Work on an Oil Rig by GW6DDF. Hard hats will be worn! Christmas din-dins at Nannau Hall on Dec 11. More gen from new sec Bob Halhead GW3KOR, Bryn Derw, Golf Road, Dolgellau.

Mid-Cheshire ARS Every Wed at 8pm at Cotebrook Village Hall, Cotebrook, near Tarporley, Cheshire, and there's a talk-in on 145·2MHz. Events for November include G6HZJ on Post Office equipment (BT?) on the 3rd, visit by crime prevention officer on the 10th (very pertinent at the present time), with Nov 17 devoted to G3PFR considering microwaves. Seems like a discourse on the QTH locator system on Nov 24 when G8XMZ describes who's where on v.h.f. and u.h.f. Notice now of Dec 1 meeting with another popular subject, video recorders, by G8PNL Rick Dodd, who can expound on club matters from 7 Thames Place, Winsford, Cheshire.

Midland ARS Established for donkey's years, the club is proud of its new call G6MAR, a bit more significant than the old G8EXW. Clubroom at 294a Broad Street, Birmingham, has a surplus gear sale on Nov 16, but there is activity every weekday evening like v.h.f. night-on-the-air on Tuesdays, code class by G4JBB on Wednesdays, h.f. n-o-t-air Thursdays and G4JBB, again, with RAE classes on Fridays. Otherwise, not much happening! Only QTH I can find that might help you get in touch is G8ODT, 138 Hillside Road, Great Barr, Birmingham B43.

Mid-Warwickshire ARS Gatherings at 61 Emscote Road, Warwick, at 8pm on first and third Tuesdays with other Tuesdays being net time on 145·350MHz, also at 8pm. Nov 2 could be too late to tell you of the RSGB audio-visual presentation on satellite communication but not for Nov 16 which is demo time for members' equipment. It's Mary Palmer G8RZR, 12 Edmondes Close, Woodloes Park, Warwick.

Nene Valley RC Formed only a few months ago, the club meets Weds at the *Royal* pub in Knox Road, Wellingborough, Northants, at 8pm and, needless to say, new members will be made most welcome. Nov 10 is h.f. activity night with a v.h.f. session on the 17th and it is worth jotting down a reminder of the Annual Dinner on Saturday, Dec 4. If you get to meetings at around

7.30 then you can join in the code practice sessions. L. Parker, 128 Northampton Road, Wellingborough, Northants, same as W'boro 79539.

Norfolk ARC It's 7.45 at the Crome Centre, Telegraph Lane East, Norwich, on Wednesdays with interesting club innovation, "short" meetings comprising announcements, a short talk and then Morse instruction, so nobody should get bored. Two or three a month are scheduled at the moment. In between, on Nov 17, G4LDG will hold forth on QRP operation. Paul Gunther G8XBT, 6 Malvern Road, Norwich (N'wich 610247). I forgot, RSGB films on December 1.

North Wakefield RC Thursdays, 7.45pm at the Working Men's Club, Carr Gate with G4OOC reviving WWII radio memories on Nov 25, and a note for your diary, the Christmas Dinner is on Dec 9 at the *Dam Inn,* Wakefield. New sec G6ELC is Steve Thompson, 3 Harlington Court, Morley. (0532) 536633.

Radio Club of Thanet The Birchington Village Centre at 8pm every Friday with an RAE course well under way. It's an operating evening on Nov 5 (hope there are no fireworks!), a wine and cheese party on the 13th, G3LCK expounding on antennas on the 19th and, wait for it, a visit to HM Coastguard, Dover, so get your name in early or you'll miss an interesting occasion. Sec is Ian Gane G4NEF, 17 Penshurst Road, Ramsgate, Kent. (0843) 54154.

The Radio Society of Harrow G3EFX All the facilities of the Harrow Arts Centre are available to the members of the club which meets every Friday starting at 8pm, located in the High Road, Harrow Weald, Middx. The Roxeth Room is normally used but the Belmont Room caters for larger meetings. Notice of the Top Band DF Hunt on Sunday, Dec 12, and possibly on 144MHz also, with likely contestants to contact Chris G4JNZ on 01-868 2159 a.s.a.p. Details on many other activities from Chris Friel G4AUF, 17 Clitheroe Avenue, Harrow, Middx, or 01-868 5002. On the night, try talk-in GB3HR on RB14.

Rossendale ARC Make a note of a talk on SSTV by G4BLL on Nov 17 at the *Bishop Blaize Hotel,* Rawtenstall, at 8pm, with Celia Adams G6GZM, 373 Bury Road, Rawtenstall, Rossendale, Lancs, anxious to give you the full info on the club's activities (Rossendale 220935).

St Helens & District ARC G4LCK G6LCK Pre-meeting code classes have started again which means every Thursday at 7.45 at the Conservative Rooms, Boundary Road, St Helens. There is a net at 11.30am on S9 f.m. if you'd like to meet some of the gang. Otherwise contact David Filer G4OAM, 9 Heswall Avenue, Clock Face, St H. (Marshalls Cross 820471).

Skelmersdale & District ARC Newly-born group meeting at the Dunlop Sports and Social Club, White Moss Road, Skelmersdale, right next to the football ground, every Thursday evening at 8.30. After just two meetings there are 29 members already and anyone interested is very welcome to contact club sec Joe Singleton BRS47778, 3 Willow Drive, Skelmersdale, Lancs, or call him on (0695) 22242.

Stratford-upon-Avon & District ARC Second and fourth Mondays at 7.30 at what must be a fine venue, the Control Tower, Bearley Radio Station, Bearley, near Stratford, and for the lazy ones the talk-in is on S22. Well-known Rev George Dobbs G3RJV will tell how amateur radio can be enjoyed on a shoestring, on November 8, when the President of the RSGB John Allaway G3FKM will also be present. The 22nd sees G3III discoursing on Aircraft Communications. If you contact PRO Clive Ousbey G6DCL, Ormond Lodge, Newbold-on-Stour, Stratford-upon-Avon, Warks, he'll send a copy of the club programme up to July next and a map showing the location of the club. SAE appreciated, of course.

Sutton Coldfield RS It is the Central Library, S.C., on the second and fourth Mondays at 7.30. Nov 8 is natter nite, with the AGM on the 22nd. Club's PRO Les McCullough G6DCI can be reached at 63 Hill Hook Road, Four Oaks, Sutton Coldfield, W. Mids., or 021-353 8784, or you can try the sec Derek Turner G8TUR on 021-353 2061.

Thames Valley ARTS The Thames Ditton Library, Watts Road, Giggshill, Thames Ditton, Surrey, is meeting venue first Tuesdays at 8pm. More from sec Julian Axe G4EHN, 65 Ridgway Place, Wimbledon, London SW19 (01-946 5669).

Thornbury & District ARC Good news! A permanent meeting place has been found, the White Horse at Grovesend on the A38, Thornbury, with entrance to the club room from an outside entrance without having to go through a bar. First Wednesdays with forthcoming meetings covering QRP operation, RTTY, synthesiser techniques, Raynet, etc. Details of programme from Alan Jones G8AZT, 9 Queens Walk, Thornbury, near Bristol.

Vale of White Horse ARS Main day is the first Tuesday at the *White Hart Hotel,* Harwell Village, Berks, at 7.30 with code class at around 7.40. Third Tuesdays are informal meetings at same spot. November 5 is junk sale time, with advance gen on the Christmas social evening from sec Ian White G3SEK, 52 Abingdon Road, Drayton, Abingdon, Berks. (0235) 37482. Might be a bit late now but the RAE lectures are still going strong on Wednesday evenings at the club room.

Wimbledon & District RS Second and last Fridays at the St John Ambulance HQ, 124 Kingston Road, W'don, at 8pm, with tea and biscuits if you haven't been able to get home first. Ken Bailey G3EPU, 32 Strathearn Road, Wimbledon Park, London SW19, is also 01-946 1390.

Worthing & District ARC G3WOR G8GCP Usual excellent newsletter *Ragchew* with 14 pages of chat and useful information, the sort of material that helps a club keep together and grow. Activities include slow Morse on the 144MHz band and a club code proficiency award, Friday net on 3740kHz at 2230, a 21MHz contest and a 7MHz s.w.l. contest, to mention a few. So it's Tuesdays at 8pm at the Amenity Centre, Pond Lane, Worthing, W. Sx., and Joyce Lillywhite, 41 Brendon Road, Worthing, is waiting to hear from potential members. Worthing 63062 will also do the trick.

