

Practical

OCTOBER 1986 £1-10

Wireless

The Radio Magazine

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Yaesu

FT1	HF Transceiver	P.O.A. (—)
FT980	HF Transceiver	1750.00 (—)
SP980	Speaker	86.09 (2.50)
FT757GX	HF Transceiver	879.00 (—)
FC757	Auto A.T.U.	318.00 (2.50)
FP757HD	Heavy Duty PSU	199.00 (2.50)
FP757GX	Switched Mode PSU	199.00 (2.50)
FT290	2m M/Mode Port/Transceiver	369.00 (—)
FT290	With Mutek front end fitted	399.00 (—)
FT690	6M M/M Portable Transceiver	289.00 (—)
FL2010	Linear Amplifier	79.00 (1.50)
MMB11	Mobile Bracket	33.00 (1.50)
NC11	Charger	10.00 (1.50)
CS11	Carrying Case	6.50 (1.50)
YHA15	2m Helical	7.50 (1.50)
YHA44D	70cm 1/2wave	10.95 (1.50)
YMA9	Speaker Mike	19.00 (1.50)
MMB15	Mobile Bracket	14.55 (1.50)
FT203R	NEW 2m H/Held/CW FN83	225.00 (—)
FT209R	NEW 2m H/Held/CW FN83	265.00 (—)
FT703R	70cm H/Held	255.00 (—)
FT709R	70cm H/Held	285.00 (—)
FT720R	2m 25W F.M.	359.00 (—)
FT720RH	2m 45W F.M.	399.00 (—)
FT720RH	2m/70cm/25W/25W	499.00 (—)
FRG 9600	60-905MHz Scanning RX	465.00 (—)
MMB10	Mobile Bracket	8.50 (1.50)
NC9C	Charger	9.50 (1.50)
PA3	Car Adaptor/Charger	18.00 (1.50)
FN82	Spare Battery Pack	25.00 (1.50)
YM24A	Speaker Mike	27.00 (1.50)
FT726R	2m Base Station	899.00 (—)
430726	70cm Module for above	255.00 (3.00)
FRG8800	HF Receiver	575.00 (—)
FRV8800	Converter 118-175 for above	90.00 (2.00)
FR77700RX	A.T.U.	53.50 (2.00)
MH188	Hand 600 8pin mic	17.50 (1.50)
MD188	Desk 600 8pin mic	75.00 (1.50)
MFA13B	Boom mobile mic	23.00 (1.50)
YH77	Lightweight phones	17.50 (1.50)
YH55	Padded phones	17.50 (1.50)
YH1	L/weight Mobile H/et-Boom mic	17.00 (1.50)
SB1	PTT Switch Box 208/708	18.50 (1.50)
SB2	PTT Switch Box 290/790	16.00 (1.50)
SB10	PTT Switch Box 270/2700	18.50 (1.50)
QTR24D	World Time Clock	39.00 (1.50)
FF501DX	Low Pass Filter	33.00 (1.50)

Linear Amps

TOKYO HI POWER		
HL 160V	2m, 10W in, 160W out	244.52 (2.50)
HL 82V	2m, 10W in, 85W out	144.50 (2.50)
HL 110V	2m, 10W in, 110W out	249.00 (2.50)
HL 35V	2m, 3W in, 30W out	76.00 (2.50)
HL 20U	70cms, 3W in, 20W out	122.50 (2.50)

MICROWAVE MODULES

MML144/30-LS	inc preamp (1/3 w ip)	94.30 (2.50)
MML144/50-S	inc preamp, switchable	106.95 (2.50)
MML144/100-S	inc preamp (10w ip)	149.95 (3.00)
MML144/100-HS	inc preamp (25w ip)	159.95 (3.00)
MML144/100-LS	inc preamp (1/3w ip)	169.95 (3.00)
MML144/200S	inc preamp (3/10/25 ip)	334.65 (3.00)
MML432/30L	inc preamp (1/3w ip)	169.05 (2.50)
MML432/50	inc preamp (10w ip)	149.50 (2.50)
MML432/100	linear (10w ip)	334.65 (3.00)

B.N.O.S.

LPM 144-1-100	2m, 1W in, 100W out, preamp	197.50 (3.00)
LPM 144-3-100	2m, 3W in, 100W out, preamp	192.50 (3.00)
LPM 144-10-100	2m, 10W in, 100W out, preamp	175.00 (3.00)
LPM 144-25-160	2m, 25W in, 160W out, preamp	255.00 (3.00)
LPM 144-3-180	2m, 3W in, 180W out, preamp	295.00 (3.00)
LPM 144-10-180	2m, 10W in, 180W out, preamp	295.00 (3.00)
LP 144-3-50	2MN 50W out, preamp	125.00 (3.00)
LP 144-10-50	2M 10W in, preamp	125.00 (3.00)
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00 (3.00)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	235.00 (3.00)
LPM 432-10-50	70cm, 10W in, 50W out, preamp	195.00 (3.00)
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00 (3.00)

SWR/PWR Meters

HANSEN		
FS50VP	50-150MHz 20/200 Interval PEP/SWR	106.70 (2.00)
FS300V	50-150MHz 20/200 PWR/SWR	53.50 (2.00)
FS300H	1.8-60MHz 20/200/10W	53.50 (2.00)
FS210	1.8-150MHz 20/200 Auto SWR	63.50 (2.00)
W720	140-430MHz 20/200W	41.50 (2.00)

WELZ

SP10X	1.8-150MHz PWR/SWR	36.50 (2.00)
SP122	1.8-60MHz PWR/SWR/PEP	85.00 (2.00)
SP220	1.8-200MHz PWR/SWR/PEP	59.95 (2.00)
SP225	1.8-200MHz PWR/SWR/PEP	109.95 (2.00)
SP420	140-525MHz PWR/SWR/PEP	71.00 (2.00)
SP425	140-525MHz PWR/SWR/PEP	109.95 (2.00)
SP825		165.00 (2.00)

TOYO

T430	144/432 120 W	52.50 (1.50)
T435	144/432 200 W	58.00 (2.00)

AERIALS BY:- JAYBEAM - MINIBEAM - HYGAIN - G. WHIP - TET - MET - TONNA

Icom Products

IC751	HF Transceiver	P.O.A. (—)
IC745	HF Transceiver	P.O.A. (—)
IC735	New HF Transceiver	P.O.A. (—)
PS15	P.S. Unit	149.50 (4.50)
PS30	Systems p.s.u. 25A	343.85 (—)
SM6	Base microphone for 751/745	39.10 (1.50)
IC505	50MHz multi-mode portable	459.00 (—)
IC290D	2m 25W M/Mode	519.00 (—)
IC271E	2m 25W M/Mode Base Str.	379.00 (—)
IC271H	100W version of above	379.00 (—)
IC27E	25W FM mobile	399.00 (—)
IC28E	25W FM	325.00 (—)
IC47E	25W 70cm FM mobile	595.00 (—)
ICBU1	BU Supply for 25/45/290	31.05 (1.50)
ICR71	General Coverage Receiver	789.00 (—)
IC02E	2m H/Held	299.00 (—)
IC2E	2m H/Held	199.00 (—)
ML1	2m 10W Linear	79.35 (2.50)
IC4E	70cm H/Held	285.00 (—)
IC04E	70cm handhold	299.00 (—)
BC35	Base Charger	67.85 (1.50)
HM9	Speaker mic	20.70 (1.50)
LC3	Carry Case	6.90 (1.50)
ICBP3	Std Battery Pack	28.75 (1.50)
BP5	High Power Battery Pack	58.65 (1.50)
CP1	Car Charging Lead	6.90 (1.50)
DC1	12v Adaptor	17.25 (1.50)
R7000	VHF/UHF Scanning Receiver	899.00 (—)
IC3200	2M/70cm Mobile Transceiver	529.00 (—)
GC5	World Clock	39.10 (2.00)

Scanning Receivers

SMC9400	VHF/UHF Scanner	249.00 (3.00)
SX200	VHF/UHF Scanner	325.00 (3.00)
SX400	VHF/UHF Continuous Coverage	625.00 (3.00)
AOR2002	VHF/UHF Continuous Coverage	435.00 (3.00)

Mutek Products

SLNA 50	50MHz Switched preamp	49.50 (2.00)
SLNA 144s	144MHz Low noise switched preamp	41.95 (2.00)
SLNA 145sb	Preamp intended for 290	31.90 (2.00)
GLNA 432e	70cm Mast head preamp	159.90 (3.00)
RPCB 144ub	Front end FT21/225	84.90 (2.00)
RPCB 251ub	Front end IC251/211	89.90 (2.00)
BBBA 500u	20-500MHz Preamp	34.90 (2.00)
GRBA 144e	2m Mast head preamp	149.90 (2.50)
SBLA 144e	2m Mast head preamp	89.90 (3.00)
RPCB 271ub	Front end for IC271	94.90 (2.00)
TVHF 230c	2M-FM Transverter	299.90 (5.50)
LBPF 144v	Bandpass Filter	24.90 (2.00)
LBPF 432u	Bandpass Filter	24.90 (2.00)
TVVF 50c	6M Transverter	209.90 (3.00)
GLNA 433e	70cm Pre-amp	89.90 (3.00)
TVVF 144a	2M Transverter	249.90 (3.00)

Datong Products

PC1	Gen. Cov. Con.	137.40 (2.00)
VLF	Very low frequency conv.	34.90 (2.00)
FL2	Multi-mode audio filter	89.70 (2.00)
FL3	Audio filter for receivers	129.00 (2.00)
ASP/B	r.f. speech clipper for Trio	82.80 (2.00)
ASP/A	r.f. speech clipper for Yaesu	82.80 (2.00)
ASP	As above with 8 pin con	89.70 (2.00)
D75	Manual RF speech clipper	56.35 (2.00)
D70	Mouse Tutor	57.35 (2.00)
MK	Keyboard morse sender	137.40 (2.00)
RFA	RF switched pre-amp	36.00 (2.00)
AD270-MPU	Active dipole with mains p.s.u.	51.75 (2.00)
AD370-MPU	Active dipole with mains p.s.u.	69.00 (2.00)
MPU	Mains power unit	6.90 (2.00)
DC144/28	2m converter	39.67 (2.00)
PTS1	Tone squelch unit	46.00 (2.00)
ANF	Automatic notch filter	67.85 (2.00)
SRB2	Auto Woodpecker blanker	86.25 (2.00)

CW/RTTY Equipment

Tono 550	Reader	329.00 (3.00)
ICS/AEA		
PK64	Complete Packet Amton/RHa etc.	239.00 (3.00)
PK80	Universal Packet TNC	239.00 (3.00)

BENCHER

BY1	Squeeze Key, Black base	67.42 (2.50)
BY2	Squeeze Key, Chrome base	76.97 (2.50)

HI-MOUND MORSE KEYS

HK703	Up down keyer	29.35 (2.00)
HK704	Up down keyer	19.95 (2.00)
HK706	Up down keyer	19.35 (2.00)
HK707	Up down keyer	18.25 (2.00)
HK710	Up down keyer	39.95 (2.50)
HK802	Up down solid brass	86.30 (2.50)
HK803	Up down solid brass	82.65 (2.50)
HK808	Up down keyer	39.95 (2.50)
MK704	Twin paddle keyer	13.50 (2.00)
MK705	Twin paddle keyer marble base	25.65 (2.00)

KENPRO

KP100	Squeeze CMOS 230/13.8v	89.00 (3.00)
KP200	Memory 4096 Multi Channel	179.00 (3.00)

STARMASTER

Keyer - Standard		54.70 (2.00)
Memory Keyer		95.00 (3.00)

Trio

TS940S	9 Band TX General Cov RX	1795.00 (—)
TS930S	9 Band TX General Cov RX	1395.00 (—)
TS440	NEW 9 Band TX General Cov RX	950.00 (—)
TS830S	160-10m Transceiver 9 Bands	898.00 (—)
AT230	All Band ATU/Power Meter	170.65 (2.50)
SP230	External Speaker Unit	51.43 (2.00)
TS530SP	160m-10m Transceiver	779.79 (—)
TS430S	160m-10m Transceiver	750.00 (—)
PS430	Matching Power Supply	139.01 (3.50)
SP430	Matching Speaker	39.50 (2.00)
MB430	Mobile Mounting Bracket	13.56 (2.00)
FM430	FM Board for TS430	45.00 (2.00)
SP120	Base Station External Speaker	33.33 (2.00)
MC50	Dual Impedance Desk Microphone	39.56 (2.00)
MC35S	Fiat Microphone 50K ohm IMP	18.65 (1.50)
LF30A	HF Low Pass Filter 1kW	27.70 (1.50)
TR7930	2M FM Mobile	365.60 (—)
TM201A	2M 25W Mobile	296.09 (—)
TM401A	7cms FM 12W	350.91 (—)
TH21E	2M Mini-Handhelds	189.30 (—)
TH41E	70cm Mini-Handhelds	220.95 (—)
TM211E	2M FM Mobiles	398.00 (—)
TM411E	70cm FM Mobiles	466.18 (—)
TS711E	2M Base Stations	770.74 (—)
TS811E	70cm-Base Stations	895.00 (—)
TR3600	70cm Handheld	324.36 (—)
TR2600	New 2M FM Synthesised Handheld	299.00 (—)
ST2	Base Stand	66.11 (2.00)
SC4	Soft Case	16.95 (1.50)
SMC25	Speaker Mike	19.78 (1.50)
PB25	Spare Battery Pack	32.20 (1.50)
MS1	Mobile Stand	38.41 (1.50)
R2000	Synthesiser 200KHz-30MHz Receiver	518.73 (—)
H55	Deluxe Headphones	29.39 (1.50)
SP40	Mobile External Speaker	18.08 (1.50)
TL922	160/10M 2kW Linear	1265.00 (7.50)
TS780	2M/70cm M/M Transceiver	998.00 (5.50)
TS670	6, 10, 15, 40M 10W M/M Transceiver	774.13 (5.50)
TR9300	6M M/M Transceiver	590.49 (5.50)
TR751	NEW 2M 25W Multimode	525.00 (—)

Power Supplies

DRAE			
4 amp	43.90 (2.50)	BNOS	6 amp 69.00 (3.00)
6 amp	63.00 (3.00)	12 amp	115.00 (3.50)
12 amp	86.50 (3.50)	25 amp	169.00 (4.50)
24 amp	125.00 (4.50)	40 amp	345.00 (4.50)

SMC

RU120406	4 amp Power Supply	14.95 (3.00)
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Aerial Rotators

KR250	Light Duty	69.00 (3.00)
FU200	Light Duty	69.00 (2.50)
AR40	5 core Medium Duty	119.00 (2.50)
KR400	Med/H Duty	129.95 (3.00)
KR500	6 core Elevation	139.95 (3.00)
KR400RC	6 core Medium Duty	159.95 (3.00)
KR600RC	8 core Heavy Duty	209.00 (3.00)
HAM1V	8 core Heavy Duty	359.00 (4.50)
T2X	8 core Very Heavy Duty	419.00 (—)
KR5400	Elevation/Azimuth	245.00 (3.00)
KR5600	Elevation/Azimuth	357.00 (3.00)

Switches

SMCS 2U	2N 50239	11.95 (1.50)
SMCS 2N	2 way 'n' Sfts	19.49 (1.50)
Welz	2 way SO239	26.50 (1.50)
Welz	2 way 'n' Sfts	46.50 (1.50)
Drae	3 way SO239	15.40 (1.50)
Drae	3 way 'n' Sfts	19.90 (1.50)
Kenpro KP21N2	way Switch	24.15 (1.50)

Miscellaneous

DRAE	Wavemeter	27.50 (1.50)
T30	30W Dummy load	8.50 (1.50)
T100	100W Dummy load	38.00 (1.50)
T200	200W Dummy load	56.00 (2.00)
CT20A	20W Dummy Load PL259	14.25 (1.50)
CT20N	20W Dummy Load N. Plugs	22.50 (1.50)
CT530	300W Dummy Load	82.00 (2.50)
DRAE	2m Pre-set A.T.U.	14.50 (2.00)

TOKYO HI-POWER

HC200	10-80 HF Tuner	115.00 (2.50)
HC400	10-160 HF Tuner	199.00 (3.50)

CAP CO.