Yet again I must ask those who send in club news to ensure that the full name, address and telephone number of the secretary or other bod is given, together with meeting time and days given clearly. Now is the time to get your orders in for presents from Father Christmas. The odd hint dropped here and there, you never know!

Medium Wave Broadcast Band DX

by Charles Molloy G8BUS

Reports to: Charles Molloy G8BUS
132 Segars Lane, Southport PR8 3JG.

A glance through the window of any large radio shop will reveal that there are two ways of marking the medium waves on radio sets. Some are calibrated in kilohertz going from 530kHz up to 1600kHz while others are marked in metres going down from 570m to 187m. Why are there two systems, what do they mean and how do we convert from one to the other?

Wavelength, as the name suggests, is the length of one complete radio wave which, on the long, medium and short waves, is measured in metres. Frequency is the number of complete waves that are sent out from the transmitter in one second. On the medium and long waves, frequency is measured in kilohertz (kHz), while on the short waves it is measured in megahertz (MHz). One hertz is one complete wavelength or cycle per second.

How do we convert from kHz to metres? If you multiply the two together, for any spot on the dial, you will find the answer is 300 000, which is the speed of radio waves measured in kilometres per second. Two formulas can be derived from this information:

1. Wavelength in metres = $\frac{300\,000}{\text{Frequency in kHz}}$
2. Frequency in kHz = $\frac{300\,000}{\text{Wavelength in metres}}$

Reader **Robert Bonsall** of Buxton is interested in North American radio stations which are all on multiples of 10kHz between 540kHz and 1600kHz. "How do you find the wavelength of a station on 1220kHz?" he writes. Use formula No. 1.

$$\text{Wavelength} = \frac{300\,000}{1220} = 246 \text{ metres}$$

Similarly, a station on 400 metres has a frequency of

$$\frac{300\,000}{400} = 750\text{kHz}$$

If you are working in MHz on the short waves use 300 instead of 300 000.
A frequency of 6MHz is equivalent to $\frac{300}{6} = 50$ metres. A wavelength of 60 metres is equivalent to $\frac{300}{60} = 5\text{MHz}$

The preferred system is frequency and an example will show why. Look at these three pairs of channels which are adjacent to each other but on different parts of the spectrum. 200kHz (1500m) and 209kHz (1435m); 540kHz (555·6m) and 549kHz (546·4m); 1593kHz (188·3m) and 1602kHz (187·3m). In each case the two stations are 9kHz apart. Since selectivity is measured in kHz, they are the same "distance" from each other so far as your radio receiver is concerned. Now look at the separation when measured by wavelength. These are 65 metres, 9·2 metres and 0·6 metres, so if you use a scale marked in metres it will be difficult to say how far apart stations on different parts of the band are from each other. Moreover, you have to use the decimal point, e.g. 188·3 at the low wavelength (high frequency) end of the medium waves.

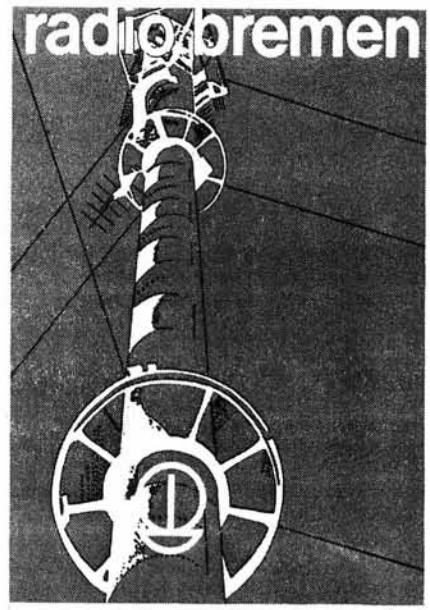
Imported receivers, and many produced for the domestic UK market, are marked in kHz on the medium waves and it cannot be long before "metres" disappears into the history books.

North American DX

The method I use in winter for checking conditions on the North American path is to look for CJYQ in St John's in Newfoundland which broadcasts on 930kHz. Its time zone is 3½ hours behind GMT, compared with GMT−4 in maritime Canada and GMT−5 in eastern USA. CJYQ is the nearest to us so it is the first to appear and ought to be audible when the Belgian station (Wolvertem) on 927kHz signs off for the night, usually around 2245. If your receiver selectivity is good you may even hear CJYQ earlier. You can also switch on the b.f.o. and look for CJYQ's carrier if QRM is bad.

Radio St Pierre on 1375kHz in the French Islands of St Pierre and Miquelon is another indicator. These islands are close to Newfoundland and although the station itself is not conspicuous it can cause a noticeable 2kHz heterodyne with Lille on 1377kHz. This method of looking for early fade-ins is only of use in winter when North Americans are audible before midnight.

RIAS Berlin



Radio Bremen

Surplus Receivers

It is some sixteen years since I wrote an article for *PW* called *Improving the CR100*. I wish I had chosen a different title, but at that time receivers like the CR100 were used by many DXers and it was the practice to try to adapt them so that they would be more suitable for that purpose.

The position has changed. These sets are now in the semi-vintage class. Their fault liability is high and spares are difficult to obtain. Consequently they are a doubtful buy for the non-technical user who does not have the necessary know-how to repair, adapt or modify, in order to keep them in working order.

I am prompted to write along these lines by a number of letters received recently from readers who have had problems with ex-wartime receivers. One reader had to have his B40 modified by a friend before he could connect it to the mains because the special mains plug that fits into the front of the set, was missing. "There was a strong smell of burning and I switched off immediately" is becoming a common experience and is one that leads almost certainly to a search for spares. Even an ordinary decoupling capacitor is none too easy to get hold of these days. Try to purchase a new 0·1μF 350VW (volts working) capacitor—they are no longer made in the UK. Spares that are available are sometimes expensive. One of the valves for my BRT 400 is listed at £10.

It can be a very rewarding task to overhaul and keep in service an old set but if your interests are more towards DXing than the technical side of the hobby then it might be better to look at some of the modern receivers that are available. Sets currently or recently available that do not have an internal ferrite rod antenna and can be used with a medium wave loop are the FRG-7, FRG-7000, FRG-7700, R-1000, R-600, R300, DX200, DX302 and SRX30D.

ORF Vienna

A Plug-in Ferrite Rod Antenna

Old-timer **Dennis Price** of Llandyssul in Dyfed has a Murphy table radiogram of 1950 vintage which has an internal ferrite rod antenna. The unusual feature of this set is that the internal antenna is joined to the receiver by leads which have wander plugs on the end. These fit into a socket panel next to the speaker sockets and the gram input sockets. Dennis wonders if he could plug a standard tuning coil into the receiver in place of the ferrite rod.

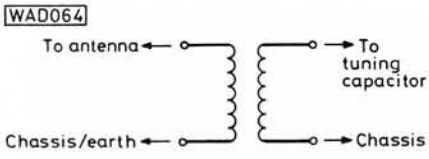


Fig. 1

Normally I discourage readers from attempting this kind of mod. It can be done but requires some technical knowledge to deal with problems that may arise or to restore the set to its original state if the attempt is unsuccessful. There is also a tendency among manufacturers to use tailor-made tuning coils and capacitors, just to add to the problem. With Dennis' receiver the problem is a lot easier. All that is required are some wander plugs and a standard tuning coil such as the Denco Blue Range 2. It is unlikely that the set will be damaged and one can as a last resort plug the ferrite antenna back in and nothing will be lost. The normal arrangement in valved receivers is shown in Fig. 1 for an antenna tuning coil and in Fig. 2 for a less common alternative. The standard value for the tuning capacitor used to be 500pF though some sets used 330pF. You need a different value of tuning coil for each. Otherwise it is a question of trial and error. Tap on the wander plugs from the tuning coil and see what happens.

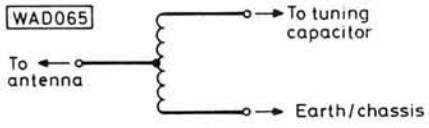


Fig. 2

Readers' Letters

"After buying a Grundig Satellit 2000 I turned my attention to the medium waves and succeeded in pulling in 15 stations in North America (USA?) and the same number in Canada" writes **Brian Buckley** from Dungannon in Northern Ireland. His antenna is a vertical half-wave dipole cut for 88·5MHz. "I've received QSL cards from WABC (770kHz), WNBC (660kHz), WOR (710kHz), WINS (1010kHz), all in New York and CJCH (920 kHz) in Halifax, Nova Scotia."

This is the time of year to look for North America on the medium waves. Try after midnight when many Europeans have gone off for the night. The band plan in use in North America is different to Europe. Station separation is 10kHz and they are all on multiples of 10kHz starting at 540kHz and ending at 1600kHz. These frequently appear in the spaces between European channels on some parts of the dial. Callsigns starting with the letter W or K are in use in the United States, and with a C in Canada, and they are used frequently which should help with identification.

Sticker from Radio Wyvern

Short Wave Broadcast Bands

by Charles Molloy G8BUS

Reports: as for medium wave DX, but please keep separate.

In the September issue I mentioned my attempts to track down a non-tunable short wave converter for a car radio and I appealed to readers for information. Radio hobbyists are a helpful lot and I was not at all surprised at the response. In fact I now feel something of an authority on the subject as I even have the circuit of three of them: the Hitachi, Blaupunkt and Becker.

Until recently there were three converters available in the UK. These were the Pye 2649, Hitachi WM20 and Blaupunkt KV900. None of them are in current production though there may be an odd one to be found and of course there is always the possibility of picking up one second-hand. The converter on offer in the United States that I heard of, is made by Grundig but an enquiry to their London office revealed that it is not available in the UK. Strangely, reader **W. R. Smith** of Barnstaple tells me that he saw a Grundig converter in a shop in Bideford a couple of years ago!

Becker Reims 10

It was **Gerry Casey** (Bordeaux) and **Ian Traynor** (Huntingdon) who came up with the answer, which is the Becker Reims 10 Shortwave Adaptor. Made in West Germany it converts any one of ten bands, 21·5, 17·5, 15, 12, 9·5, 7·1, 6·2, 5, 4 and 3·2MHz (13, 16, 19, 25, 31, 41, 49, 60, 75 and 90 metres), into signals in the range of the medium waves. The medium wave car radio acts as a tunable i.f. to provide bandspread reception of each s.w. band, on the touch of a push-button switch.

Gerry sent me a copy of the circuit diagram while Ian provided the name of the UK importer which is Autocar Electrical Equipment Co Ltd, Chantry Road Industrial Estate, Kempston, Bedford MK47 7SD. Tel: 0234 853535.

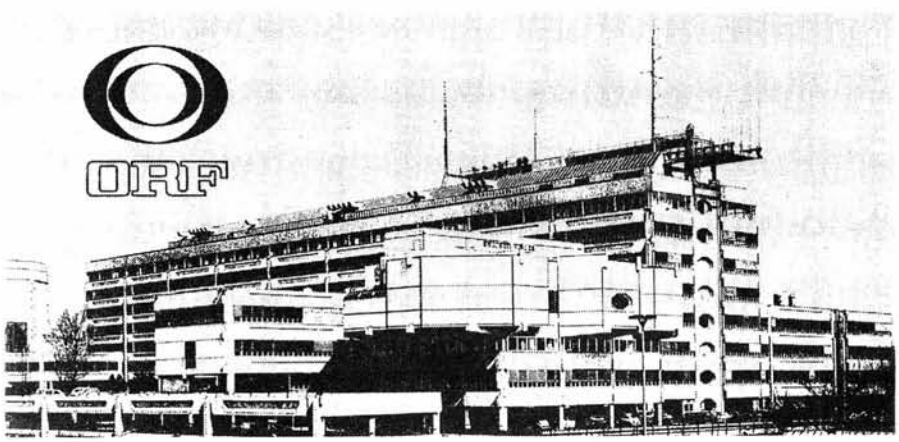
Many thanks to Gerry and Ian on behalf of reader Peter Askam and myself. Peter used to have a Pye converter until it and his car radio were stolen and he has been on the lookout for a replacement for some time. Thanks also to **B. J. Slater** G8UOP, **Maj. Gen. Eric Younson, Terry Collins, W. F. Baister, Rob Mannion** G3XFD and **Frank Osborn** G2CVO for their interesting and informative letters. I would like to quote from all of them but will have to give the last word to Gerry Casey. He was having his Reims 10 transferred to a new car when "we were all dismayed to find no signals on the short wave when we tried it, whereupon the installers took the whole rig to pieces—it was only the next day that I learned that there had been a particularly severe s.i.d. at that very time!!

Readers' Letters

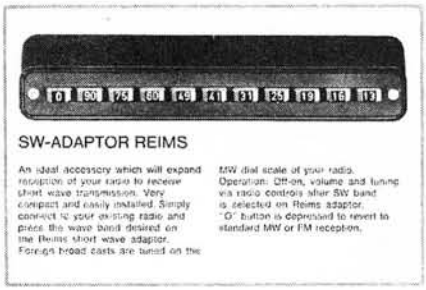
"I am always searching for car short wave sets but they are few and far between" writes **S. C. Wain** from Greenhithe, who mentions that he has a Blaupunkt model Santos which he believes is still in stock at Bosch Ltd. This receiver covers the medium waves plus nine short wave bands and is an alternative to using a normal car radio plus converter.

"As well as my R390 and Vega 206 I have an HMV domestic radio" writes **John Dennis Court** from Birmingham. This receiver, made in 1951, covers the medium and long waves plus 21·5MHz (13·9m) to 1·6MHz (187 metres) short waves, in two bands. "The sound quality is absolutely unbelievable—four position tone control." John picked up his semi-vintage receiver in a second-hand shop for £5 and he says it pulls in the DX with a 3 metre-long antenna.

"I thought I would write to you about the new receiver I've got" writes **Peter Manson** from Glasgow. The set he is referring to is the Sony ICF 2001 which is a portable with digital readout and press-button tuning. "There is no dial! To



Recent veris from Radio New Zealand



SW Adaptor Reims 10 (from Becker catalogue)

tune a station, India for example, key in 1-1-6-2-0. Press EXECUTE and there you are. The absence of a dial is compensated for by a few manual tuning buttons, so just depress one or two of these and the radio goes up or down in steps of 1kHz or 10kHz." DX heard includes Radio Uganda on 5·027MHz at 2030 in Swahili.

Paul Myers, Stanmore, is another satisfied Sony ICF 2001 user. He sent an impressive log of stations heard. "Why can I sometimes hear radio amateurs from the USA using a non-amateur frequency of 2·402MHz" he writes. Must be a spurio; has anyone any ideas on this one?

The ICF 2001 is no doubt the first example of the short wave receiver of the future. Many of us will miss the conventional tuning scale. On the other hand press-button tuning will remove all the guess work from short wave listening and should make this media more acceptable to the general listener in search of entertainment.

Home Computers and DXing

In a recent broadcast over *Media Network,* the broadcasting of computer programs over the air came up again. Regular readers will remember the tests made over Radio Netherlands last winter when two programs, a Range and Bearing program and a Sunrise-Sunset program, were transmitted over the air. Subsequently the listings of these programs were printed in a Radio Netherlands publication called *Computer Information Release* which is available free of charge. Further information on the experiments and a copy of the listings are available from Jonathan Marks, Producer Media Network, English Section, R. Netherlands, PO Box 222, 1200JG, Hilversum, Holland.

These two programs are of particular interest to the DXer and I am hoping they will be suitable for the Sinclair Spectrum which I have on order. The Range and Bearing calculates the direction and distance of a transmitter from your QTH, information of obvious interest if you want to set up a directional antenna.

The second program, to quote the R.Ned. booklet "is used to find out whether there is complete darkness between the listener at the receiving location and the transmitter. The program will ask you the latitude and longitude of the receiving location (or transmitter location) and the date of reception—you can work out during which part of the 24 hour clock there is complete (or almost) darkness between you and the transmitter." This information should be invaluable to the tropical bands DXer who relies on a path of darkness for his DX.

Hopefully more computer programs of interest to DXers will appear from Radio Netherlands this winter. One obvious use for the home computer is as a logbook, where it should be easy to recall information by station, frequency, time of day, etc.

Listener Card from Radio Finland

Broadcasts Heard

Keith Nockels, who has been listening to the Middle East on 15MHz (19m band) on his Fidelity Rad 21, turned up the following: Rabat in Arabic at 1616—"this was either on 15·335 or 15·360 (probably 15·360), The Voice of the Arabs 15·475MHz, Dubai in English at 1630 on 17·775 and 21·655."

L. Hollis Brandon has an FRG-7, a Windom and a.t.u. and he reports hearing Radio Australia on 6·035 in the 6MHz band at 1840, RAE Argentina in English at 2230 on 11·71MHz and the Voice of Free China in Taiwan at 2145 on 9·61MHz. Radio Australia has been a surprisingly good signal on the 6MHz band during the evenings recently and I've listened to the programmes on several occasions.