AERIAL TUNERS		
SPC3000	1kW PEP	225.00 (6.00)
SPC3000D	3kW PEP	325.00 (6.00)



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Practical Wireless

The Radio Magazine

OCTOBER 1986 VOL 62 NO. 10 ISSUE 955



THIS MONTH'S COVER

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Editorial and Advertisement Offices:

Practical Wireless
Enefco House
The Quay
Poole, Dorset BH15 1PP

☎ Poole (0202) 678558
Prestel 202671191

Editor Geoff Arnold T.Eng(CEI) FSERT G3GSR

Assistant Editor Dick Ganderton C.Eng. MIERE G8VFH

Art Editor Steve Hunt

Technical Features Editor Elaine Richards G4LFM

Technical Projects Sub-Editor Richard Ayley G6AKC

Technical Artist Rob Mackie

Advertisement Manager Roger Hall G4TNT

Administration Manager Kathy Moore

Accounts Annette Martin

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 the shop manager is Hank, G3ASM,
 the address, 56 North Road,
 Darlington,
 telephone 0325 486121.

In Cambridge,
 the shop manager is Tony, G4NBS,
 the address, 162 High Street,
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 telephone 0223 311230.

LOWE ELECTRONICS SHOPS are open from 9.00 am to 5.30 pm, Tuesday
 to Friday and from 9.00 am to 5.00 pm on Saturday. Shop lunch hours vary
 and are timed to suit local conditions. For exact details please telephone the
 shop manager.

In Cardiff,
 the shop manager is Carl, GW0CAB,
 the address, c/o South Wales
 Carpets, Clifton Street, Cardiff,
 telephone 0222 464154.

In London,
 the shop manager is Andy, G4DHQ,
 the address, 223/225 Field End
 Road, Eastcote, Middlesex,
 telephone 01-429 3256.

In Bournemouth,
 the shop manager is Colin, G3XAS,
 the address, 27 Gillam Road,
 Northbourne, Bournemouth,
 telephone 0202 577760.

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

AR2002 receiver.



Frequency range of the AR2002 is from 25 to 550 and from 800 to
 1300 MHz. Modes of operation are wide band FM, narrow band FM and
 AM. The receiver has 20 memories, memory scan and a search mode
 which checks frequencies between user designated limits.

The receiver has a push button keypad for easy frequency entry and
 operation.

A front panel knob allows the listener to quickly step up or down in either
 5, 12.5 or 25 kHz steps from the frequency initially chosen.

The AR2002 has a front panel LED bar "S" meter.

There is a front panel 3.5 mm jack socket for headphone use.

A socket for the optional RS232 interface (RC PACK) is provided on the
 rear panel. The RC PACK consists of an 8 bit CPU with its own ROM and
 RAM and with your own computer acting as a dumb terminal many
 additional operating facilities become available. Of course, if you want to
 write your own programs using the RC PACK as an interface then
 "the sky's the limit".

AR2002 £435.00 inc VAT, carriage £7.00
RC PACK £221.00 inc VAT, carriage £7.00

data equipment.

CD600 RTTY, CW, ASCII, TOR, AMTOR decoder, output
 for UHF television, monitor and printer, can also be used
 as morse tutor £188.19 inc VAT, carriage £7.00

CD670 A higher specification RTTY, CW, ASCII, TOR, AMTOR
 decoder complete with liquid crystal dot matrix display, variable RTTY shift,
 normal/reverse mode switch, outputs for TV, monitor and printer and
 can also be used as morse tutor £286.73 inc VAT, carriage £7.00

CD660 Similar to the CD670 but without the
 built-in display £231.79 inc VAT, carriage £7.00



DAIWA meters.

CN410M . . . 3.5 to 150 MHz, forward 15/150 W, reflected 5/50 W,
 SO239 connectors £53.28 inc VAT, carriage £1.50

CN460M . . . 140 to 450 MHz, forward 15/150 W, reflected 5/50 W,
 SO239 connectors £57.73 inc VAT, carriage £1.50

NS448 with remote head . . . 900 to 1300 MHz, forward 5/20 W, reflected
 1.6/6.6 W, N type connections £75.00 inc VAT, carriage £2.50

NS660P with switchable meter reading (average, normal PEP and hold
 PEP) and provision for optional remote head (U66V), 1.8 to 150 MHz,
 forward 15/150/1500 W, SO239 connectors £99.50 inc VAT,
 carriage £2.50

U66V remote head, 140/525 MHz, max 300 W, N type
 connectors £48.00 inc VAT, carriage £1.50

SC20 extension cable for U66V, approx 20 metres long
 £25.85 inc VAT, carriage £1.50



All advertised prices subject to exchange rate variation.

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 2817, 2430, 4057, 4995.

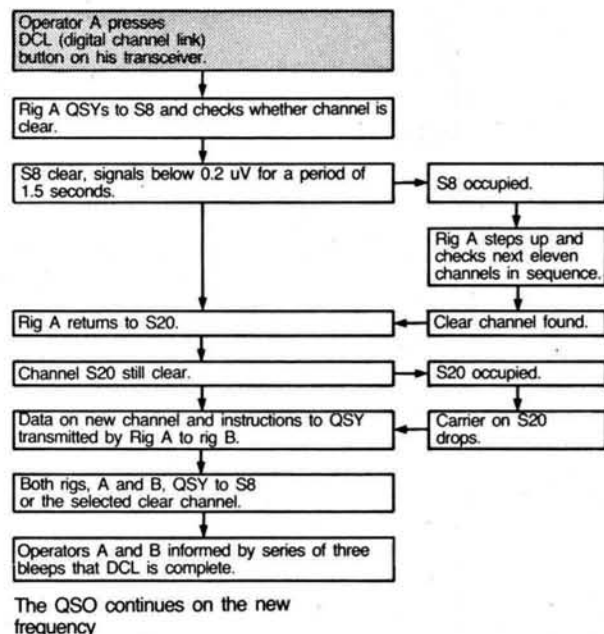
send £1 for complete mail order catalogue.



DCL explained.

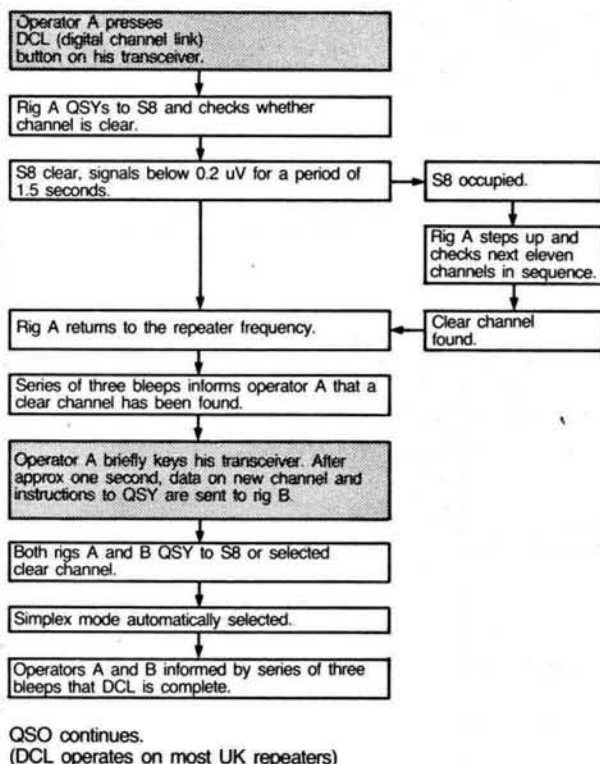
DIGITAL CHANNEL LINK WHILST SIMPLEX

Contact established on, say, S20 between operator A and operator B. DCS codes match and DCL activated on both rigs.



DIGITAL CHANNEL LINK WHEN QSYING FROM A REPEATER

Contact established on a repeater between operator A and operator B. DCS codes match and DCL is activated on both rigs.



TR751E and TM2550E.

Amateurs have for a long time joked about the day when the equipment would take over and there would be no need of them in the shack. This would suit many wives; gardening and painting the house would no longer be a female preserve. But do not worry, this day has not yet dawned. However, certain operations currently performed by the amateur can be done much quicker and whilst mobile, more safely by present day electronics. It used to be no problem finding a clear channel; that is not so today and to find one whilst driving is positively dangerous! And that's where the new DCL system unique to TRIO comes in.

As an inexpensive option, DCL (digital channel link) is available for the two metre TM2550E FM and the TR751E multi-mode mobile transceivers. What does DCL do? Let me explain.

Imagine you are operating mobile using one of the above new rigs, you are on FM and a friend, one of your regular contacts, is using a similar transceiver fitted with the DCL option. You have established contact on S20. The DCS codes in the two rigs match, a simple matter, the relevance I will explain later, DCL is activated on both rigs, you press the channel link button and within seconds both transceivers have QSYed to a new unoccupied channel. The QSO continues and has avoided the interminable "up one" etc and at no time has your attention been taken off the road.

What happened is simple. On pressing the channel link button your transceiver automatically moved to a user designated "base" frequency: In the UK usually S8 (145.200). If the channel was clear (the rig is looking for a channel with signals not above 0.2 uV for a period of 1.5 seconds), the rig adopts this as the new channel. Without human intervention your transceiver returned to S20, transmitted data identifying the new frequency and instructed the other rig to QSY. Within seconds both rigs are on a new clear channel. A series of three beeps sound to inform you that DCL is complete and your QSO can continue.

To avoid your string of data QSYing every DCL equipped rig within range and listening on S20, it is necessary for the two rigs to recognise each other and, more importantly, ignore the rest. This is simply arranged by a selective call system. The two operators involved knew one another, they always had a contact on their way into work and accordingly both rigs had the same prearranged DCS (digital code squelch) code activated. The system also works for larger nets. As long as the DCS codes match. The DCL system will find that clear channel and QSY each rig.

To answer your questions . . . if that base frequency, S8, had been occupied the rig would have checked the next eleven "S" channels above ie. S9, S10, S11 and so on until one falling within the signal level parameters had been found.

If S20 was in use when the transceiver returned then it would have waited until the channel became clear before transmitting the data.

If no channels are free then the transceiver would continue to scan until either the reset button or press to talk switch restored the rig to the original channel.

In order that data is not lost when QSYing from a repeater, the rig has to be manually keyed in order to send the new clear channel data. On the new frequency both rigs revert automatically to simplex.

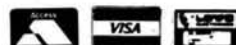
I have tried to explain the operation of the DCL system. You will soon be hearing bursts of data as people QSY safely, why not call in at a LOWE shop where we will be pleased to demonstrate the system.

All advertised prices subject to exchange rate variation.

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 2817, 2430, 4057, 4995.



send £1 for complete mail order catalogue.



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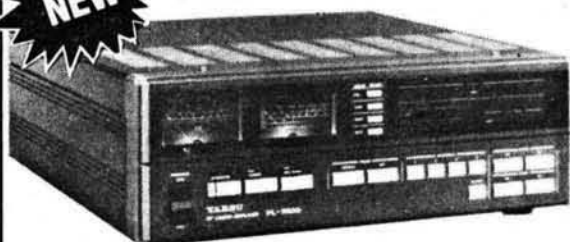
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TALK IN ON SUB

NEW



YAESU'S NEW SOLID STATE LINEAR

THE FL 7000 IS A MICROPROCESSOR CONTROLLED SOLID STATE LINEAR AMPLIFIER INCORPORATING ALL THE VERY LATEST SEMICONDUCTOR TECHNOLOGY. THE LINEAR, FULLY INTEGRATED AUTOMATIC A.T.U. AND P.S.U. ARE ALL PUSH BUTTON CONTROLLED FROM AN AESTHETICALLY PLEASING FRONT PANEL INCLUDING TWIN METER MONITORING

SPECIFICATIONS:

Freq. Coverage: All Amateur Bands (inc. WARC)
Power Output: 500W PEP
Duty Cycle: (SSB) 100% for 30 min.
(Full carrier) 100% for 2 min.
Size & Weight: 390x130x140mm(WHD), 30Kg (66lbs).

A.T.U.

Impedance Matching Range: 1.8-2MHz, 25 to 100Ω unbalanced.
All other bands, 16 to 150Ω unbalanced.
Max. Frequency PWR: 600 watts.
VSWR after matching: 1:1 to 1.2:1.
Insertion Loss: <0.5dB when matched.

FL 7000 PHONE FOR BEST PRICE

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FT 290R II

FT290R & FT767X

Both the FT290R II and the FT767GX feature the very latest in R.F. and microprocessor technology to offer the operator both 1st class performance combined with ease of operation. Why not experience this for yourself, pop in today!

NEW



FT 767GX



VHF/UHF SCANNING RECEIVER
ALL MODE (INCL. SSB UP TO 460 MHz)
100 MEMORY CHANNELS
FRG9600 £465 PA4C £14.50



GENERAL COVERAGE HF RX
200 MEMORY CHANNELS
VHF/UHF CONVERTER (OPT.)
NRD 525 T.B.A.



GENERAL COVERAGE HF RX
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Leeds (0532) 782326
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SMC (Jack Tweedy) Ltd
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New Whittington,
Chesterfield
Chest. (0246) 453340
9.30-5.30 Tues-Sat

BUCKLEY
SMC (TMP)
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Buckley, Cwyd
Buckley (0244) 549563
10-5 Tues, Weds, Fri
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247A Freeman Street
Grimsby
(0472) 59388
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13.5 VOLTS 20 AMP REG.

VERSATOWERS - SIMPLY THE BEST MONEY CAN BUY. FULLY GALVANISED - EASY TO INSTALL/ OPERATE - ROTATOR MOUNTING CAPABILITY - LARGE RANGE FROM 30FT TO 100FT - PRICES FROM £215 EXCLUDING DELIVERY - MOST EX-STOCK

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THIS MONTH'S BARGAINS FREE DELIVERY SAVE POUNDS	UHF COAX PLUGS: PL259 UR67/RG8 UR175 reducer 50 UR176 reducer 75 PL259A reducer 50 PL259A de luxe UR67 PL259B de luxe UR43/75 PL259E L angle 5mm PL259M metric	BUY NOW There will never be a better time. We will not be able to repeat these prices with new stocks.	ELEMENT ONLY, BASE EXTRA 370F 4m 2dB/4 20W 2m 1/4 λ 2NE 2m 5/8 λ 3dB/4 78F 2m 1/8 λ 4.5dB 78F 2m 1/8 λ ball mt 88F 2m 5.2 25H 70cm 5.5dB/4 26E 70cm 6dB/4 35H 70cm 6.3dB/4 70N2DX 2m/70 2.7/5.1 2N6M 50/144 72SM 2S 2m/70cm 38F 2m mobile ele HS770 144/432 duplex GCCA Gutter 4m cable SOCA 4m cable + PL259 SOCALL 6m cable + PL259 SOCALL 4m long reach TMCA5 trunk mount 6m TMCA H.D. trunk mt SOMM magnetic mt 4m SOWM adj wing mount GCCA gutter d/1 adj BSD bumper strap HS88BK bumper mt ext CARRIAGE EXTRA £2 BASES FREE WITH ELEMENTS	COAX CABLE LDF250R £3.68/M LDF450R £4.43/M UR4350R £31p/M UR7650R £32p/M UR6750R £39p/M UR7075R £32p/M UR3975R £36p/M UR5775R £71p/M CARRIAGE £1 UP TO 20 MTRS £2.50 OVER 20 MTRS	BNOS 25Amp P.S.U. £149.00 40Amp P.S.U. £296.00 2M 3/50 no pre-amp £108.00 2M 10/50W no pre-amp £108.00 2M 1/100W £181.00 2M 3/100 £157.00 2M 25/160 £217.00 70cm 3/50 £235.00 70cm 10/50 £195.00 70cm 10/100 £335.00		
TB3 hf 3 ele beam £230.00 TB2 hf 2 ele beam £155.25 TB1 hf rotary dipole £83.38 CK1-2 conv. kit TB1-2 £79.93 CK1-3 conv. kit TB1-3 £155.25 CK2-3 conv. kit TB2-3 £14.84 UGP-2m ground plane £36.25 CS vert. 4.8dBd £34.62 LR1/2m vert. 4.3dBd £27.20 LW5/2m 5 el 7.8dBd £16.68 LW8/2m 8 el 9.5dBd £21.05 LW10/2m 10 el 10.5 £27.20 LW16/2m 16 el 13.4 £40.83 PBM14/2m parabm 11.7 £53.13 PMM14/2m parabm 13.7 £65.49 04/2m gd 4 el 9.4dBd £33.98 06/2m gd 6 el 10.9dBd £44.51 08/2m gd 8 el 11.9dBd £55.60 05/2m 5 over 5.10dBd £29.67 08/2m 8 over 8.11.1 £40.77 5X/2m 5 el crossed £32.14 8X/2m 8 el crossed £41.40 10X/2m 10 el crossed £51.92 10X/137 Sat Xd yagi £55.20 2X/87G h/ness 137 £47.55 X6/2m/12/70 2m/70cm £92.00 C8/70 vert. 6.1dBd bg £30.30 D8/70 8 over 8 12.3 £37.09 PBM18/70 parabm 13.1 £49.45 PBM24/70 parabm 15. £33.35 LW24/70 24 el 14.8dBd £24.73 MBM28/70 mt 11.5 £40.83 MBM48/70 mt 14dBd £55.78 MBM88/70 mt 16.3 £48.24 8X/70 crossed 10dBd £59.28 12X/70 crossed 12dBd £43.70 CR2/23cm cn rel 613.5	UHF COAX SOCKETS: S0239F 4 hole fix S0239T 2 hole fix S0239M nut inner S0239NO nut outer S0239E free angle SM PL258 back/B female PL274 back/B chassis PL274 back/B male M359 elbow mvt M358 12F/1M M358AF T3F M458 3F/1M N PLUGS 50 OHMS: UG536 small UG21 large N SOCKETS 50 OHMS: UG58 4 hole NSNI nut inner UG1052 free small UG523 free large N ADAPTORS: UG107 T2F/1M UG23 T2F UG57 double male UG29 double female UG27 elbow 1/4m INTERSERIES CONNECTORS: UG255 uhs-bncp UG273 uhs-bncS UG146 uhs-N/P UG583 uhs N/S S04NF uhs N/S UG201 N'-bncS UG349 N'-bncP UG606 N'S-bncS POST AND PACKING 65p	ROTATORS S.M.C. search the world for only the best rotators. We are pleased to advise the most suitable for your installation. FU200 Offset £69.00 KR250 Small bell £75.00 KR400 Popular bell £129.95 KR400RC D/L bell £159.95 KR400RC MD bell £209.00 AR40 CDE bell £119.00 CO45 CDE bell £218.99 HAM1V VHD bell £359.00 KR500 Elevation £139.95 KR5400 Az. & elev £245.00 KR5400A Comp. control £289.00 KR5600 HD Az. & elev £357.00 KR5600A Comp control £377.00 CARRIAGE PAID KR600RC	OSCAR MOBILE 370F 4m 2dB/4 £18.50 20W 2m 1/4 λ £3.00 2NE 2m 5/8 λ 3dB/4 £9.00 78F 2m 1/8 λ 4.5dB £18.60 78F 2m 1/8 λ ball mt £18.60 88F 2m 5.2 £18.60 25H 70cm 5.5dB/4 £29.37 26E 70cm 6dB/4 £29.37 35H 70cm 6.3dB/4 £33.70 70N2DX 2m/70 2.7/5.1 £22.90 2N6M 50/144 £10.47 72SM 2S 2m/70cm £9.20 38F 2m mobile ele £10.50 HS770 144/432 duplex £21.30 GCCA Gutter 4m cable £12.65 SOCA 4m cable + PL259 £7.20 SOCALL 6m cable + PL259 £8.60 SOCALL 4m long reach £11.75 TMCA5 trunk mount 6m £16.10 TMCA H.D. trunk mt £12.45 SOMM magnetic mt 4m £6.00 SOWM adj wing mount £6.45 GCCA gutter d/1 adj £11.50 BSD bumper strap £12.45 HS88BK bumper mt ext £23.35 CARRIAGE EXTRA £2 BASES FREE WITH ELEMENTS	TELESCOPIC 10R SECTIONS, GUYED 30ft £43.00 carr £5.00 40ft £69.57 carr £6.00 50ft £86.00 carr £8.00	TELO MASTS 30ft £43.00 carr £5.00 40ft £69.57 carr £6.00 50ft £86.00 carr £8.00		
ICOM ICV751 HF tcvr £1465.00 IC745 tcvr £799.00 IC735 HF tcvr £949.00 PS35 PSU £193.00 PS15 PSU £158.00 PS55 PSU £185.00 SM6 £39.10 ICR71 Receiver £825.00 IC271E 2m base £835.00 IC471E 70cm base £927.00 Higher power units available IC290D All-mode £542.00 IC27E 2m FM £399.00 IC47E 70cm FM £495.00 IC2E 2m £225.00 IC02E 2m £299.00 IC04E 70cm £299.00 BP3 Ni-cad pack £29.90 LC3 Case £6.90 LC11 Case £9.20	MORSE KEYS HK703 straight key £28.35 HK704 straight key £19.95 HK706 straight key £19.35 HK707 straight key £18.25 HK710 straight key £39.95 HK808 straight key £58.65 HK711 knee key £34.50 HK802 straight key £36.30 HK803 straight key £32.65 HK804 straight key £78.25 MHK831 st & squeeze £189.00 BK100 mech. bug £31.00 MK701 single paddle £28.50 MK702 single paddle £29.95 MK703 squeeze £31.00 MK705 squeeze £27.60 MK706 squeeze £25.30 POST & PACKING £1.50	COAX SWITCHES SZU 2way vhf £11.95 SZN 2way 'N' £19.45 KP21N 2way 'N' £27.60 AN2 2way side £4.60 AN3 2way side £5.00 POST AND PACKING £1.65	JVL QUADLOOP 144-160L 2m 16dBd £ 144-260L 2m 18.5dBd £ 432-190L 70cm 16.5 £45.00 432-270L 70cm 18.5 £65.00 1296-260L 23cm 18.5 £49.00 1296-170L 23cm 22 £79.00 2320-440L 13cm 21 £49.00 CARRIAGE EXTRA £2.50	COAX RELAYS ML144/30LS £94.30 MML144/50S £106.95 MML144/100S £149.95 MML144/100HS £159.85 MML432/30L £169.95 MML432/50 £149.95 MML432/100 £299.00 MML432/100 £37.90 MML144/28R £236.90 MML144/28R £35.65 MML432/28S £35.65 MML432/28S £39.90 MML432/144S £39.90 MML1296/144 £129.95	MICROWAVE M. ML144/30LS £94.30 MML144/50S £106.95 MML144/100S £149.95 MML144/100HS £159.85 MML432/30L £169.95 MML432/50 £149.95 MML432/100 £299.00 MML432/100 £37.90 MML144/28R £236.90 MML144/28R £35.65 MML432/28S £35.65 MML432/28S £39.90 MML432/144S £39.90 MML1296/144 £129.95	WALL BRACKETS W12 £8.75 p&p £2.95 W18 £11.17 p&p £3.75 W21 £12.07 p&p £3.75 W24 £13.88 p&p £3.75	MINI QUAD H01 £189 6-20M 1.2t ele Boom only 4.5ft Carriage £4.00 or G4MH mini beam only £88.50 carr £4.50
MET ANTENNAS 432/15B 70cm 5 ele. £19.49 432/17X 70cm crossed £56.55 432/17T 70cm 15dB £45.08 144/19T 2M 14.2dBd £64.26 50.5 6M 5 ele. £59.90 CARRIAGE EXTRA £2.65	MORSE TUTORS Dalong D70 go anywhere battery powered £56.65 M/M Morse talker £115.00 M/M Morse Caller £169.00	SMC SERVICE Free Interlink delivery on major equipment. Access and Barclaycard over the phone. Biggest branch agent and dealer network. Interlink Service contract at £7.30. Biggest stockist of amateur equipment. Same day despatch possible.	GUARANTEE Importer warranty on Yaesu Musen products. Ably staffed and equipped Service Department. Daily contact with the Yaesu Musen factory. Tens of thousands of spares and test equipment. Twenty-five years of professional experience. 2 Year warranty on regular priced Yaesu products.				

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On many regular priced items SMC offers Free Finance (on invoice balances over £120). 20% down and the balance over 6 months or 50% down and the balance over a year. You pay no more than the cash price! details on eligible items on request.



ICOM

IC-28E 2m. FM mini-mobile.

Rx Range 138-174 MHz.

This new 2 metre band transceiver is just 140mm (W) x 50mm (H) x 133mm (D) and will fit nearly anywhere in your vehicle or shack. Power output is 25 watts or 5 watts low power and is supplied complete with an internal loudspeaker.

The large front panel LCD readout is designed for wide angle viewing with an automatic dimmer circuit to control the back lighting of the display for day or night operation.

The front layout is very simple, all the controls are easy to select making mobile operation safe. The IC-28E contains 21 memory channels with duplex and memory skip functions. All memories and frequencies can be scanned by using the HM-15 microphone provided. Also available is the IC-28H with the same features but with a 45 watt output power.

Options include IC-PS45 13.8v 8A power supply, SP8 and SP10 external speakers, HS15 flexible mobile microphone and PTT switchbox.



IC-271 & 471 Multimode Base stations

ICOM can introduce you to a whole new world via the world-communication satellite OSCAR. Did you know that you can Tx to OSCAR on the 430-440 MHz IC-471 and Rx on the 2m IC-271.

By making simple modifications, you can track the VFO's of the Rx and Tx either normally or reverse. This is unique to these ICOM rigs and therefore very useful for OSCAR 10 communications. Digital A.F.C. can also be provided for UOSAT etc. This will give automatic tracking of the receiver with digital

readout of the doppler shift. The easy modifications needed to give you this

unique communications opportunity are published in the December '84 issue of OSCAR NEWS. Back issues of OSCAR NEWS can be obtained from AMSAT (UK), LONDON E12 5EQ.

This range includes the IC-271E-10W, IC-271E-25W, 271H-100W and the 70cm versions IC-471E-25W and 471H-75W r.f. output. The 271E has an optional switchable front-end pre-amp. The 271H can use the pre-amp AG-25, with the 471E and 471H using the AG35 mast-head pre-amp. Other options include internal switch-mode PSU's: the 271E and 471E use the PS25 and the 271H and 471H use the PS35.



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ICOM

The ICOM Control System

If you have a BBC Micro (Model B) or Commodore 64 or 128, the ICOM control system can control up to four (or more) ICOM radios in the range IC-751, 735, R71, R7000, 271, 471 and 1271 (and 745 with modification). The help menu shows the available functions.

H = HELP	↔ Frequency Steps
F0 Frequency	↑ V Up/Down (arrows)
F1 Select Mode	M Memory Channel
F2 Freq/Memory Scan	.. Memory Up/Down
F3 Mode Scan	/ VFO/Memory
F4 VFO - Memory	B Bargraph Select
F5 Memory Write	@ Occupancy On/Off
F6 Memory Clear	: Scan Stop Off/On
F7 Set SIG Level	S Change Set
F8 Memory File Read	DEL Speech (If fitted)
F9 Memory File Write	Q Quit



IC-735, The Compact HF Radio

The new ICOM IC-735 is ideal for mobile portable or base station operation. It has a general coverage receiver from 0.1MHz to 30MHz and transmits on all amateur bands from 160m to 10m. SSB, CW, AM and FM modes are included as standard. RTTY and Amtor are also possible. The IC-735 has a built-in receiver attenuator, pre-amp, noise blanker and RIT to enhance receiver performance. A 105dB dynamic range with pass band tuning and a sharp I.F. notch filter for superior reception. The twin VFO's and 12 memories can store mode and frequency. The HM12 scanning mic is supplied. Scanning functions include programme scan, memory scan and frequency scan. The IC-735 is one of the first H.F. transceivers to use a liquid crystal display which is easily visible under difficult conditions. Controls that require rare adjustment are placed behind the front panel hatch cover but are immediately accessible. Computer remote control is possible via the RS-232 jack. Output power can be adjusted from 10 to 100 watts with 100% duty cycle. A new line of accessories are available, including the AT150 electronic automatic antenna tuner and the PS55 AC power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories. See the IC-735 at your authorised ICOM dealer or contact Thanet Electronics Limited.

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ICOM

VHF/UHF FM Handportables

If you want a handheld with exceptional features, quality built to last and a wide variety of interchangeable accessories, take a look at the ICOM range of FM transceivers. All ICOM handhelds come with an IC-BP3 nicad battery pack, flexible antenna, AC wall charger, belt clip, wrist strap and personal earpiece as standard.

IC-2E/4E, 2 metre and 70cm thumbwheel handportable.

These popular handhelds from ICOM are still available. For those Amateurs who require a simple but effective FM transceiver the IC-2E and 4E take some beating. Frequency selection is by means of thumbwheel switches (with 5kHz up-switch) and duplex or simplex facility. Power output is 1.5 watts or 150 milliwatts (2.5 watts is possible with IC-BP5A battery pack).

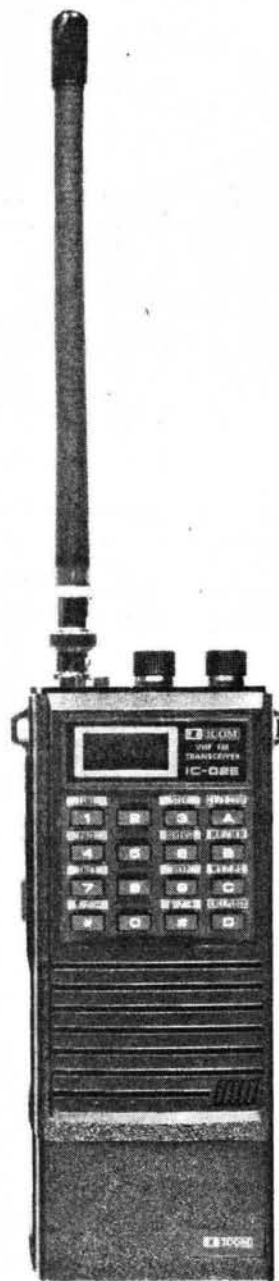
IC-02E/04E 2 metre and 70cm keypad handportable.

These direct-entry CPU controlled handhelds utilize a 16-button keypad allowing easy access to frequencies, memories and scanning. Ten memories store frequency and offset. Three scanning systems, priority, memory and programmable band scan, (the IC-02E now with an improved CPU retains duplex offset). These handhelds have an LCD readout indicating frequency, memory channel, signal strength, transmitter output and scanning functions. Power output is 3 watts or 0.5 watt in low power position for the IC-02E and 2.5 watts or 0.5 watt for the IC-04E. (5 watts is possible with the IC-BP7 battery pack or external 13.8V.DC.)