Peter Gatehouse Buckingham sends in a log of 5MHz (60m) DX which "cost me quite a few headaches and bleary vision. Telegraph QRM is also a problem to put it mildly—telegraph QRM seems to consist of high pitch and low pitch rapidly alternating like a microprocessor stores its program on tapes." Peter goes on to suggest that two audio notch filters in series, one tuned to the high and the other tuned to the low pitch would probably cure the problem but might take a lot of the coveted signal as well unless the notch is really sharp. Sounds like a good idea. Has anyone tried it?

QSL card from Radio Norway

An interesting feature of Peter's log is the amount of DX heard during the evening from Africa and Asia. No need to stay up all night to DX on 5MHz. One item I really like is "very weird music on 5·035MHz around midnight" probably from Alma Ata in Kazakhstan in Asiatic USSR. The receiver is a Sony CF950 used with a long wire.

QSLs

This month's QSL cards are supplied by **Simon Hamer** of New Radnor. Of particular interest is one from Radio New Zealand dated 15 August 1982, after the official closing of that station.The RNZ transmitters are currently being used to relay domestic programmes, though for how long is anyone's guess.

VHF Bands

by Ron Ham BRS15744

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

As usual, my monthly postbag was full of your fascinating letters in which many had information helpful to other readers in addition to your comprehensive reports about the aurora on September 6 and the tropospheric openings hinged around the 3rd and 13th. May I also thank you on behalf of our journal for all the kind remarks in your letters about our 50th anniversary issue.

Solar

Both **Cmdr Henry Hatfield,** Sevenoaks and I recorded radio noise from the sun at 136 and 143MHz respectively on August 20, 26, 27, 28 and September 12. **Dave Coggins,** Knutsford, is building an astronomical observatory with rotatable dome to house a refractor telescope and equipment for radio astronomy.

Referring to the aurora on September 6, **Ted Waring,** Bristol, having used his optical gear, wrote "On solar CM at the time was a binary group, with follower, diffuse and hard to focus for spot counting, probably filaments and penumbral bits and ahead of the group was a simpler binary group which appeared to have rotated clockwise through 90 degrees in a few days, September 3 to 7". During Ted's routine observations he counted 38 sunspots on August 18, 52 on the 27th, 48 on September 2 and 25 on the 8th.

Aurora

The auroral alert system, organised by **Phil Hodson** G8RBY in Leicester, called me around 1300 and 1800 on September 6 and like many others who received the call, I soon had the home gear switched on. At 1317, I heard several auroral warblings in Band II, counted 24 burbling signals from European radio and television stations between 48 and 72MHz and tone-A c.w. on 144MHz. By 1400 the event was very strong, peaking just east of north, and by then signals from the Sussex 28MHz beacon GB3SX, had taken on an auroral tone and a multitude of burbling signals from commercial stations were rapidly appearing between 40 and 100MHz. At 1815, I heard very strong aurora-influenced signals from 11 European and Russian TV transmitters between 48 and 65MHz, several east-European broadcast stations operating between 66 and 71MHz and many warblings in Band II. Like **Susan Beech** RS50969, Dollar, Scotland, Ted Waring heard tone-A signals from GB3SX and a number of QSOs between "G" stations on 28MHz. Dave Coggins received auroral reflected signals from the 28MHz beacons in Germany DF0AAB, DK0TE and DL0IGI, Norway LA5TEN and GB3SX, plus 2 stations in DF, 14 from all parts of "G", 1 GI, 4 GM, 3 GW, 1 GU, 3 LA, 1 LX and 2 PA. **Brian Oddy** G3FEX, Storrington, Sussex, using a TS520S to a dipole worked PA3BFM on 28MHz via aurora and Dave Coggins writes, "As well as hearing the aurora on 28MHz, I also heard it on the 3·5, 7, 14, 21, 50 and 144MHz bands".

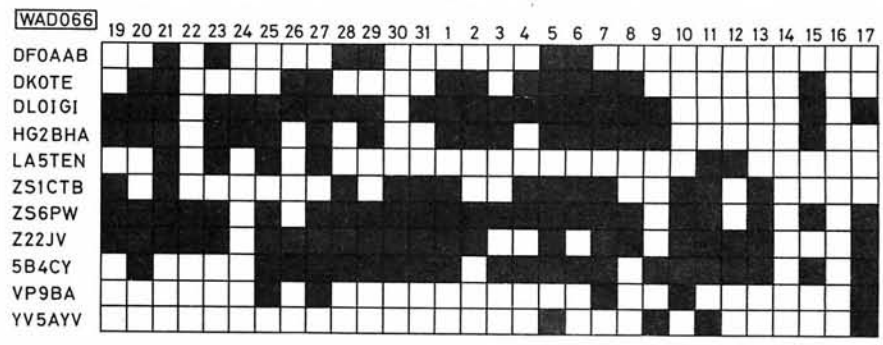


Fig. 1: Distribution of 28MHz beacon signals

28MHz Beacons

My thanks to **Dave Newman** G4GLT, Leicester, for the information that, as from September 5, the Zimbabwe beacon Z22JV on 28·250MHz became Z21ANB and will soon be moving from the home of Z22JV, Horare, to a permanent QTH in Bulawayo. This is a memorial beacon to the late Z21AN. At 1237 on September 9, **Geoff Arnold** G3GSR, our Editor, heard a new beacon PY2EXD on 28·265MHz and Dave Newman heard it, peaking 599, at 1833, making his 41st beacon heard on the 28MHz band. At 0755 on September 16, Dave Newman logged the new Bahrain beacon A92C with the "spaces" on 28·245MHz and the "mark" side of the f.s.k. on 28·247MHz putting it almost bang on top of the much stronger South African beacon ZS1CTB, "which is definitely a real problem" says Dave. The old beacon A9XC was previously on 28·450MHz. **George Coulter,** Dover, heard the Indian beacon VU2BCN at 1015 on August 18, his brother John in Winchester logged it on the 20th and Dave Coggins heard it on September 5.

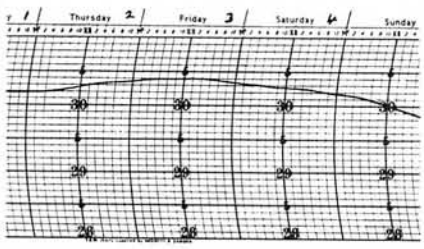


Fig. 2: Barograph chart for early September

W. G. Kelly, Belfast, using an FRG-7 and indoor dipole, along with Susan Beech, **Harold Brodribb,** St Leonards-on-Sea, George and **John Coulter,** Dave Coggins, Henry Hatfield, Ted Waring and I contributed to the list of beacon signals received (Fig. 1) between August 19 and September 17. When I made up the chart I was delighted to see the DX beacons in Bermuda and Caracas appearing in the list again.

The 50MHz (6m) Band

Between August 31 and September 9, **Graham Rogers** VK6RO, was on holiday in the north-west of VK6 and although conditions were not always brilliant he worked 83 JAs and heard KA6OR in Okinawa on a.m., c.w., f.m. and mainly s.s.b. on 50MHz with his mobile gear. "I worked 2 or 3 JAs with 59 plus 20dB reports both ways, while driving very close to the Tropic of Capricorn on the main highway going north," writes Graham who also heard the Japanese beacon JA2IGY on 10 occasions and television sync on 49·75MHz on 5 occasions. Graham used a FT-690R, a 30W p.a. and a quarter-wave whip antenna on the roof of his car. Since October 1979, Graham has made 801 contacts with Japanese stations in addition to HL2JD and KG6DX from his car.

Between 1432 and 1547 on September 8, Dave Newman made cross-band QSOs, 50/28MHz, on c.w. at 599, with ZS6BUF, ZS6BMS and ZS6LN, and during the opening he heard the beacons ZS6DN on 50·058MHz and ZR6ABF, which is a ZS v.h.f. callsign, on 50·020MHz. "The 50MHz group in the UK is delighted that the Home Office has given us permission to use 50–52MHz outside TV hours" (*40 experimental licences are to be issued—Ed.)* writes Dave and rightly adds "it is certainly a step in the right direction". Dave Coggins heard signals from the Gibraltar beacon ZB2VHF on August 15 and 26 and GB3SIX every day from the 18th to the 31st.