STOP PRESS. New handheld available. Just released is the **IC-12E** 23cm keypad handportable, this new transceiver has direct keypad entry for frequency, memories and scanning systems. Ten memories store operating frequency simplex or duplex. An internal power module provides 1 watt or 100 milliwatts of RF power. Five tuning speeds including 12.5kHz and 25kHz.

Also available for ICOM handhelds are a large range of optional extras including a variety of rechargeable nicad power packs, dry-cell battery pack, desk charger, headset and boom mic, speaker mic, leatherette cases and mobile mounting brackets.

For more information on these handportables and other ICOM Amateur equipment contact your local authorised ICOM dealer or Thanet Electronics Ltd.



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ICOM

IC-3200E Dual-band



If you are a newly licensed or just undecided about which band to first operate, then the ICOM IC-3200E is just the answer. This is a dual-band (144-146/430-440MHz) F.M. transceiver ideally suited for the mobile operator. The IC-3200E has a built in duplexer and can operate on one antenna for both VHF and UHF, and with 25 watts of output power on both bands (the low power can be adjusted from 1 to 10 watts) you can never be far from a contact whether simplex or 2m/70cm repeater.

The IC-3200E employs a function key for low priority operations to simplify the front panel and a new LCD display which is

easy to read in bright sunlight, 10 memory channels will show operating frequencies simplex or duplex, and four scanning systems memory, band, program and priority scan. Try this exciting set from ICOM the IC-3200E, when only the best will do.

Options include IC-PS45 AC power supply, HS15 mobile boom mic, SP10 external speaker, UT23 speech synthesizer and AH32 dual-band mobile antenna.

Telephone us free-of-charge on:

HELPLINE 0800-521145.

— Mon-Fri 09.00-13.00 and 1400-17.30 —

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

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



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

Alyntronics, Newcastle, 091-761002.
Amateur Radio Exchange, London (Ealing), 01-992 5765.
Amcomm, London (S. Harrow), 01-422 9585.
A.R.E. Comms, Earlestown, Merseyside, 09252-29881.
Arrow Electronics Ltd., Chelmsford, Essex, 0245-381673/26.
Beamrite, Cardiff, 0222-486884.
Booth Holdings (Bath) Ltd., Bristol, 02217-2402.
Bredhurst Electronics Ltd., W. Sussex, 0444-400786.
D.P. Hobbs, Norwich, 0603-615786.
Dressler (UK) Ltd., London (Leyton), 01-558 0854.
D.W. Electronics, Widnes, Cheshire, 051-420 2559.
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TS811E	70cm Base Stations	895.00	(—)
CD10	callign display unit for DCS system	119.23	(1.50)
TR3600	70cm Handheld with DCS	324.36	(—)
TR2600	New 2M FM Synthesised Handheld	324.36	(—)
ST2	Base Stand	66.11	(1.50)
SMC30	Speaker Mike	24.30	(1.00)
PB26	Spare Battery Pack	28.26	(1.00)
MS1	Mobile Stand	38.41	(1.00)
R2000	Synthesised 200KHz-30MHz Receiver	518.73	(2.50)
VC10	VHF Converter 118-174MHz for R2000	139.05	(2.00)
H55	Deluxe Headphones	29.39	(1.00)
SP40	Mobile External Speaker	18.08	(1.00)
TL922	160/10M 2kW Linear	1265.00	(7.00)
TR9300	6M M/M Transceiver	499.00	(5.00)
NEW			
TR751E	2M Multimode with DCL (mobile)	525.00	(3.00)
MU1	DCL option for TR751E	26.76	(1.00)

Linear Amps

MML144/30-LS	inc preamp (1/3w i/p)	84.38	(2.00)
MML144/50-S	inc preamp, switchable	106.95	(2.00)
MML144/100-S	inc preamp (10w i/p)	149.95	(2.50)
MML144/100-HS	inc preamp (25w i/p)	159.95	(2.50)
MML144/100-LS	inc preamp (1/3w i/p)	169.95	(2.50)
MML144/200S	inc preamp (3/10/25 i/p)	334.65	(2.50)
MML432/30L	inc preamp (1/3w i/p)	169.95	(2.00)
MML432/50L	inc preamp (10w i/p)	149.50	(2.00)
MML432/100	linear (10w i/p)	334.65	(2.50)
MMT144/28	2M linear transverter 10W output	129.95	(3.50)
MMT144/28R	2M linear transverter 25W output	236.90	(3.50)
MMT432/28S	70cm linear transverter 10W output	195.50	(3.50)
MMT1296/144G	23cm linear transverter 2W output	258.75	(3.50)
MMG144/28	2M converter	35.65	(2.00)
MMG144V	2M RF switched GASFET preamp	37.90	(2.00)
B.N.O.S.			
LPM 144-1-100	2m, 1W in, 100W out, preamp	197.50	(2.50)
LPM 144-3-100	2m, 3W in, 100W out, preamp	197.50	(2.50)
LPM 144-10-100	2m, 10W in, 100W out, preamp	175.00	(2.50)
LPM 144-25-160	2m, 25W in, 160W out, preamp	255.00	(2.50)
LPM 144-3-180	2m, 3W in, 180W out, preamp	295.00	(2.50)
LPM 144-10-180	2m, 10W in, 180W out, preamp	295.00	(2.50)
LP 144-3-50	2M, 3W in, 50W out, preamp	125.00	(2.50)
LP 144-10-50	2M, 10W in, 50W out, preamp	125.00	(2.50)
LP 432-1-50	70cm, 1W in, 50W out, preamp	235.00	(2.50)
LP 432-3-50	70cm, 3W in, 50W out, preamp	235.00	(2.50)
LP 432-10-50	70cm, 10W in, 50W out, preamp	195.00	(2.50)
LP 432-10-100	70cm, 10W in, 100W out, preamp	335.00	(2.50)

SWR/PWR Meters

WELX	1.8-150MHz PWR-SWR	36.50	(1.50)
SP10X	1.8-60MHz PWR-SWR	85.00	(1.50)
SP220	1.8-200MHz PWR-SWR	59.95	(1.50)
SP225	1.8-200MHz PWR-SWR	109.95	(1.50)
SP420	1.8-525MHz PWR-SWR	71.00	(1.50)
SP425	140-525MHz PWR-SWR	109.95	(1.50)
SP25	1.8-200MHz 430-450MHz, 800-930MHz and 1240-1300MHz SWR/Power meter	163.00	(2.00)
DANFA Power and SWR METERS			
CN410M	3.5-150 MHz mobile cross needle meter	53.30	(1.50)
CN460M	140-150MHz mobile cross needle meter	57.75	(1.50)
NS448	900-1300MHz swr/power meter 520W	78.00	(2.50)
NS660P	1.8-150MHz PEP Cross Needle Meter up to 1.5KW	99.50	(2.50)
TRIO Power and SWR METERS			
SW100A	SWR/power meter 1.8-150MHz	42.95	(2.50)
SW100B	SWR/power meter 140-450MHz	42.95	(2.50)
SW200A	SWR/power/PEP meter 1.8-150MHz	92.70	(2.50)
SW200B	SWR/power/PEP meter 140-450MHz	92.70	(2.50)
SW2000	SWR/power/PEP meter 1.8-54MHz up to 2KW	99.00	(2.50)
SWC1	Optional coupler for SW200 1.8-150MHz	25.50	(1.50)

SWC2

SWC3	Optional coupler for SW200	25.50	(1.50)
SWC4	2KW HF coupler for SW200A/B	30.20	(1.50)
	23cm coupler for SW200A/B	39.90	(1.50)

VHF Receivers

NEW

RT7000

AOR 2002	VHF/UHF continuous coverage scanner	£899.00	(3.00)
FRG9600	60-905MHz scanning receiver	435.00	(3.00)
HX2000E	Handheld VHF-UHF scanner	269.00	(3.00)
R537S	Handheld airband receiver	64.90	(2.50)
R532	Mobile Base-Portable airband receiver	209.80	(3.00)

Sony Products

2001D	150KHz-30MHz, 76-108MHz, 108-136MHz 32 memories AM-SSB-FM broadcast/airband	329.95	(3.00)
7600D	150KHz-30MHz, 76-108MHz 10 memories AM/SSB-FM broadcast receiver	179.95	(3.00)
Air-7	108-136MHz, 144-174MHz, 76-108MHz + LW/MW-SW superb handheld receiver	249.95	(3.00)

Icom Products

IC751A	HF Transceiver	1399.00	(—)
IC735	New HF Transceiver	899.00	(—)
P.S. Unit		149.50	(4.00)
PS30	Systems p.s.u. 25A	343.85	(—)
SM6	Base microphone for 751/745	39.10	(1.00)
IC2900	2m 25W M/Mode	519.00	(—)
IC271E	2m 10W M/Mode Base Stn.	649.00	(—)
IC271H	100W version of above	979.00	(—)
ICR71	General Coverage Receiver	789.00	(—)
IC02E	2m H/Hand	299.00	(—)
IC04E	70cm handheld	299.00	(—)
BC35	Base Charger	67.85	(1.00)
HM9	Speaker mic	20.70	(1.00)
LC11	Case for IC02E-04E	8.05	(1.00)
BP4	Empty battery pack for Icom handhelds	9.20	(1.00)
IC490E	70cm 10W multimode	579.00	(3.00)
BP3	Sid Battery Pack	28.75	(1.00)
BP5	High Power Battery Pack	58.65	(1.00)
CP1	Car Charging Lead	6.90	(1.00)
DC1	12v Adaptor	17.25	(1.00)
RT7000	VHF/UHF Scanning Receiver	899.00	(—)
IC3200	2M/70cm Mobile Transceiver	529.00	(—)

SPECIAL OFFER

IC505	50MHz multimode 10W ONLY	349.00	(3.00)
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NEW

IC28H

SLNA 50	50MHz Switched preamp	49.90	(1.50)
SLNA 144S	144MHz Low noise switched preamp	41.95	(1.50)
SLNA 145Sb	Preamp intended for 290	31.90	(1.50)
GLNA 432e	70cm Mast head preamp	159.90	(2.50)
B88A 500u	20-500MHz Preamp	34.90	(1.50)
TVHF 230C	2M HF Transverter	299.90	(2.50)
TVVF 50c	60M Transverter 2m input	209.90	(2.50)
GLNA 433e	70cm Pre-amp	89.90	(2.50)
TVVF 144a	2M Transverter	249.90	(2.50)
GMFA 144e	2M Mast Head Preamp	119.95	(2.50)
TVVF 30a	6M Transverter 10M input	249.90	(2.50)

CW/RTTY Equipment

BENCHER			
BY1	Squeeze Key, Black base	67.42	(2.00)
BY2	Squeeze Key, Chrome base	76.57	(2.00)
H8-MOUND MORSE KEYS			
HK708	Straight key	18.10	(2.50)
HK702	Deluxe version of above on Marble Base	34.50	(3.00)
HK706	Straight key	19.50	(2.50)
HK707	Straight key	18.50	(2.50)
MK704	Squeeze paddle	17.50	(2.50)
MK705	Squeeze paddle on Marble Base	27.90	(3.00)
RTTY-EQUIPMENT			
PK54	Packet AX-25, Amtor, RTTY, CW and ASCII	239.00	(4.00)
HFM-64	Modem	100.00	(2.50)
AMT-2	Terminal Unit RTTY/AMTOR/ASCII/CW	245.00	(3.00)
AMT-2/CBM64	Software for the above for the Commodore 64	51.75	(2.50)
AMT-2/VIC20	Software for the above for the Commodore VIC 20	51.75	(2.50)
AMT-2/BBC B	Software for the above for the BBC B	44.85	(2.50)
CWR 610E	RTTY/CW/ASCII Decoder	216.40	(3.00)
CD660	Amtor/RTTY/CW/ASCII decoder	231.00	(3.00)
Soon to be available software for the Amstrad 644 series.			
KEYERS & ACCESSORIES			
Star Master Key	Electronic Keyer	54.70	(3.00)
NEW Star	Masterkey electronics CMOS memory keyer	95.00	(3.00)
TRX3	Morse Oscillator	11.70	(1.50)
Drae	Morse Tutor	52.00	(3.00)

Yaesu

FT757GX	HF Transceiver	879.00	(—)
FC757	Auto A.T.U.	318.00	(2.00)
FP757HD	Heavy Duty PSU	199.00	(2.00)
FP757GX	Switched Mode PSU	199.00	(2.00)
FT190	2m M/Mode Port/Transceiver	369.00	(—)
FT190	With Mutek front end fitted	399.00	(—)
MM111	Mobile Bracket	33.00	(1.00)
NC11	Charger	10.00	(1.00)
CSC1A	Carrying Case	6.50	(1.00)
YHA15	2m Helical	7.50	(1.00)
YHA44D	70cm jwave	10.95	(1.00)
YMA49	Speaker Mike FT290/790	19.00	(1.00)
FT203R	NEW 2m H/Hand/CW/FNB3	225.00	(—)
FT209R	NEW 2m H/Hand/CW/FNB3	255.00	(—)
FT703R	70cm H/Hand	255.00	(—)
FT709R	70cm H/Hand	255.00	(—)
FT270R	2m 25W F.M.	359.00	(—)

P&P

FT2700R	2m/70cm/25W/25W	499.00	(—)
MMB10	Mobile Bracket FT209/709	8.50	(1.00)
NC3C	Charger	19.00	(1.00)
PA3	Car Adaptor/Charger	19.00	(1.00)
FNB2	Spare Battery Pack	25.00	(1.00)
YM24A	Speaker Mike FT208/708	27.00	(1.00)
FT268R	2m Base Station	899.00	(—)
430/726	70cm Module for above	309.00	(2.50)
FRG8800	HF Receiver	575.00	(—)
FRV8800	Converter 118-175 for above	90.00	(1.50)
Hand 600	Hand 600 8pin mic	17.00	(1.00)
Desk 600	Desk 600 8pin mic	75.00	(1.00)
MD188	Boom mobile mic	23.00	(1.00)
MF1A38	Lightweight phones	17.50	(1.00)
YH77	Padded phones	17.50	(1.00)
YH55	L/weight Mobile H/set-Boom mic	17.00	(1.00)
YH1	L/weight mobile H/set-Boom mic	17.00	(1.00)
YH2	PTT Switch Box 208/708	16.00	(1.00)
SB1	PTT Switch Box 250/790	18.50	(1.00)
SB2	PTT Switch Box 270/2700	18.50	(1.00)
SB10	World Time Clock	39.00	(1.00)
QTR24D			
FT767GX			

FL7000	HF Gen. Coverage trans. with optional VHF/UHF 6M modules	P.O.A.	(—)
FT727G	Solid state linear with built in auto ATU	P.O.A.	(—)
FT727G	Dual band handheld transceiver 144-146MHz, 430-440MHz up to 5W on each band	P.O.A.	(—)
FT290R	MKII, 2M multimode portable with optional 25W linear	P.O.A.	(—)

Power Supplies

DRAE			
4 amp	40.50 (2.00)	6 amp	69.00 (2.50)
6 amp	63.00 (2.50)	12 amp	115.00 (3.00)
12 amp	86.50 (3.00)	25 amp	168.00 (4.00)
24 amp	125.00 (4.00)	40 amp	345.00 (4.00)

Aerial Rotators

KR400	Med/H Duty	119.00	(2.50)
KR500	6 core Elevation	139.95	(2.50)
KR400RC	5 core Medium Duty	147.95	(2.50)
KR600RC	6 core Heavy Duty	199.00	(2.50)
KD038	lower mast clamps	14.00	(2.50)