RTTY

Between August 16 and September 5, **Norman Jennings,** Rye, copied RTTY signals from stations in 19 countries, DL, EA, F, G, HB9, I, JA, LA, LU, OE, OH,

Fig. 3: Our Technical Editor's QSL card

OK, ON, OZ, SM, UA, W, YO and YU on 14MHz, 3 countries, HA, SV and VE on 21MHz and G3EHM and G8TRA on 144MHz at 1030 on August 29. My log from August 19 to September 17 is similar except for 3 extra countries, YV, VK and 4B7. During the tropo opening on September 13 and 14, Phil Hodson G8RBY made RTTY QSOs on 144MHz with DB9YU, DD4DT, DF1ZE, DJ5GI, and with OZ1GRF located on Bornholm Island, believed to be the first-ever UK 144MHz RTTY QSO with this island. Thanks for this QSO go to OZ1BJF, because I asked him in an s.s.b. QSO if he had RTTY and he replied "no, but I will call my friend for you and arrange a sked . . . which he did" writes Phil. Congratulations to all concerned and just to prove that there can be a lot of interest with a RTTY receiver, I tried two 10-minute sessions starting at 0754 on August 21 and 0806 on the 29th and each time I logged 9 stations in 5 countries.

Sporadic-E

As the 1982 sporadic-E season drew to an end there were still a few surprises in store. At 1902 on August 21, I counted 24 very strong east-European f.m. broadcast stations between 66 and 73MHz, 14 at 0800 on the 29th, 21 around 1900 on September 8 and 11 at 0900 on the 15th.

Tropospheric

The atmospheric pressure, measured at my QTH, 61m a.s.l., with a Short and Mason barograph hovered around 30·0in. (1015mb) from midday on August 19 to 1600 on the 25th when it fell to 29·8 (1009), rising to 30·2 (1022) over the 28th and 29th. At 0800 on the 31st the pressure began to rise, peaking at 30·4 (1029) at midday on September 3rd, and then fell rapidly from 1800 on the 3rd to 29·8 (1009) by 2200 on the 5th, Fig. 2. A steady rise began again at 0800 on the 6th, reaching 30·4 at 0200 on the 12th, and then falling gradually to 30·1 (1019) on the 18th. These two similar ups and downs in pressure are the typical recordings made during a tropospheric disturbance. Harold Brodribb enclosed the Atlantic Weather charts from the *Daily Telegraph* for September 12, 13 and 14 showing the movement of the high pressure system. A careful study of these daily weather charts published in some newspapers can be very rewarding to the DXer and the scientifically-minded alike.

During the opening on September 3, **John Fell** G8MCP (Fig. 3), our Technical Editor, worked stations in all UK areas including EI on 144MHz s.s.b. On the 4th, husband and wife team, **John** and **Jackie Brakespear** G8RZP and G8RZO, Isle of Sheppey, worked OE5UAL and 7 DLs on 432MHz, and during the lift on the 14th they worked 9 OZs and 17 SMs on 144MHz s.s.b. This included Oscar Bäckman SM5CHK, one of the lecturers at the RSGB convenion in 1982 at Sandown Park. Phil Hodson G8RBY, Leicester, had 144MHz QSOs with 3 SMs and 5OZs on the 14th and early in the evening of the 13th, **Ian Shaw** G4MWD, Ockley, Surrey, heard Fs working into Scandinavia, DLs working EI, GJ4ICD working GM and very strong GWs coming in on the side of his Tonna beam. "This is a tropo and a half" said Ian who worked stations in 15 new QRA squares on the 14th and added LA and SM to his countries' list, giving him 95 QRA squares and 21 countries on 144MHz in about a year. On the 11th, John Fell contacted stations in GD and GI and heard GM, while during the 12th, 13th and 14th, he worked GI, GM, PA, ON, OZ, SM, LA, Y22 and 12 stations in West Germany.

"Tropo conditions were very good in all directions at this QTH on September 13 with the exception of north" writes **Jim Penny** GM4JLY, Aberdeen, who had QSOs with stations on the south coast of England, the Channel Islands, France and Sweden on 144MHz s.s.b., and G, GW, F, DL, OZ and SM on 432MHz. Jim's QSO with GJ4ICD gave him a new country on 432MHz and could well be the first GM/GJ QSO on this band. Many congratulations to both stations. Incidentally Jim, keep a look-out for John Fell and other amateurs on the south coast who often listen out and call for GM when conditions are right on both 144 and 432MHz. Congratulations to **Richard Bird** on the Channel Islands and a colleague in Dawlish who made a two-way QSO of 152km on September 10, on 934MHz while evaluating Reftec CB equipment. During the tests, colinears and 4-element Yagis were tried and one station went mobile.

Band II

While **Ian Kelly** was on holiday in Great Yarmouth and using a Pye 9015 radio receiver in Band II, he received strong signals from broadcast stations in Belgium BRT-2 Egem, Genk and Schoten, American Forces Network Brussels and Shape and British Forces Network in Germany on August 28, Belgium, France, Germany and Holland on the 29th and September 1, and predominantly Belgian on the 3rd and 4th.

Between 2120 and 2230 on September 1, **Simon Hamer**, Presteigne, also received signals from Belgium BRT-I and II, France Lille, BBC Radios Cambridgeshire and Northamptonshire and ILRs Capital, Chiltern, Essex and LBC between 88 and 98MHz. Around the same time on the 3rd, Simon added 3 German stations NDR II and III and WDR III, French TDF Cultur from Caen and Cherbourg and TDF Musique Nantes and Dutch news, NOS-1 from Goes. On the 4th, Adrian Butcher, Washington, Sussex, using an Amstrad portable with its own telescopic antenna heard American and French voices from stations around 98MHz, and around 0745 on the 4th I counted 23 continental stations between 87 and 103MHz and a similar number at 1025 on the 14th. Later at 1215, I used the radio section of my Plustron TVR5D with its own rod antenna at a site 30m a.s.l. near Lewes, Sussex, and heard strong Dutch and French stations. At 1714, at a position 60m a.s.l., several German signals were prominent.

Around 1645 on the 3rd, Harold Brodribb, using a Bush VHF80 and loft dipole, counted 23 French stations and like us all found many more twitters and warbles each representing another weaker station behind a strong one. At 0830 on the 4th Harold, using a Roberts R505, counted 5 Dutch and 25 French broadcasters between 87 and 104MHz, and daily from the 12th to 16th he counted 19, 26, 21, 14 and 16 French stations respectively. Between 1900 and 2200 on the 12th, **John Williams,** Cheltenham, using a Fidelity portable and an Ekco A320, heard a variety of signals and programmes interfering with his normal local and BBC stations. Like most of us

Fig. 4: Richard Brownlow comparing QSL cards

on the 13th, Simon Hamer found Band II packed with signals but he managed to identify DDR I and DDR II from East Germany, NDR I and NDR III from West Germany plus news from SDR-3 Heidelberg, WDR III Teutoburgerwald and Hessischer Rundfunk.

Congratulations to **Julian Dean** and **Gavin McCoy** of ILR *Radio 210* who have passed the RAE and are awaiting their callsigns. Gavin told me that the latest reception report received for the 97MHz transmissions of *Radio 210* came from a mobile in Germany.

Other Stations

John Molyneux G6DCH, Salfords, Surrey, uses a IC-255 mobile on 144MHz and with a mains pack at home where he couples it to a home-brew antenna. John is a member of the Reigate Amateur Transmitting Society and a committee member of the newly formed Surrey Police Radio Club.

Husband and wife team, **John** and **Margaret Marshman** G4LIO and G6GYF, Cosham, use a FT-227R at home with a colinear array and mobile with a half-wave antenna. John, ex-Royal Signals TA and a member of the RNARS is keen on c.w. and operates a FT-101Z and home-brew 14MHz dipole and is looking for a mint WX-19 to build up a vintage station. If anyone can help John is QTHR or available on 0705-373320.

Any French amateurs looking for a sked in the UK on 144MHz, or visiting the Portsmouth area should contact **Les Sawford** G6APD, QTHR or ring 0705-735005.

Congratulations to Ian Shaw G4MWD on making his first meteor scatter contact on 144MHz with EA3LL, using 20W c.w. at 0600 on August 11, during the Perseids shower.

Ron Parfitt G8MY, Farnborough, was first licensed in 1937 when he was experimenting on the 56MHz band. At present Ron uses a KW2000, FT-101Z and SB200 linear into a 2-element quad for 21MHz, 2-element quad for 28MHz and a half-wave dipole for 14MHz. Ron is a keen c.w. operator and during his 40 years-plus on the air he has received a signed photograph from JY1 and won the Commonwealth DX Certificate.

Congratulations to **Elaine Howard** G4LFM on her election as Chairman of the newly formed Flight Refuelling Amateur Radio Society at Wimborne. The Society meets on Sundays at 1930 and already has more than 60 members. Under the leadership of G8MCP and G8MCQ members are building a 6m diameter dish antenna for 1296MHz "Earth-Moon-Earth" experiments and 4GHz satellite TV. During a Society DF hunt, John Fell G8MCP, won a trophy for finding the fox on 144MHz in 1·5 hours over a 12 mile range. To make the hunt more awkward the fox G8MCQ transmitted varying signal strengths and directed his beam towards the Purbeck Hills to scatter his signal. Readers interested in joining should contact Mike Owen G8VFY QTHR.

On January 21, 1981, **Richard Brownlow** G4LCV made his first ever c.w. contact with **Joe Horvath** W6GPB. When the QSL card arrived, he noted that Joe was first licensed in 1932 and had been in radio for 60 years. Later, while operating at the Chalk Pits Museum station GB2CPM, Richard glanced across at the amateur radio exhibition and spotted Joe's QSL card (Fig. 4) which he sent to G2YL in the mid-1930s.

Congratulations to the Horndean and Royal Navy Amateur Radio Societies who operated a station, with the special call GB2TSR, from the Ocean terminal building at Southampton during the Tall Ships Race between August 21 and 25. The station was managed by Horndean Chairman, Doug Hotchkiss G4BEQ and Don Walmsey G3HZL who worked all bands, including c.w. during the event. "We worked all countries where the competitors came from and we were praised by the organisers on a very successful operation" said Doug.

One of our readers, **Frank Dawe** G4OWE, Bognor Regis, worked with Dr Eccles in 1924 on equipment for 56MHz and was one of the founder members of Marconi Instruments. During WWII he worked on WS-19 sets and RDF equipment and in 1946 he founded the Dawe Instrument Co. from which he retired in 1966. Frank has been active on the 144MHz band and currently uses an Argosy Ten/Tec and long-wire antenna on the h.f. bands.

David Couzens G8HSK, Crawley, is a keen home-constructor and builds power supplies, digital devices and test gear, and for 144MHz he has modified a Pye Vanguard for his car and a Pye Cambridge for home, used with a 6-element Yagi.

John Hunt, Brighton, uses an FT-290 and loft ground-plane antenna on 144MHz. His callsign, which began with an AA licence 2FSR in 1938, became G2FSR directly after WWII. In the late 1940s, John was in the Far East and used home-brew gear, made from ex-American and Japanese military equipment, under the callsigns VS4JH, VS6JH and later 2C4JA. Since he was licensed, John has won a "Top Band" event and received the Somerset Trophy as well as the DXCC and WAZ certificates. During the petrol shortage at the end of WWII, John remembers seeing NFD equipment taken to the site by horse and cart, driven by Bill Hall G8JM.

The Chalk Pits Museum Amateur Radio Station, operated by Gerry, Margaret and Richard Brownlow, inaugurated the station's new callsign, GB2CPM, on August 22. When the station is operational visitors can watch a TV screen on the shack bench showing details of the station and its antenna, operators' names, some examples of the Q code and the Morse code, all originating from a programme Richard made for his Sinclair Spectrum computer.

Having moved to a new QTH, **Tony Bailey** G3WPO operates on all bands with a KW2000A and rotatable beam, and on 144MHz with a Wopobox which he designed. Tony has also designed and built a talking 6-digit frequency counter and an audio s.w.r. bridge, both suitable for blind operators. Readers interested should contact Tony at 20 Farnham Avenue, Hassocks, Sussex.

TV

by Ron Ham BRS15744

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

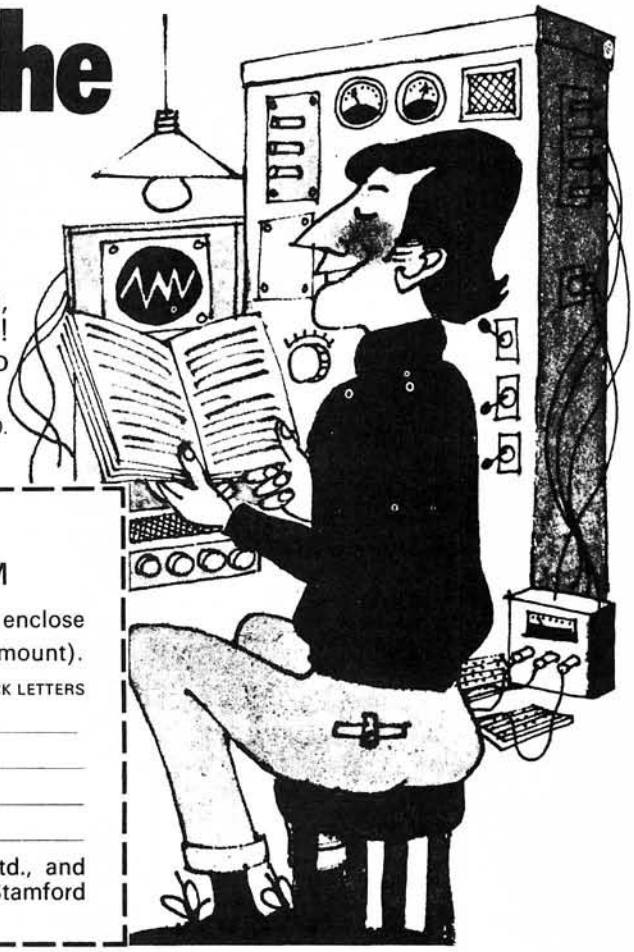
Very often, September is a good month for tropospheric openings. There seems to be the right combination of atmospheric pressure and temperature changes taking place to set the domestic television pictures fluttering, which automatically sends the DXers rushing to their shacks for a more detailed look at bands III, IV and V.

Sporadic-E

Tim Anderson, Stroud, received pictures in Band I from Hungary, West Germany and Yugoslavia on August 27, Spain on the 31st, Italy on September 4 and Hungary and Spain again on the 8th. At 1830 on the 8th, Tim saw a caption with a dish antenna on the left and some letters he could not read on the right, followed by a coloured gentleman in African-style dress. "Any ideas?" asks Tim, who also logged test-cards from Norge Gamlem, Hemnes, Melhus and Televerket on the 12th. "Conditions between August 15 and September 12 were quite interesting," writes **Sam Faulkner,** Burton-on-Trent, whose list of stations is similar to Tim's with the addition of Portugal and the USSR. At 1625 on September 6, Sam watched athletics in Athens from Italy on Ch. 1A 53·75MHz and when he turned his beam north/north-east, auroral activity was in evidence on many Band I TV channels.

Between August 21 and September 14, the Cawser family, Burton-on-Trent, frequently received pictures from Italy, Poland, Spain and the USSR and saw athletics, Basil Rathbone in a British film with the sound dubbed in Spanish, bullfights, cartoons including Merry Melodies *Porky Pig*, cycle racing, *Kojak*, an opera singer with sub-titles, a Russian programme about a United Nations

Every month is the right frequency



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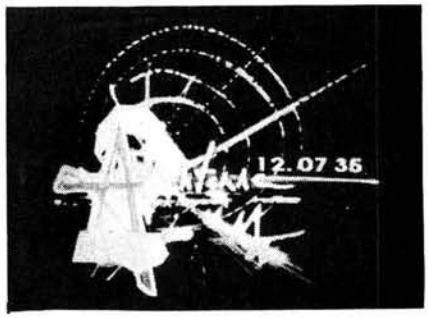


Figs. 1, 2 & 3: French pictures received by Nicholas Wythe

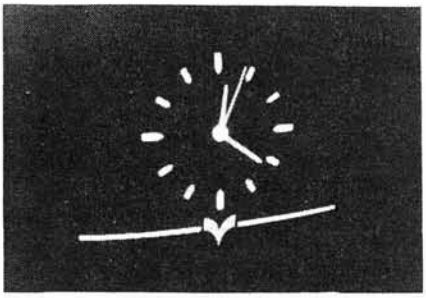


Fig. 4: Yorkshire TV clock received by George Garden

Fig. 5: Bugs Bunny received from Holland by David Girdlestone

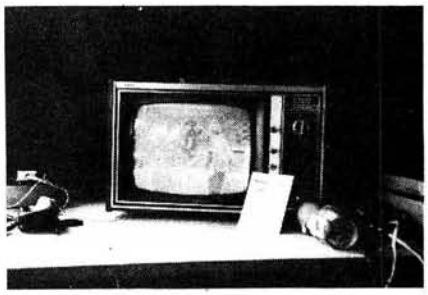


Fig. 6: ATV receiver at the Brownsea Island station

meeting with English-speaking people and translators, volley-ball between DDK and CCCP and several appearances of a Russian YL announcer with their clock showing local time four hours ahead of GMT. At 0820 on August 19, I received strong colour pictures of a programme about the varieties of fungus with a YL presenter, the PRAHA caption at 1830 on September 4, the MTV-1 clock showing 2 hours ahead of GMT at 1859 on the 8th, test cards from Poland at 1321 on the 9th and Budapest, Grunten and RAI-1 at 0807 on the 15th and a Teletext style list headed "Schlagzeilen" at 1200 on the 15th.