Switches

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UHF MOBILE



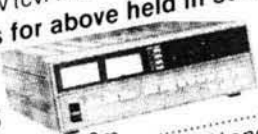
YAESU FT 770RH 70cm 25w FM high visibility display	435.00
YAESU FT 790R 70cms all mode	469.00
YAESU FT 2700RH 70cm/2m 25w each band full duplex	449.00
ICOM IC 490E all mode 70cms 10w/1w	529.00
ICOM 3200E 2m/70cm 25w each band	479.00
ICOM IC 47E 25w FM very small 9 memories	445.00

HF EQUIPMENT



YAESU FT 767 1.8Mhz-430Mhz. All mode gen cov rcvr	POA
YAESU FT ONE gen cov tcvr	1999.00
YAESU FT 980 gen cov tcvr inc AM/FM	1750.00
YAESU FT 757GX gen cov tcvr inc AM/FM/Keyer	839.00
ICOM IC 751A gen cov tcvr inc AM/FM/Keyer	1299.00
ICOM IC 745 gen cov tcvr	925.00
ICOM IC 735 gen cov tcvr inc AM/FM	829.00

HF LINEAR AMPLIFIERS



YAESU FL 2100Z 160m to 10m	862.00
YAESU FL 7000 solid state integral PSU and ATU	POA
TOKYO HL 1K 1kw amplifier	829.00
TOKYO HL 1KGX new 1K linear	POA
TOKYO HL 2K new 2K linear	POA
TOKYO HL 3K 3Kw new linear	POA
ICOM IC 2K/LPS	1625.00

HANDHELD TRANSCEIVERS

FT 727 VHF UHF Hand held	POA
YAESU FT 203R with FBA 5 battery case	185.00
YAESU FT 203R with FNB 3 nicad 2.7w	215.00
YAESU FT 203R with FNB 4 nicad 3.7w out	219.00
YAESU FT 203R with FBA 5 battery case 1.8w	229.00
YAESU FT 209R with FBA 5 battery case 2.7w	255.00
YAESU FT 209R with FNB 3 nicad 2.7w	260.00
YAESU FT 209R with FNB 4 nicad 3.7w	235.00
YAESU FT 209R with FBA 5 battery case	265.00
YAESU FT 209RH with FNB 3 nicad 3.7w	269.00
YAESU FT 209TH with FNB 4 nicad 5w	189.00
YAESU FT 209RH with FNB 3 nicad 3.7w	289.00
YAESU FT 209RH with FNB 4 nicad 5w	275.00
ICOM IC 2E synthesised 1.5w 2m	289.00
ICOM IC 02E keypad entry lcd display	
ICOM IC 4E synthesised 1.5w 70cm	
ICOM IC 04E keypad entry lcd display 70cms	
FT 703R and FT 709R available same output spec as FT 203/209.	

RECEIVERS



YAESU FRG 8800 gen cov 150Khz-30Mhz large display, keyboard entry/free tuning	540.00
ICOM IC R71 100 Hz to 30Mhz passband tuning/notch filter, variable tuning rate	729.00
YAESU FRV 8800 converter module 118-179 for FRG 8800 range extension	90.00
AOR 2002 UHF/VHF 25Mhz-550Mhz and 800Mhz-1300Mhz	425.00
YAESU FRG 9600 UHF/VHF Scanning receiver all mode 100 mem. Now up to 950Mhz	429.00
ICOM R7000 Scanning rcvr 25-2000Mhz 99 memories all mode	849.00
FDK ATC 720 airband rcvr handheld 720 channels	189.00
FDK RX 40 141-180Mhz handheld rcvr	159.00
JIL SX 400 UHF/VHF rcvr inc PSU	598.00

RTTY/CW

TONO 5000E CW RTTY ASCII and AMTOR c/w 5" high res monitor	POA
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VHF MOBILE TRANSCEIVERS

Range of 50Mhz equipment both YAESU and ICOM in stock.

YAESU FT 290R mob/port 2m all mode c/w nicads, chgr, case	369.00
YAESU FT 290R as above with Mutek	399.00
YAESU FT 270R 25w FM	315.00
YAESU FT 270RH 45w FM with fan	359.00
YAESU FT 2700RH 2m/70cms 25w each band full duplex	449.00
YAESU FT 2700RH 25w all mode	469.00
ICOM IC 290D 25w all mode	359.00
ICOM IC 27E 25w FM 9 mem	399.00
ICOM IC 27H 45w FM 9 mem	449.00
FDK M750XX 2m all mode 20w	279.00
FDK M725X 2m FM 25w	

VHF BASE STATIONS

YAESU FT 726R/2M all 726 options available	899.00
ICOM 271E multi mode 25w 32 mem	779.00
ICOM IC 271E/H multi mode 100w	979.00

UHF BASE STATIONS

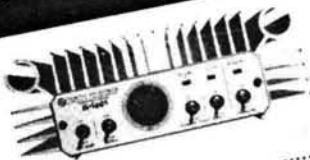
YAESU FT 726 70cms multimode — all 726 options	899.00
ICOM 471 E 25w multimode 70cms	889.00
ICOM 471 H high power multimode (75w) — 70cms	1099.00
ICOM 1271 E multimode 1240-1300Mhz	1099.00

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VHF LINEAR AMPLIFIERS



TOKYO	
HL160V 2m 10w in 160w out	239.00
HL82V 2m 10w in nom 85w, typ 100w out	139.00
HL110V 2m 10w in 110w out	239.00
HL35 2m Gaasfet preamp .5-5w in 35w out	75.00
HL30V 2m .5-3w in 30w out	54.00
HL20U 70cms .5-3w in 20w out	—
HL30U 70cms Gaasfet preamp 2w in 30w out	120.00
HL30U 70cms Gaasfet preamp 1-15w in 60w out	215.00
HL60U 70cms Gaasfet preamp 12w in 100w out	399.00
HL120U 70cms Gaasfet	—
HRA 2 2m mast preamp, Gaasfet	—
HRA 7 70cms mast preamp, Gaasfet	—

BNOS	
LPM 144-1-100 2m c/w preamp 1w for 100w out	197.50
LPM 144-10-100 2m c/w preamp 10w for 100w out	175.00
LPM 144-3-100 2m c/w preamp 3w for 100w out	197.50
LPM 144-25-160 2m c/w preamp 25w for 160w out	250.00
LPM 144-3-180 2m c/w preamp 3w for 180w out	290.00
LPM 144-10-180 2m c/w preamp 10w for 180w out	290.00
LPM 144-3-50 2m c/w preamp 3w for 50w out	125.00
LP144-3-50 2m c/w preamp 10w for 50w out	125.00
LP144-10-50 2m c/w preamp 1w for 50w out	230.00
LPM 432-3-50 70cm c/w preamp 3w for 50w out	235.00
LPM 432-3-50 70cm c/w preamp 10w for 50w out	195.00
LPM 432-10-50 70cm c/w preamp 10w for 100w out	329.00
LPM 432-10-100 70cm c/w preamp 10w for 100w out	—

MICROWAVE MODULES range also available, call for details or literature on above.



ANTENNA COUPLERS

AMCOMM 9000 coax, random wire, tuned feeders 100w	89.00
CAPCO SPC 300C 1Kw antenna coupler	188.37
CAPCO SPC 300C 3Kw antenna coupler	279.42
CAPCO SPC 300M 1Kw module only	103.09
CAPCO SPC 300M 3Kw module only	132.18
TOKYO HC 200 8 band 200w pep with SWR/power meter	115.00
TOKYO HC 400 9 band 350w pep with SWR/power meter	199.00
TOKYO HC 2000 9 band 2Kw pep	399.00
WELZ AC 38 3.5-30Mhz 200w	85.00
ICOM AT 100 100w auto antenna coupler	345.00
ICOM AT 500 500w auto antenna coupler	475.00
YAESU FC 757GX auto antenna coupler	318.00
YAESU FRT 7700 receiver antenna tuner	49.85

HEIL ACCESSORIES

HEIL HC3 Mic element Yaesu/Trio	22.85
HEIL HC5 Mic element Icom SM5/6	25.40
HEIL HM5 Desk Mic (300Hz-3Khz) cardioid	59.00
HEIL MM5 handheld Mic with HC3	29.00
HEIL SS2 Speaker special comms spkr	59.00
HEIL EQ300 Mic Equaliser	65.00
HEIL BM10 lightweight headset/boom mic	65.00

POWER SUPPLIES

YAESU FP 757HD 20A	199.00
YAESU FP 757 GX 20A	169.00
YAESU FP 700 20A	175.00
BNOS 12/6amp	69.00
BNOS 12/12amp	115.00
BNOS 12/25amp	169.00
BNOS 12/40amp	340.00
BNOS professional range also available on request	POA
ICOM IC PS 35 switch mode	182.00
ICOM PS 15 20amp external	149.00
ICOM IC PS 55 20amp	185.00
ICOM IC2 KLPS to match IC2KL linear	349.00
ICOM IC PS 25 switch mode	106.00
SMC RS 12 4amp 5 amp peak	14.95
DRAE 4 amp	40.50
DRAE 6 amp	63.00
DRAE 12 amp	86.50
DRAE 24 amp	125.00

HI-MOUND MORSE KEYS

HK 702 manual with marble base	37.00
HK 704 manual	24.50
HK 705 manual	19.00
HK 706 manual	19.35
HK 707 manual	18.25
HK 708 manual	18.00
HK 802 manual solid brass	87.50
HK 803 manual solid brass	84.00
MK 701 single lever paddle	28.50
MK 702 single lever paddle	29.95
MK 703 twin paddle squeeze heavy base	32.50
MK 705 twin paddle squeeze marble base	28.50
KENPRO KP 100 squeeze paddle/Cmos keyer	89.00
230v/13.8v	—
KENPRO KP 200 squeeze paddle/keyer multi memory	179.00
4096 bit	—

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ORDER FORM

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by ☐ Cheque ☐ Barclaycard (Number _____) Name _____

Address _____

Tel. _____

I enclose payment for: £ _____

☐ Access (Number _____) Call Sign _____

PW 10/86



Mobile Safety

Sir: Regarding the letter from G3KPO in the August issue of *PW*, readers may like to know that changes are being made to the *Highway Code*. A proposed new rule, 49A—*Microphones and Car Telephones*, advises:

"Do not use a hand held microphone or telephone handset while your vehicle is moving, except in an emergency. You should only speak into a fixed, neckslung, or clipped on microphone when it would not distract your attention

from the road. Do not stop on the hard shoulder of a motorway to answer or make a call, however urgent."

Personally, I would be more inclined to drop a £10 microphone than a £1000 telephone, as I think most drivers would be. Also with radio you can ask the station at the other end to wait, if you need both hands, at no cost, unlike a telephone at about 25p a minute. I hope this will help out, as regards the law on this matter.

**P. J. Penycate BRS87468
Bracknell, Berks.**

The Highway Code does not itself, of course, have the force of law, but failure to observe its provisions would count against a road-user involved in an accident. Also this amendment to the Highway Code is only proposed at the moment and could be changed still further before actually becoming

final.

The advice contained in this proposed rule is very sensible, and is similar to that which has appeared for many years in the RSGB Mobile Safety Recommendations. For those not familiar with the twelve recommendations from the RSGB, they can be found in the publication Amateur Radio Operating Manual—3rd Edition, by R. J. Eckersley G4FTJ.

The Good News...

Sir: Back in October 1982, I picked up a copy of *Practical Wireless* from a newsagent's stand. I had not read the magazine for many, many years and so I was pleasantly surprised to find that its contents related so much to amateur radio. I immediately placed an order with my newsagent and

have received it regularly ever since.

I like the "feel" of the magazine, I like its presentation and layout. It has eye appeal, but above all I like its contents. It caters for all levels, from the beginner to the amateur who knows it all (or thinks he does). I like its sense of humour—does our very technical hobby have to be so boringly stuffy as other journals would have it? Although radio technology is very much part of our game, behind every callsign is an individual who is different from the next.

After reading the August 1986 issue of *PW*, I congratulate Gordon King G4VFW on his strikingly graphic article about his confrontation with a.c. mains. Thank God he lived to write it. The *Portrait Of An Old Timer*—G6QN, by Tony Smith G4FAI warmed the

PW COMMENT

Freedom

WHAT THE LAW SAYS about the rights of an individual to listen to radio signals from stations other than broadcast and amateur varies considerably from country to country. In the UK, the Wireless Telegraphy Acts permit listening to "authorised broadcasting stations and licensed amateur stations" only, unless you have a licence for some other service. For the general public, the only licence freely available is the CB Licence, which you need even if you only intend to listen. Those who would like to see less restriction, and I am among them, often quote the USA as the shining example of the freedom to listen. You might summarise the difference in attitude between the radio listening regulations of the two countries thus: In America, everything is permitted which is not forbidden; in Britain, everything is forbidden which is not permitted.

Now, from reports which have been appearing recently in the US magazine *Ham Radio* it seems that there is a grave risk that restrictive legislation similar to the UK Wireless Telegraphy Acts may soon be enacted in the USA. Over there, the present law, the Communications Act of 1934, does not seek to limit the freedom to listen, but instead provides severe penalties for anyone who misuses or divulges any private communication heard over the air, a far more sensible approach to radio eavesdropping. As Joseph Schroder W9JUV put it in his leader in the February 1986 *HR*, "In 1934, at least, the framers of the law were wise enough to realise that they could not stop casual radio listening without placing a 'Kilocycle Cop' in every household."

The new legislation proposed for the USA is in the Electronic Communications Privacy Act of 1986, which has the declared intent, according to its sponsors, of imposing severe sanctions on casual listening outside the amateur and broadcast bands. The US Justice Department has already said that it couldn't and wouldn't enforce the Act against casual listeners: they obviously have a far more realistic outlook on life than the members of the House of Representatives Sub-committee responsible for drafting the Act.

Why, after all these years, is it proposed to do a "U"-turn on the right to listen in the USA? The answer is intense lobbying by the cellular radio industry. As W8JUV puts it: "After all the

time, money and technical genius they've invested in developing cellular technology, they've suddenly discovered it is possible for others to eavesdrop on what their customers are saying. So have they harnessed some of their technical genius to solve this terrible problem? Of course not. They've gone to the place where any and all problems are solved easily and at someone else's expense: Washington DC."

In the process of drafting the resulting legislation, it's been extended to cover the entire radio spectrum from d.c. to light. When you consider that there are an estimated 480 million broadcast receivers in use in the United States, a large proportion of which will tune outside the broadcast bands, it is pretty obvious that the new law will be unenforceable. And as I've said before in these pages, unenforceable law is bad law.

One thing on which I would agree with the members of that House of Representatives Sub-committee, is the right of everyone to privacy in their telephone conversations. The way to ensure that, though, is to use a little bit of modern technology. On this side of the Atlantic, a couple of UK companies have seen the need, realised the market potential and done something about it. Advanced Electronic Products (Merseyside) Limited have designed a unique low-cost scrambler i.c. intended for use in cordless and cellular telephones, mobile radios and security systems. The DVS100 chip will be manufactured by Marconi Electronic Devices Limited, and will be used by equipment manufacturers under the "Supatel" brand label.

Manufactured in bulk c.m.o.s., the new device is a digital speech processor using time division multiplex (t.d.m.) encryption techniques to give effective security with excellent voice quality. The t.d.m. scrambling technique "slices" the speech waveform in the time domain and then transmits the slices in a different order. This breaks up the phonetic content of the waveform, and makes the transmitted signal unintelligible to the human ear. At the receiving end a similar circuit, synchronised with the transmitter processor, puts the slices back into the right order again. The DVS100 plus one 64K DRAM, can encrypt and decrypt two analogue speech channels in a full duplex system.

I wish the two companies responsible every success with this new product, both in the UK and overseas.

Geoff Arnold

heart. The feature by Nigel Cawthorne G3TXF on the Dayton Hamvention illustrated so well an aspect of the US amateur radio scene. Particularly praiseworthy is the article by David Iles G4XGA* on his portable contest experiences. Not only does it hold one's interest in reading it, but his literary style would do credit to a professional journalist. (Perhaps he is one!)