Tropospheric

July was another good month for tropospheric openings in 1982 when **Nicholas Wythe,** Folkestone, received pictures from the French network Antenne 2 and saw the last newscast of the day, Derniere (Fig. 1), a news caption from Malouines (Fig. 2) and a clock caption (Fig. 3). Up in Bracknell, **George Garden,** using a Philips 1201, saw the close-down clock for the first time from Yorkshire Television's transmitter at Belmont (Fig. 4).

Ian Kelly, operating with a 16-element Yagi from his holiday location in Great Yarmouth, received pictures on September 2 and 3 from Belgium and Holland, and saw such programmes as *Bugs Bunny* (Fig. 5), *Flintstones, Sesame Street* and the film *Ivanhoe.* He also logged pictures from Anglia TV at Sandy Heath, Central TV Sutton Coldfield, Thames TV Crystal Palace, TVS Hannington and Yorkshire TV Belmont. "I logged more at Great Yarmouth in a week than I have all my life in Reading!" writes Ian. Between 2115 and 2215 on the 3rd, **Simon Hamer,** Presteigne, received pictures from BBC-1 Crystal Palace and Oxford, BBC 1 East Sandy Heath and Holland NOS-2 from Goes.

"Good tropo conditions during the evening of September 3 caused complete mayhem in our normally crowded Chs. 21–50 spectrum," writes Sam Faulkner, who received several very strong French stations between Chs. 21 and 35, and at times signals from TVS Rowridge on Ch. 27 and Hannington on Ch. 42, were exceptional.

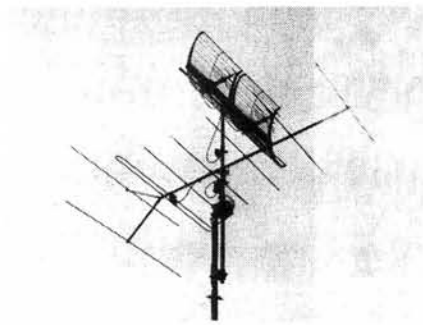
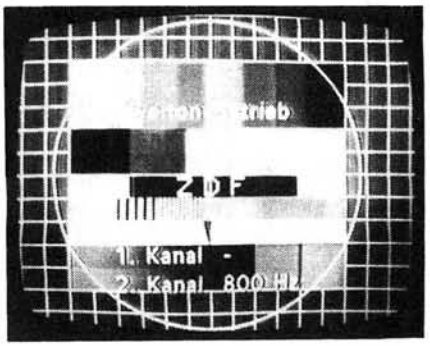


Fig. 7: DXTV array of Fraser Lees

"The best lift we have ever seen," remarked **Dave Cawser** about the opening on September 14, when he and his family watched colour programmes from Holland which included *The Count of Monte Cristo* with sub-titles and the Rotterdam Orchestra, followed by five minutes of adverts such as Cinzano, Dreft and Nivea and then the late night news. Between 0915 and 1016, I received very strong colour pictures from ARD ZDF Germany and watched *Round the World Quiz,* followed by a music nostalgia programme about the 1920s, with the Pasadena Roof Orchestra complete with vintage microphone in front of the band stand. Almost daily between the 10th and 14th, I received good pictures from Central TV on Ch. B8, with just a dipole antenna feeding my 405-line receiver. During the evening of the 13th, Simon Hamer logged pictures from France on Chs. 21, 24, 27 and 34, Holland and Tyne Tees TV from Bilsdale; and Tim Anderson writes: "The best day for Radio Telefis Eireann was today". It sure was Tim, because around 2100, in Band III, I watched RTE news, in colour, with reports by Donal Kelly and Kievon Wood with Anne Doyle as newscaster, followed at 2116 by the weather report. At 2030 on the 14th, I watched a charity appeal from Holland, in colour, plus adverts for Glorix, Miele Vacuum Cleaners,



Figs. 8, 9 & 10: Pictures received in Norwich by David Girdlestone

Royco Soap and Talbot Samba Cars and at 2038 the news programme *Nos-Journal.*

On September 14, 15 and 16 **John Thompson** G6DVR, Gillingham, using a JVC CX619GB receiver and rotatable XG14 antenna, logged u.h.f. test cards from Radio Bremen, DDR-F1, NDR-111, Sweden TV2, Tyne Tees TV and ZDF. While down in Folkestone, **Nicholas Wythe** received excellent colour Teletext from Holland on Ch. E32 and a clock, football, Heute Abend and Vormittagsprogram captions and Videotext from ZDF on Ch. E35. "What a marvellous period of tropo ducting" remarked Nicholas, who also saw *Paddington Bear* in colour from RTBF Wavre, Belgium on Ch. E28 and *The Best of Groucho Marx* from Nederland-2 on Ch. E32.

Amateur TV

"The Scottish Amateur Radio Convention was well attended with 850-plus present," writes **Jim Penny** GM4JLY, Aberdeen, and one of the attractions was a lecture and demonstration of Amateur Television on 432MHz, in colour, by GM8AZS and GM8AVT. At the stand of the Aberdeen ARS was a complete ATV station and visitors were fascinated to see it working, in colour, with GM8OFX describing the gear from the receiver screen. Well done lads, all good publicity for ATV.

During the ATV contest on September 11 and 12, **John Brakespear** G8RZP, Isle of Sheppey, worked 16 stations, mainly one way, with ON and PA0 using 144MHz as the return frequency. John's best DX was G8GLQ/P, 19km west of Bristol, and some of the equipment in use was a Microwave Modules transverter, a G8LES modulator and a 88-element multi-beam antenna.

Members of the Flight Refuelling Amateur Radio Society demonstrated colour ATV equipment to the Lady Mayor of Poole at their special event station, GB2RMA, on 29 August, in conjunction with a local firm's sports day. Several members, using Nick Foot's callsign, G8MCQ/P, set up an ATV station on Brownsea Island in Poole Harbour as part of the celebrations of the 75th Anniversary of the foundation of the Scout Movement and the ATV signals, received on the island from Poole (Fig. 6), via a home-brew 432MHz Yagi and *PW* up-converter, may well have been the first live ATV colour pictures to arrive at Brownsea from the mainland.

Fig. 11: Commercial received by David Girdlestone

SSTV

At 1830 on August 17, Sam Faulkner logged another new SSTV country, V2AR on 28·680MHz, while he was working DL3ZAU and exchanging pictures with WB2OQS between 1830 and 1930 on August 21 and 22. Sam logged ZS2AO, with CQ SSTV caption, on September 4 and 7, a CQ caption from LU8AH and a QSO between ZS6BTD and WB4QQF on the 4th and pictures from GW3TLP at 2030 on the 5th. His first real chance to log Stateside came on September 12 when W2UOX was calling 17PQD, W2KXL was calling CQ SSTV and a caption, complete with eagle emblem, came from WB5UZS in Texas. A portrait of 8P6NC and graphics followed during a QSO with the east coast of the USA, and at 1735 VO1BL was 59 plus from Newfoundland while exchanging pictures with ON7HK. From 1800, pictures from South America were excellent, "the multi-path problem slowly disappeared from the video of LU1DEE and details of QTH, equipment and operator's photograph were superb during his QSO with DK7BI", writes Sam.

Richard Thurlow G3WW, attended the BATC convention at Leicester on September 5 and saw the colour SSTV demonstration by John Stace G3CCH and G4EQD with home-brew equipment and using the G3NOX, 26-picture, colour tape. During the dem, John used one of Richard's tapes of the colour transmissions he received from 13XQW. "Grant Dixon G8CGK, showed his microprocessor complete with wall-hung print-out and his ZL fast to slow scan converter and many ATVers thronged the room," said Richard. Congratulations to all concerned and don't forget to let me know about your various SSTV activities.

Station Information

Like **M. J. Stafford,** Newcastle-upon-Tyne, **Les Borthwick,** Harwick, uses a Plustron TVR5D and writes, "Any TVDXer in the Borders Region wishing to compare notes, could they write to me at 7 McLagan Drive, Burnfoot, Harwick, Borders Region, Scotland". John Brakespear often watches Dutch TV on his domestic receiver and uses his TVR5D for the sound channel.

Fraser Lees enclosed a photograph of his rotatable DXTV array mounted on the chimney at his home in Ringmer, Sussex, Fig. 7. **David Girdlestone,** Norwich, gives credit to his very large Wolsey HG36 antenna and Hirschmann rotator for the super pictures he received from Belgium, Holland and Germany, Figs. 8, 9, 10, during August. David has purchased a Sony C5 video recorder which has already proved very useful for recording the DX and the fun of the playback and seeing such programmes as *Bugs Bunny, Dallas, Colombo, Muppets* and commercials (Fig. 11), from continental stations.

George Garden took his JVC CX610 while travelling on a first-class sleeper to Scotland and received strong colour pictures from Crystal Palace on leaving Kings Cross station and for some distance up the track, strong pictures from the Yorkshire Television transmitter at Emley Moor as the train passed through the Midlands, and on the return journey George watched the close down of Scottish Television from Craig Kelly.

Brian Renforth moved QTH, on September 4, from Chippenham to North Shields and experienced his first DX in his new home on September 13 and 14 when he received colour pictures from HTV Wenvoe and the BBC Cymru/Wales news and weather on a 1973-vintage colour set with his antenna directed towards Pontop Pike.

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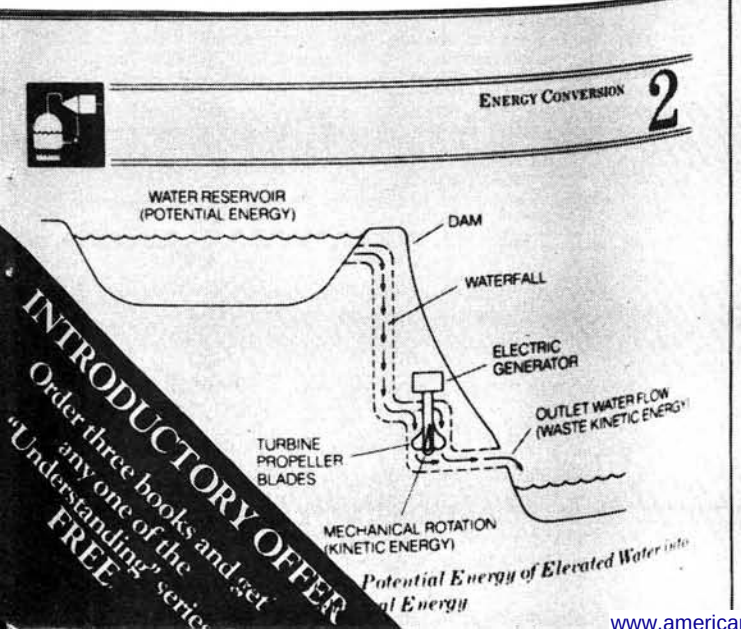

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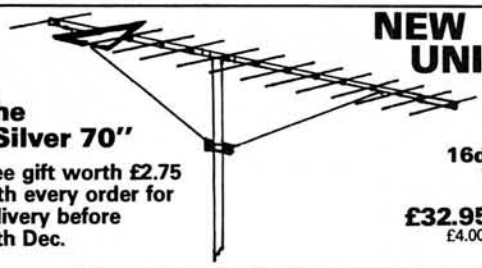

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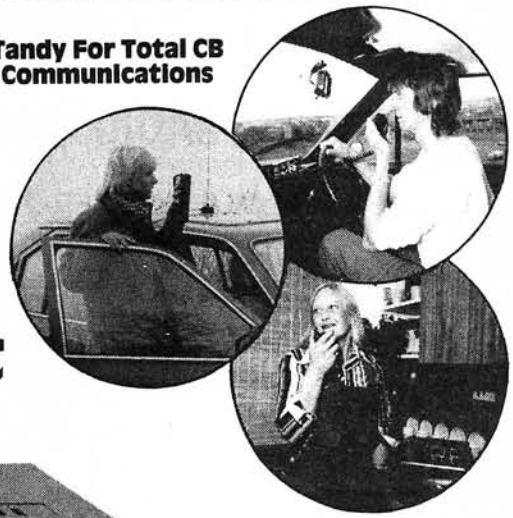

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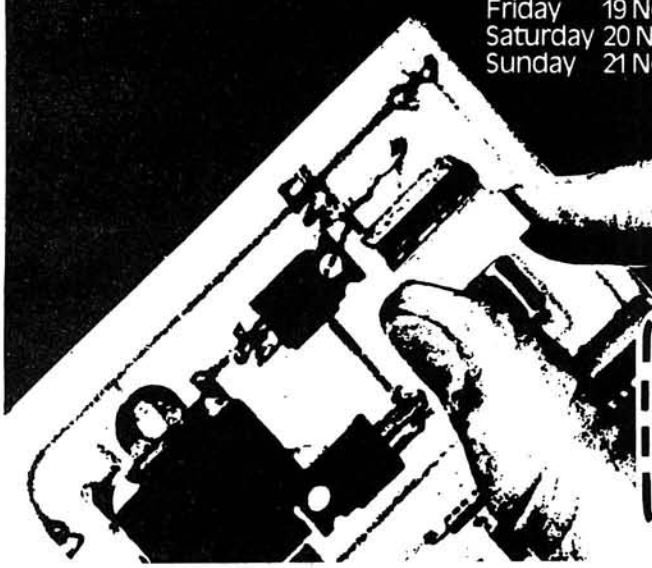

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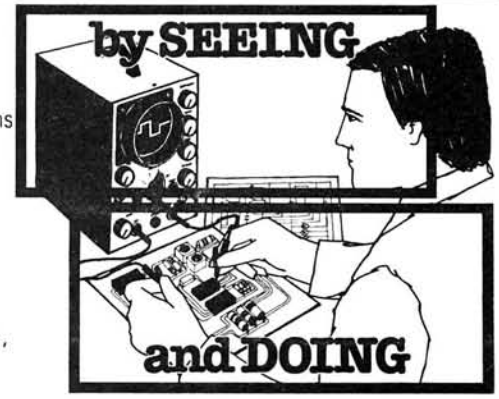

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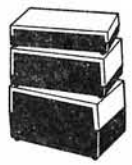

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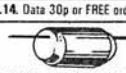

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6X5GT	0.85	6X6G	1.30
6X6G	1.30	6Z4	0.70
6Z4	0.70	7B7	1.75
7B7	1.75	7Y4	1.25
7Y4	1.25	9D2	0.70
9D2	0.70	9D6	2.50
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12K8GT	0.80	12Q7GT	0.80
12Q7GT	0.80	12SC7	0.65
12SC7	0.65	12SH7	0.65
12SH7	0.65	12SJ7	0.70
12SJ7	0.70	12SQ7	1.45
12SQ7	1.45	12SQ7GT	0.85
12SQ7GT	0.85	12Y4	0.70
12Y4	0.70	13D3	0.70
13D3	0.70	13D5	0.90
13D5	0.90	13D8	0.80
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723A/B	11.90	6060	1.95
807	1.25	6084	2.30
813	14.80	6065	3.20
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832A	8.90	6080	5.30
866A	3.80	6146	4.95
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957	1.05		
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1629	1.85		
2051	2.90		
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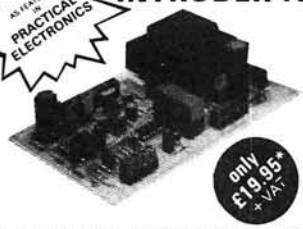
INTRUDER ALARM CONTROL UNIT CA 1250

AS FEATURED IN PRACTICAL ELECTRONICS



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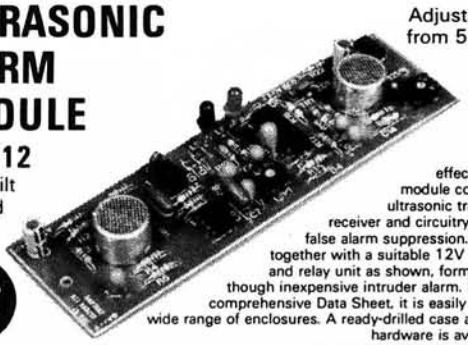

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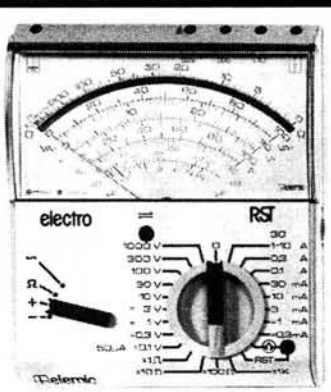

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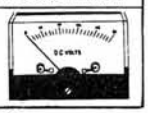

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FL2100Z	9-band 1200W linear	425.00
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FT 107DMS	As above with memory	779.00
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FP107EG	Cased PSU with speaker	113.00
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