What a thought-provoking article John Feeley G4MRB has written—*It Comes To Us All* he said. Nothing to do with amateur radio you say? Well, the "Silent Key" For Sale adverts are pertinent evidence that it is relevant. Finally, the letter from Australian reader T. Mitchell about the PWFET Dip Oscillator by John Thornton Lawrence GW3JGA prompted me to look at it again and so I have promised myself I am going to build it.

Keep up this interesting mix of good technical articles with touches of humour and human interest and you will have me as a faithful reader until "It comes to me" also.

John V. Hoban G3EGC
Bolton, Lancs.

**Our apologies to G4XGA for mis-spelling his surname in our August issue. Talking of John Thornton Lawrence, watch our pages for another useful item of test-equipment from his workbench in the very near future.—Ed.*

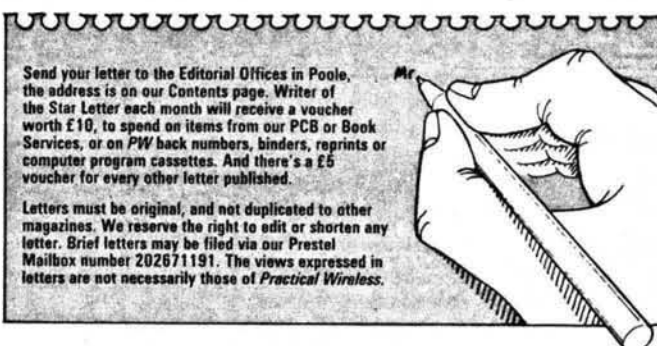
... and the Bad!

Sir: What a "doom and gloom" issue was August PW—enough to drive one to 27MHz! Not one, but six pages on the delights of a demise via electric shocks, plus another page on how to dispose of your gear **before** you're dead.

All we need now is a monthly obituary column, and adverts listing ex-government coffins and slightly used urns. Blow me! —I know that amateur radio is supposed to be a forward-looking hobby, but need we look that far forward?

H. N. Kirk G3JDK
Rotherham, Yorks.

The whole point of the articles was that safety should be borne in mind at all times. We never know when our time may come—it could be tomorrow, or even today—but there's no sense in hastening the day by our own carelessness!—Ed.



Send your letter to the Editorial Offices in Poole, the address is on our Contents page. Writer of the Star Letter each month will receive a voucher worth £10, to spend on items from our PCB or Book Services, or on PW back numbers, binders, reprints or computer program cassettes. And there's a £5 voucher for every other letter published.

Letters must be original, and not duplicated to other magazines. We reserve the right to edit or shorten any letter. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of Practical Wireless.

Interference

Sir: Your PW Comment, (June 1986 issue), on the trials and tribulations of some radio amateurs and their neighbours neatly focuses on the need to strike a balance between conflicting "rights". It is easy for administrators to sort out a conflict of "right" and "wrong"; much more difficult to deal with those cases where both sides demonstrably have rights and responsibilities in conflict.

The Department's attitude is therefore to try to bring together the two sides of the dispute and we shall continue this policy of discussion, negotiation, reconciliation and occasional table thumping which seems to be the lot of radio

regulators in all parts of the spectrum. Whilst the problem has been more prominent in some parts of the amateur press it is important to note that there are only a very few cases of difficulty. Unfortunately where they do occur what tends to suffer in the end is the good name that has so long been enjoyed by amateur radio.

As your comment column points out the problem is likely to get worse so the Department needs to consider both immediate problem cases and also to seek long term solutions with manufacturers and of course the RSGB.

M. V. Coolican
Dept of Trade & Industry
London SE1

OUR SERVICES

QUERIES

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

COMPONENTS, KITS AND PCB'S

Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the article. Kits for some of our more recent projects are available from CPL Electronics, 8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE. Tel: 0642 591157. The printed circuit boards are available from our new PCB SERVICE. For details see p27.

CONSTRUCTION RATING

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

Beginner

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

Intermediate

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

Advanced

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

INSURANCE

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

BACK NUMBERS AND BINDERS

Limited stocks of some recent issues of PW are available at £1.25 each, including post and packing to addresses at home and overseas (by surface mail).

Binders are available (Price £5.50 to UK addresses, £5.75 overseas, including post and packing) each accommodating one volume of PW. Please state the year and volume number for which it is required.

Send your orders to Post Sales Department, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP. All prices include VAT where appropriate.

Please make cheques, postal orders, etc., payable to Practical Wireless. Access, Mastercard, Eurocard and Visa accepted.

SUBSCRIPTIONS

Subscriptions are available at £13 per annum to UK addresses and £15 overseas, from "Practical Wireless" Subscription Department, Competition House, Farndon Road, Market Harborough, Leicestershire LE16 9NR. Tel: (0858) 34567. Airmail rates for overseas subscriptions can be quoted on request.

Special Event Stations

GB2TV

The Borehamwood & Elstree ARS in association with the BBC at Elstree on September 20-21. It is to commemorate the 50th Anniversary of High Definition Television transmission in the world.

On 2 November 1936, the BBC started the first high definition television service in the world. Using hastily converted studios at Alexandra Palace in North London, the first programmes were transmitted using, alternately, a mechanical Baird system and an electronic EMI system. The latter quickly becoming the accepted standard from which all modern television has developed. The first programmes were seen by



On the 2nd November, 1936, the BBC started the first High Definition Television Service in the world. Using hastily converted studios at Alexandra Palace in North London, the first programmes were transmitted using, alternately, a mechanical Baird system and an electronic EMI system, the latter quickly becoming the accepted standard from which all modern television has developed. The first programmes were seen by probably no more than 2,000 people, a figure which had grown to 50,000 by the start of the war in 1939 when transmissions abruptly ceased. In 1985, the audience for the BBC's relay of the "Live Aid" concert was estimated worldwide to be 1500 million, that is the measure of the 50 year growth of television from those small beginnings in 1936. In half a century it has become the most powerful means of communication in the world. This Anniversary is a matter of pride to the BBC and to the whole Television Industry.

HF & VHF Communication's Equipment Kindly Loaned By "NORTH LONDON COMMUNICATIONS LTD"

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century it has become the most powerful means of communication in the world. This anniversary is a matter of pride to the BBC and to the whole television industry.

The station will be using s.s.b., c.w. and possibly RTTY on 3.5, 7, 14, 21, 28 and 144MHz. The operating hours will be from 1200GMT on the 20th until 2000GMT on the 21st.

BBC ELSTREE CENTRE

And
Borehamwood & Elstree
Amateur Radio Society



Commemorate
50 Years of High Definition Television
1936 «» 1986

GB2WHC: September 14 from 10am until 5.30pm. The station will be active on h.f. and 144MHz from Welwyn Hatfield Water Carnival, Stanborough Lakes, Welwyn Garden City. QSL cards for all contacts. More details: **GOAII QTHR.**

GB00LD: September 13/14. The station will be operating during the open days of Oldbury-on-Severn Nuclear Power Station. They will be using h.f., 144 and 430MHz bands. QSL cards will be issued.

GB800: September 20-28. The station is commemorating the Dumfries Octocentenary and will be operational from St. Michaels Church Hall. They will be using 3.5-28MHz bands and 144MHz. The 3.5 and 7MHz band antenna will be a "V" on the church spire at 61m.

Diary Dates

September 16

Rugby ATS are holding an auction of radio goodies. Also "on-site" will be trade stands and club stands. Both parking and entrance is free, and doors open at 7.30pm. All at the Cricket Pavilion, "B" Building Entrance, BTI Radio Station, A5 Trunk Road, Hillmorton, Rugby. For more details, contact **Kevin Marriott GB7WH, on 0788 77986.**

September 21

The 21st Peterborough R&ES mobile rally takes place at the Wirrina Sports Stadium, Bishops Road, Peterborough. Doors are open from 10.30am until 5pm, and there is free car parking. More details from **Peter N. Wilson G4PNW, 221 Tyesdale, Bretton, Peterborough PE3 6XZ.**

October 5

The Welsh Amateur Radio Convention will be held at Oakdale Community College, Blackwood, Gwent. Doors open at 10am and the official opening will be at 11am, performed by the president of the RSGB. All the usual trade stands, bring and buy and RSGB stand will be there, Morse tests by appointment and much more. Entrance is £1.50 on the door. More details from

R. B. Davies GW3KYA, 16 Vancouver Drive, Penmain, Blackwood NP2 0UQ.

October 11

The RSGB Midlands Convention is being held at Madley Court Centre, Telford. The main part of the convention starts at 11am.

Lecture programme is:

1330-1345 Opening Address by Keith Fisher G3WSN.

1345-1455 Cellular Radio by Malcolm Appleby G3ZNU.

1455-1605 10GHz Amateur Television by Peter Blakeborough G3PYB.

1605-1715 Meteor Scatter—The Reliable Mode by Ken Willis G8VR.

1715-1900 VHF Forum with G3WSN, G3YGF, G3PFR, G4JLG.

More details from **J. P. H. Burden, 18 Langley Road, Merry Hill, Wolverhampton.**

October 12

The Carmarthen ARS are holding their rally at St. Peters Hall, Carmarthen, from 10.30am to 5pm. Free parking, licensed bar and refreshments available. Details from **GW3GUE on 0267 83460.**

October 19

Hornsea ARC are holding Elohex '86 in the Floral Hall,

Hornsea. It's called an amateur radio, computer and electronics exhibition. There will be local club and trade stands, raffles, junk and bring and buy stands, and refreshments are available. Doors open between 10am and 5pm. More details from **Richard Guttridge G4YTV on 0401 62498.**

October 24/25

The Leicester Amateur Radio Show is being held at the Granby Halls, Leicester. For more details, contact **Frank G4PDZ on 0533 553293.**

November 1

The sixth North Devon Radio Rally will be held in Bradworthy Memorial Hall (near Holsworthy). The doors open from 10.30am to 5pm. There will be bring and buy stands, etc. For further details, please contact **G8MXI, Flexbury, Bradworthy, Holsworthy, Devon EX22 7TWQ.**

November 9

Bridgend and District ARS are holding their rally at the Recreation and Leisure Centre, Angel Street, Bridgend. The doors open at 10.30am (10am for the disabled), and there is free parking, bring and buy, etc. More details from **GW10UP on 0656 723508.**

Can You Help

Murray Thompson VK3ZUW has just finished restoring a WWII Army Jeep, and is now restoring a WWII Number 19 transceiver to install in it. Has any reader had any experience in modifying these units (oscillator drift, etc). If so please contact Murray at, **6 Goodwin Street, Blackburn, 3130, Melbourne, Australia.**

Mr V. Barrett is looking for a source of a BBC-B program called SatPic. The designers are Peter Clappison and Matthew Atkinson, but that's all he knows. If you can help, please write to **"Reefon", 40 West End, Breageside, Portleven, Helston, Cornwall.**

80 Prefixes

To celebrate Botswana's 20th Anniversary of Independence, Botswana radio amateurs have been allowed to use, during the months of September and October only, the following Special Event Callsigns:

For full licence holders Prefix—802

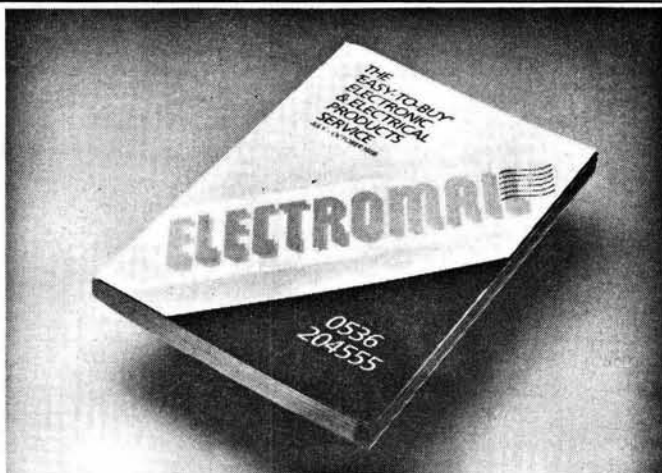
For novice licence holders Prefix—800

Please note that BARS does not operate a running QSL bureau, incoming cards are distributed only to BARS members.

You Too Can Buy From RS Components

Electromail is a brand new way to buy from RS Components. In the past, when projects in *Practical Wireless* specified RS Components as the supplier in the construction notes, it was not always easy to obtain those bits and pieces. Now that has all changed. Electromail offers the full RS Components range of over 12 500 quality products—all industry proven. They range from capacitors to cabinets, batteries to books.

The 688-page catalogue gives complete product, price and ordering information, together with



photographs and detailed descriptions. Payment can be by cheque or credit card and fast dispatch is made from extensive stocks. The catalogue is also an invaluable technical

reference book.

To get your copy send £2.50 to **Electromail, PO Box 33, Corby, Northants NN17 9EL**. Or telephone (0536) 204555 with your Access or Visa number.

RAE Courses

Brighton: Brighton College of Technology, Pelham Street, Brighton. The college will be running the C & G 765 Radio Amateurs Course commencing in September. Enrolment is on September 8 and 9 between 1600 and 2000Z. More details from R. A. Bravery G3SKI, at the college.

Broadstairs: Adult Education Centre, Hilderstone House, St. Peter's, Broadstairs. The course starts on Friday Oct 3 at 7pm. The tutor is Dr Ken Smith G3JIX, who includes practical projects as part of the work. Hilderstone RS meets on the same night so Morse classes available, too.

Bristol: Brunel Technical College, Ashley Down Road, Bristol. A variety of courses on offer. Mondays—Radio Amateur Theory; Tuesdays—Radio Amateur

Morse; Thursdays—Radio Amateur Practical.

Enrolment is September 9 and 10. For more details contact **course tutor Phil Brouder G3ZJH on 0272 41241 ext 64**.

Derby: Derby College of Further Education, Wilmorton, Derby DE2 8UG. This college offers a selection of courses, all commencing in September. The C&G 765 RAE course—1 two hour session for 30 weeks. The Advanced Radio Amateurs Course—1 two hour session for 30 weeks. Enrolment is September 8 and 9. For further information, **F. Whitehead G4MLL on Derby 73012 ext 52**.

Gosforth: Gosforth Adult Education Centre, Gosforth. The RAE course is on Tuesday evenings. Further details from **The College or the course tutor, Mike**

Stott G8BGU on 0661 32020.

Hailsham: Hailsham Leisure Centre, Vicarage Lane, Hailsham. The course starts on September 16 at 7.30pm, and is run by **Southdown ARS**.

Halifax: Holmfild High School, Holdsworth Road, Holmfild, Halifax. The course starts on Thursday September 25 at 7pm and runs for 32 weeks. The course tutor will be **Rev. H. Makin G3FDC**.

Hendon: Hendon College of Further Education, The Burroughs, Hendon. Enrolment for this course is Wednesday September 10 from 2–8pm. More details can be obtained on **01-202 3811**.

High Wycombe: Amersham College. Radio Amateurs Exam course starts Tuesdays 7pm on September 16. Tutor is Mrs Shirley Hesketh G4HES. Morse Code classes Monday September 15 at 8pm. Tutor is Mr R. Ray G3NCL.

High Wycombe: Princes Risborough Adult Education Centre. Enrolment is Tuesday September 9 and Wednesday 10th for Walters Ash Middle School. RAE course starts Thursday September 25 at 7.30pm. Course tutor is Mr R. Ray G3NCL. Morse classes start Thursday September 25 at 7.30pm. Course tutor is Mr Chris Norton G0AZV.

Islington: Islington Institute, Rising Hill Street, London WC2. The course starts on Monday 22 September, 1830–2130Z. Enrolment is on Monday 15 September from 1800Z. There is also a Morse course on Wednesday evenings from 1900 to 2100Z.

Leyland: Wellfield High School, Leyland. The course tutor will be David Duff G3VYV. Both enrolment and the start of the course is during September, local newspapers will have details or telephone Preston 600234.

Llwynypia: Rhondda College of Further Education. The college will be running a course in September and the enrolment period is the first week in September.

Manchester: Pendlebury High School, Cromwell Road, Swinton. The course starts at the end of September on Monday evenings, 7.30pm. The lecturer will be **P. Whatmough G4HYE**.

Melton Mowbray: Melton Mowbray College of Further Education, Asfordby Road, Melton Mowbray. Enrolment for the RAE course is September 1/2. Further details are available from the **College on MM 67431 or the course tutor (Ken Melton) on Sileby 3849**.

Ormskirk: Crosshall High School, Ormskirk. Enrolment for this course is in September, see local press or telephone Preston 600234 for more details. Course tutor will be David Duff G3VYV.

Stockport: Avondale Evening Centre, Edgeley, Stockport. The course is on Tuesday evenings and starts 16 September ready for the May '87 exam. Further information from the **Evening Centre Head at Avondale School, or the course tutor on 061-427 4730**.

Stockport: Reddish Vale Evening Centre, Reddish Vale Road, Stockport SK5 7HD. Enrolment is on September 15, 16 and 18 between 7 and 9pm. The lectures are Monday evenings from 7 to 9pm. Further details from **Dave Wood at the Centre on 061-477 3544 ext 235**.

PW Insurance Scheme

As a result of continuing negotiations for a new and improved PW Radio Users' Insurance Scheme, it has been agreed with the present underwriters that all existing policies, including those which are renewed up to the end of July 1986, will be maintained. Unfortunately, no new business or renewals can be accepted from 1 August 1986, although alterations and additions can be made to existing policies whilst they remain in force.

Negotiations are continuing, and we will announce details of the new, improved scheme as soon as they are concluded. In the meantime, please be assured that cover under current policies is maintained.

SMC Opening

Monday, July 7, saw the official opening of new headquarters for South Midlands Communications Limited, now in its 25th year of operation. The new building, which is located in Chandler's Ford, between Southampton and Winchester, gives SMC a total of some 400 000 square feet of showroom, office, storage and manufacturing space all under one roof. Besides carrying a wide range of equipment and antennas for radio amateurs, SMC is deeply involved in professional communications, including marine. Separate showrooms for professional and amateur customers are a feature of the new building, and there is a large car-park.

The opening ceremony was performed by Mr Hasegawa, President of the Yaesu Musen Company of Tokyo and of Yaesu USA, who commented warmly upon the long and successful trading association between his company, celebrating its 30th Anniversary, and SMC.



After the formal cutting of the ribbon, Mr Hasegawa was joined by Barry Gardner, Managing Director of SMC, and the rest of the Board in painting in one eye of a Japanese "good luck" doll. Tradition has it that in the earliest days of a business, the doll must have both eyes open all the time to symbolise that everyone involved should always be alert, to ensure future prosperity and success. When a business has established itself, one eye can be painted in—it is safe to take a little nap. If ever both eyes are painted in, it is

said that the business will decline, for no-one can afford to go totally to sleep on the job.

To find SMC's new abode, leave the A33 at the Eastleigh turn-off. From the bottom of the slip-road follow the signs for Chandler's Ford until you reach a T-junction with traffic lights. Turn right, and within a few hundred metres take the turning on the left signposted to an industrial estate. Turn right at the end of that road, then immediately left again. SM House is on the left at the end.

Morse Courses

Manchester: Pendelbury High School, Cromwell Road, Swinton. The classes are Tuesday evenings, 7.30pm with the instructor being W. Stevenson G4KKI. More details from **G4HYE** on 061-794 3706 or from **Swinton Adult Education Centre** on 061-794 5798.

Milton Keynes: The Meeting Place, Hodge Lea Lane, North Milton Keynes. Two classes are available: 1—for novices up to 12 w.p.m. for RSGB Morse test; 2—Advanced course for speeds up to 20 w.p.m. Both courses run for 20 weeks and are tutored by RSGB examiners. For more details contact **Alan** on **Milton Keynes 78804** or **Stuart** on **Bedford 767904**.

Stockport: Reddish Vale Evening Centre, Reddish Vale Road, Stockport. The course is 20 lessons for all levels of ability to about 17 w.p.m. Several tutors will be available to assist. The lessons are on Thursday evenings from 7–9pm.

Licence Fees Change

Regulations which revise the fees for Wireless Telegraphy Act Licences have been announced. They came into effect on July 14.

Just about the only ones to remain unchanged are the amateur and citizen band radio licences.

All the changed fees can be found in the Statutory Instrument issued on July 2, ISBN 0 11 067039 6.

HF Convention

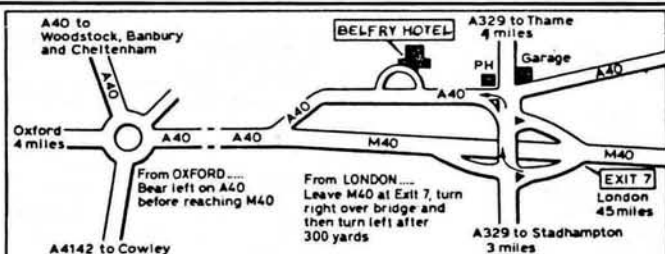
The RSGB National HF Convention is being held in the Belfry Hotel, Milton Common, Oxford, on Sunday September 28. Doors open at 10am and admission is £2.

There is a full day's lecture programme scheduled:

- 1030–1130 h.f. antennas for small gardens
- 1145–1245 Q & A Forum with RSGB officials
- 1330–1415 Presentation of trophies
- 1430–1530 h.f. receivers
- 1545–1546 DX forum, with slides of DXpedition activity
- 1730 DX buffet

Those wishing to stay for the buffet contact Roger Brown G3LQP beforehand. (The cost will be £5.50).

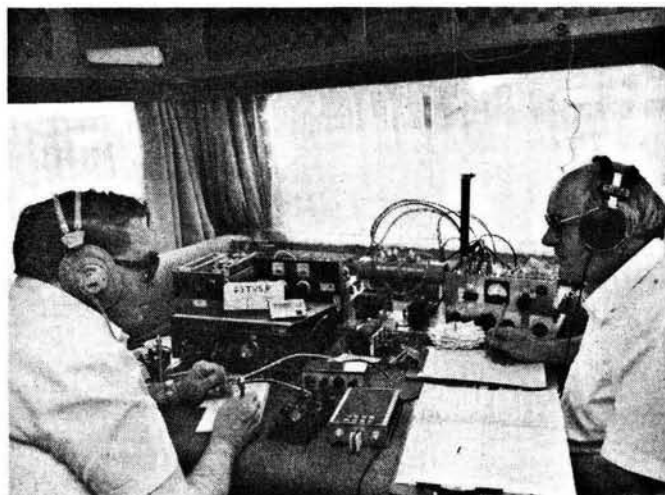
Other attractions during the day are 1.8MHz get-together, car boot sale, ISWL stand, WAB stand, 12 w.p.m. Morse tests, RNARS ORQ runs, RSGB Bookstall and much more.



Thames Valley & NFD

The Thames Valley ARTS conducted this year's contest from a luxury caravan in G30GP's farm. The photograph shows G3JIP and G3BPM using a Drake TR7 and a bank of five home-built a.t.u.s, switched for fast band changing and precise matching on all contest frequencies. The antenna was a 80-5m centre-fed dipole.

The club says that now they have optimised their system, which paid off with the improved score, it is all down to the skill of the operators!



Gas Iron

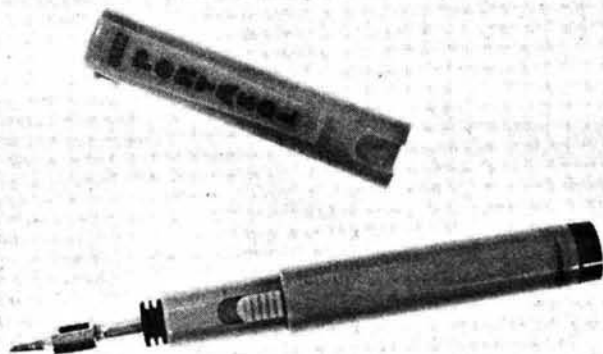
Those of you who regularly face the bleak prospects of toiling up to the top of a mountain to operate for a contest will appreciate the usefulness of this item.

The Oryx Portasol gas soldering iron allows you to make soldered joints anywhere.

Liquid gas is used as the heating source and is held in a reservoir inside the iron. A patented catalytic converter provides the actual heating of the tip and there is no flame during the process.

The conversion rate is adjustable and the tip can be set to a maximum temperature of 400 degrees Celsius. The iron is equivalent to a 60W electric iron and is therefore capable of man-sized jobs.

The internal gas supply



gives one hour of soldering and refilling takes just seconds and is identical to filling a gas cigarette lighter.

A protective cap includes the lighter to start the heating process and the iron can be carried in the pocket like a pen.

Priced at £18.40 inc. VAT and postage, it is available from

Greenwood Electronics,
Portman Road,
Reading, Berks RG3 1NE.
Tel: (0734) 595843.
Access and Visa may be used to order.

Anti-slip Mats

Cobonic has the answer to all those slippery problems around the workshop or lab.

Called StopSlip, it has endless applications. Its inherent tackiness means that any item placed on its surface will stick there as if glued, but without leaving any traces either on the table or the object.

Made from hardwearing materials, it is claimed to be long-lasting and needs only an occasional wash with soapy water to remove accumulated dust and other debris and to restore its original tackiness.

Available in various sizes and 2 or 3mm thick, it can be cut to any shape or size with a pair of scissors.

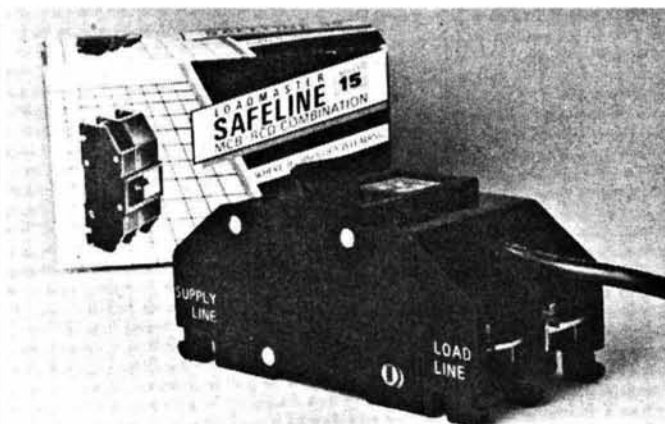
Further information is available from: **Cobonic Ltd., 32 Ludlow Road, Guildford, Surrey GU2 5NW. Tel: (0483) 505260.**

Protection

The probability of shock or earth leakage currents having a d.c. content is particularly high in the radio shack.

Electronic circuits can modify the a.c. waveform resulting in a complex a.c./d.c. or pure d.c. leakage current.

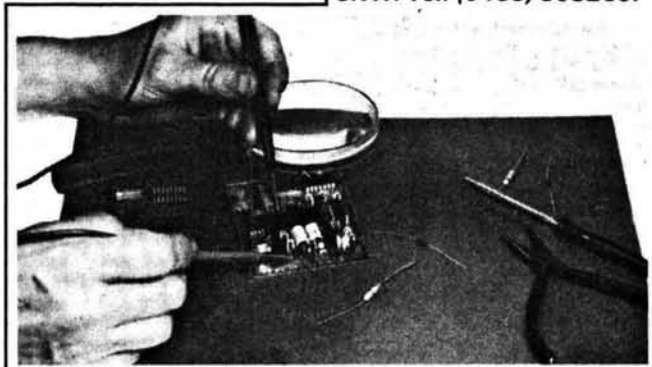
The recently introduced Safeline range of miniature circuit breakers/r.c.d.s and isolator/r.c.d.s have a unique principle of operation claimed by the makers, Dorman Smith Switchgear, to overcome the shortcomings of traditional r.c.d.s.



Although the need for the close shock protection afforded by r.c.d.s is widely appreciated many people are unaware that the majority of r.c.d.s are incapable of sensing shock currents having a d.c. content. Nor is it generally appreciated that many r.c.d.s become less sensitive, slow or even fail to operate if not periodically exercised using the test button.

Capable of sensing a.c., d.c. or complex a.c./d.c. shock or leakage currents as well as detecting overload currents in the case of the m.c.b./r.c.d. Safeline should prove a worthwhile safety addition in the shack.

Details are available from **Dorman Smith Switchgear Ltd., Blackpool Road, Preston, PR2 2DQ. Tel: (0772) 728271.**



Precision Bits and Pieces

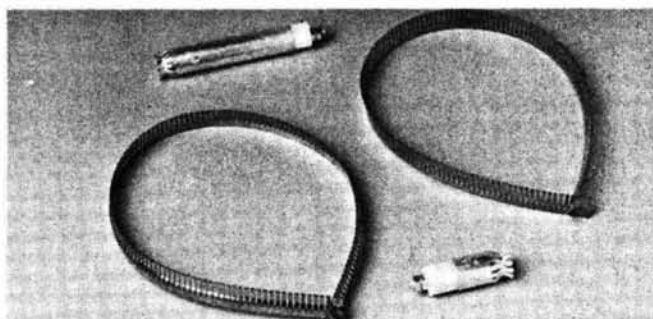
GHP—otherwise Gordon's High Precision—has an interesting range of such components together with stocks of such goodies as ptfе rod, tube and sheet. Just the job for those air outlets for the K2RIW or W2GN amplifiers—not to mention many other uses which need a good insulator at high temperatures.

Other products available include beryllium copper finger strips, cathode/heater connectors, brass wire

mesh, a range of exotic valves and microwave diodes, valve sockets and semi-rigid coaxial cable.

A range of ready-punched high-power linear amplifier chassis will be introduced shortly along with a range of ready finished parts and castings for very high power on 1296MHz.

For further details and a price list, contact: **GHP, 19 Brampton Road, Poole, Dorset BH15 3RE. Tel: (0202) 683274.**



Ken Michaelson G3RDG gives a user's view of the POCOMTOR AFR-2010 RTTY all-mode decoder.

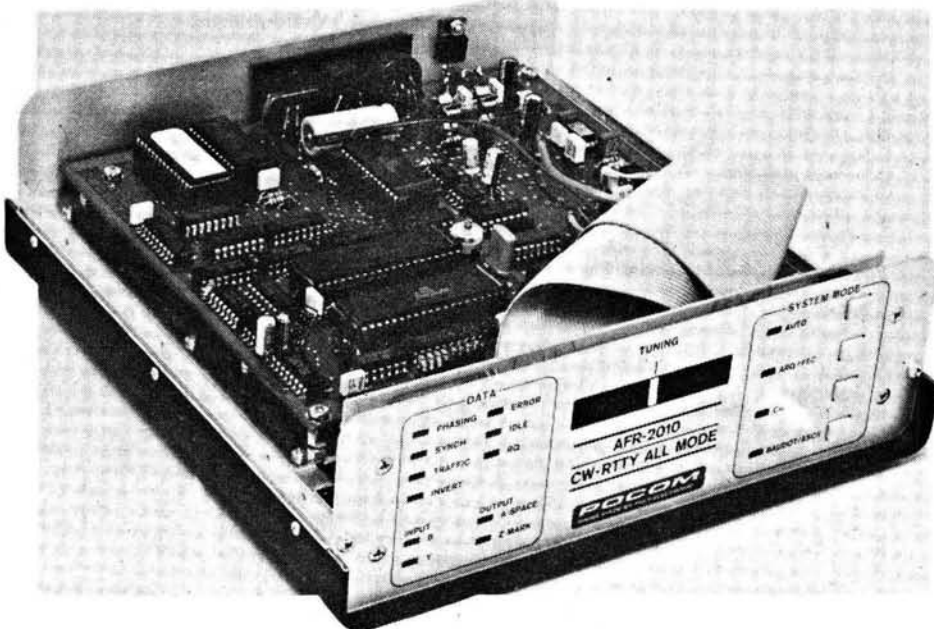
This was a most interesting piece of equipment to review as it was Swiss made. It was the first time I have had a unit from Switzerland to look at, and I must say I was impressed with its appearance. It is made by a firm called Poly-Electronic of Basserdorf, Switzerland, and consists of a steel case in two halves, covered with black crinkle vinyl, and measuring approximately 220 x 220 x 70mm. The interior contains a main circuit board facing upwards and two smaller circuit boards facing downwards, one of which is the optional video board, all three are attached to a horizontal central platform. It can be seen from the photographs of the unit that the workmanship is of a very high quality.

Solid State Design

The design is entirely solid state and automatic in action, and the front panel gives all the information which might be required for operation.

Dealing with the front panel indicators and push buttons first, the righthand side is labelled SYSTEM MODE. Within an outlined square are four "push on/push off" buttons together with, on their lefthand side, four red l.e.d. indicators. The buttons are, from top to bottom, AUTO, ARQ/FEC, CW and BAUDOT/ASCII. Whenever one of these buttons is depressed "on", its associated red l.e.d. indicator is illuminated, and when the button is pressed for a second time to switch the facility off, the indicator is extinguished. On the lefthand side of the front panel is an outlined square of the same size as the righthand one, but in this case it encloses eleven l.e.d.s in two columns. The outlined square here is labelled DATA, starting with the lefthand column from top to bottom the information shown is as follows: PHASING green l.e.d., SYNCH green l.e.d., TRAFFIC green l.e.d. INVERT orange l.e.d., INPUT B orange l.e.d. and INPUT Y green l.e.d. The righthand column of this outline is from the top, ERROR red l.e.d., IDLE orange l.e.d., RQ orange l.e.d., OUTPUT A-SPACE orange l.e.d. and OUTPUT Z-MARK green l.e.d.

In the centre of the front panel is the "tuning bar", a horizontal opening measuring approximately 57 x 9mm. This is in fact a series of red l.e.d.s, sixteen in all, each of which shows a



narrow vertical oblong. In the initial stage there is just one vertical l.e.d. alight in the centre, but as soon as a station is tuned in, or even as soon as any input is received, the rest of the l.e.d.s light up in a random fashion. As one tunes over the frequency and passes various types of transmission the tuning bar alters in brilliance and length. I will describe the appearance of the tuning bar for various types of signal later.

On the rear panel of the unit there are four sockets, two DIN types at the top middle together with one audio type 2-pin socket and one phono socket on the lower edge. The lefthand DIN socket is a 6-pin version which caters for the +12/14 volt supply and a connection for an external loudspeaker if required. The centre socket, a 5-pin type, covers RS232 input output, t.t.l. output and the d.t.r. (data terminal ready) for serial printer. The righthand audio type socket accepts, as its name implies, the audio input from the receiver/transceiver. The phono socket at the lower edge is the "composite" video output for a monitor equipped to receive composite signals. In my case, I used a Philips TV Computer Monitor which had inputs for both red/green/blue and composite, and it gave a very readable display.

The unit will decode the following codes in the speeds as shown.

Baudot—45, 50, 57, 75 and 100 baud fully automatic, and in manual 150 and 200 baud.

ASCII—110, 150, 200 and 300 baud including 8-channel press services.

ARQ—as the CCIR recommendation 476-2 AMTOR and SITOT.

FEC-COL—Collective transmissions for all receivers.

FEC-SEL—Restrictive transmissions for only one receiver.

FEC-COL/SEL—Both following CCITT recommendation 476-2.

FEC-COL—In deviation from CCIR recommendation for secret services.

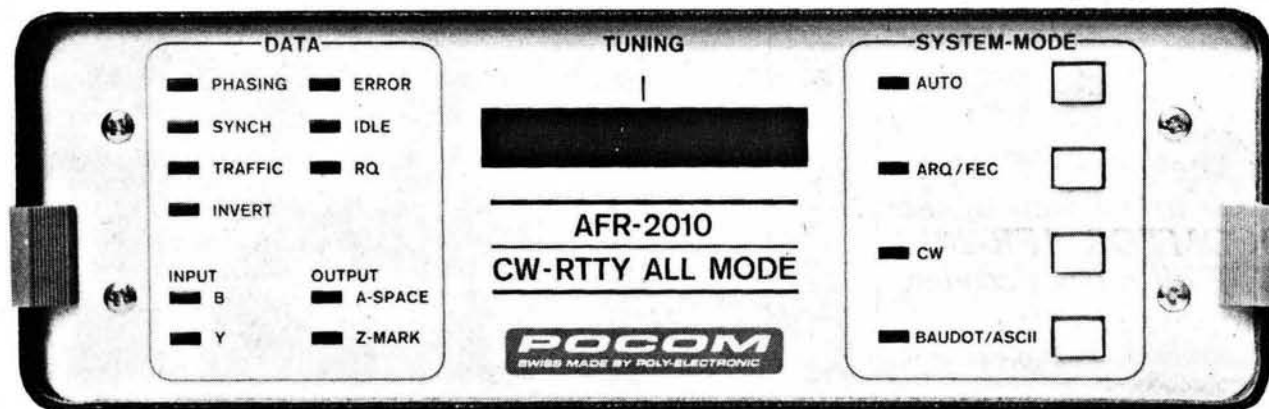
CW—15-250 words per minute.

It has connections from the DIN socket at the rear, as I mentioned above, for t.t.l. out, RS232 in and out and data terminal ready for the serial printer. The logic for the printer (or video) is 1 start bit, 8 data bits and 2 stop bits, no parity. There is no "on/off" switch, the unit becoming operative as soon as the 12/14 volt supply is plugged into the rear DIN socket.

Fully Automatic

When I think back to the days of trying to receive RTTY on the old model 7E/RP and then the Creed 444 teleprinter with the ST5 terminal unit, this POCOMTOR is in a different world. As I mentioned before it is fully automatic in operation. All one has to do is to decide whether the signal is Baudot/ASCII, c.w. or ARQ/FEC, and the unit does the rest! One can manually choose the baud rate by continually pressing the BAUDOT/ASCII button at the bottom right of the front panel, and the various speeds are shown on the screen. For example, 45 baud normal, 45 baud invert, 50 baud normal, 50 baud invert etc. This, of course, rules out all the business of either fiddling with the normal/reverse switch of a standard demodulator or changing sidebands on the receiver to discover which way up the transmission is. If one decides to spin the dial and stop at any Baudot transmission it is only necessary to press the AUTO button in

AS REVIEWED IN THIS ISSUE



PROBABLY THE BEST DECODER IN THE WORLD

In its standard form the **POCOM 2010** is extremely versatile and capable of decoding most signals, yet it costs just **£781**. However, specialist users may want to be able to decode some of the more unusual transmissions that are around, so for them a range of expansion boards are available. These just plug straight into the **2010** and turn it into what must be the most versatile decoder on the market (the boards marked YES are fitted as standard).

RTTY Baudot CCITT No. 1 Standard 45/50/57/75/100/150/200 Baud
 RTTY Baudot CCITT No. 2 Standard 45/50/57/75/100/150/200 Baud
 RTTY Baudot CCITT No. 1 Variable 30-250 Baud, Accuracy 1/1000 Baud
 RTTY Baudot CCITT No. 2 Variable 30-250 Baud, Accuracy 1/1000 Baud
 RTTY Baudot CCITT No. 1 Bit-Inversion, Variable 30-250 Baud, Accuracy 1/1000 Baud
 RTTY Baudot CCITT No. 2 Bit-Inversion, Variable 30-250 Baud, Accuracy 1/1000 Baud
 RTTY 8 Channel 200 Baud Press Service (SID, KNA, etc.)
 NEW RTTY CODE 8 Channel 200 (300 Baud) Press Service (DPA, VWD, etc.)
 RTTY ASCII CCITT No. 5 Standard 110/150/200/300 Baud
 RTTY ASCII CCITT No. 5 Variable 30-250 Baud, Accuracy 1/1000 Baud
 RTTY Baudot Synchron-Printer, Variable 30-250 Baud, Accuracy 1/1000 Baud
 RTTY Baudot Mode 32, Variable 30-250 Baud, Accuracy 1/1000 Baud
 RTTY Autospec, Variable 30-250 Baud, Accuracy 1/1000 Baud
 MORSE (CW) 15-250 Characters Per Minute (CPM)
 TOR (SITOR/SPECTOR/AMTOR, ARQ-FEC according to CCIR 476-2), 100 Baud

AFR-2010

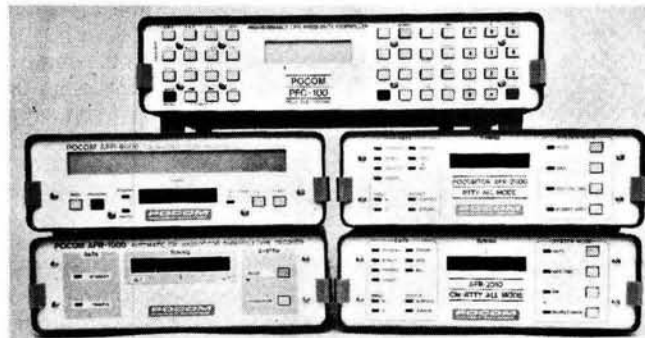
OPTION YES
 YES
 OPTION YES
 YES
 OPTION YES
 YES
 OPTION YES
 YES
 OPTION YES
 YES
 YES
 YES
 YES
 YES
 YES

ARQ Multi Channel (Time Div. Multiplex, Moore) 2 Sub-channels 86, 96, 100 Baud
 ARQ Multi Channel (Time Div. Multiplex, Moore) 4 Sub-channels 172, 192, 200 Baud
 ARQ Multi Channel (TDM) Mode PLEX 2 Sub-channels 86, 96, 100 Baud
 ARQ Multi Channel (TDM) Mode PLEX 4 Sub-channels 172, 192, 200 Baud
 ARQ One Channel Standard 48, 64, 72, 85, 96 Baud
 FEC System with 7 BIT Code according to CCITT No. 3, 96, 100, 192, 200 Baud
 FEC System with 7 BIT Code Self Checking (Convulgenter Code) 30-250 Baud
 FEC System with 7 BIT Code according to CCITT No. 3, 30-250 Baud
 BIT ANALYSE (Analysis of received BIT format)
 AUTO SPEED-CHECK Baud Rate Indication 30-250 Baud with 1/1000 Baud Accuracy

OPTION YES
 OPTION YES
 OPTION YES
 OPTION YES
 OPTION YES
 OPTION YES
 OPTION YES
 YES

The price of individual expansion units is available on request and a fully expanded AFR 2010, capable of decoding virtually any transmission in any mode, costs about £1500.

INTRODUCING THE REST OF THE POCOM FAMILY



- 1 — PFC 100
- 2 — AFR 8000
- 3 — AFR 2000
- 4 — AFR 1000
- 5 — AFR 2010

POCOM decoders are manufactured in Switzerland by the Poly-Electronic company who are known throughout the world for the quality of their products. The **2010** is the flagship of their range and this is the one that we would recommend to professional and commercial users — it covers everything! The **AFR 8000** is similar to the **2010** (it uses the same software) but it has the added feature of a built-in LCD display which makes it ideal for mobile or marine use where a video monitor is not really practicable, although a video option available. The **AFR 2000** is again similar to the **2010** but in its standard form it is supplied without CW capability. A CW expansion board is available as an option. The **AFR 1000** is a budget priced ASCII, ARQ/FEC (SITOR/SPECTOR/AMTOR) and CW decoder which has many of the features of the **2010** but which is not upgradeable. Although it is not a decoder, it is worth mentioning that we can also supply the **POCOM PFC 100**, a versatile frequency controller for radios such as the NRD 515 and the ICOM R70/71.

Whether you are a professional user or a dedicated listener there is a **POCOM** decoder for you and, although the top of the range model costs about **£1500**, prices start from as little as **£395**. They may not be the cheapest on the market, but they are certainly the best! For more details send s.a.e. (at least 8"×6") for a free booklet which gives the full specifications of the entire **POCOM** range of decoders.

This ad cannot really do justice to these marvellous pieces of equipment, so next time you are in the area, come in and try them for yourself — you will be convinced.

FULL RANGE OF TRIO PRODUCTS STOCKED
 We are also stockists of DAIWA—MET ANTENNAS—MUTEK—WOOD & DOUGLAS—TASCO TELEREADERS—MICROWAVE MODULES—ICS AMTOR—AEA PRODUCTS—DRAE

Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands.

Telephone: Stourbridge (0384) 390063/371228.

Telex: 337675 TELPES G

Instant finance available subject to status. Written details on request.



addition to the BAUDOT/ASCII one and behold, the unit samples the incoming code and within 4 to 6 seconds displays the incoming traffic on the screen or, in my case, on both the screen and printer. It is necessary to hold the tuning position for this period of time to allow the unit to sample the signal and decide what speed and shift it is, and also which way up. The orange l.e.d. on the lefthand side display shows you the sense of the signal but it makes no difference to the result. You print the traffic just the same!

Operation of the POCOMTOR AFR-2010

In use, it is essential to have a stable receiver otherwise the unit is unable to sample and resolve signals. I myself used the Yaesu FRG-8800 general coverage receiver, which gave a good account of itself during the review, and I will now discuss the actual operation of the unit under normal listening conditions. As I remarked previously, the ease with which I could tune in and print most of the Baudot signals really had to be experienced to be believed. For correct tuning for Baudot one turns the receiver tuning control until the two endmost l.e.d.s are lit. In fact, there are two remaining l.e.d.s at each end of the display, which are not wired up, and therefore do not operate. So there is a gap of approximately 6mm at either end. When the two l.e.d.s are lit (switching on and off in sympathy with the signal), the receiver is correctly tuned. The remaining l.e.d.s between the two outer ones also glow, giving the appearance of a faint bar with two bright ends. If one is not sure of the transmitting speed (in bauds), then all one has to do is to press the AUTO button, wait for the required four to six seconds for the unit to sample the speed and correct sense, and the copy duly appears on the screen and/or printer. There is another way in which one can tune in Baudot signals, and this by means of a completely new facility, the "speedcheck mode". This prints out the actual speed of the transmission to three places of decimals, so that by pressing the BAUDOT/ASCII button again and again, one can arrive at the correct speed and sense of the transmission.

Sometimes it was found that although the code sounded like Baudot, it must have been some special version of it as the unit would not produce traffic. By and large, there was hardly any which could not be resolved provided that care was taken in the tuning of the signal.

When tuning for ARQ/FEC the appearance of the tuning bar is slightly different in that when the receiver is correctly tuned it appears that the bar is opening to the full width from the centre and also displaying a bright centre l.e.d. All these three alter in brightness in sympathy with the re-

ceived signal. I found that I had to be more careful in tuning ARQ/FEC than was necessary with Baudot, but it was not difficult to get into resonance. One can also use the "auto" facility in this mode, which means that the unit will copy either ARQ or FEC. If it is desired, then the "manual" mode can be used, which means that the "auto" is switched off and you have to decide whether you want either ARQ (AMTOR) or FEC. I found it a simple matter to tune to the calling frequency for AMTOR on 3-588MHz to listen to various amateurs who transmit and receive in this mode.

Morse Decoding

The last form of transmission which this "magic box" can decode is c.w. (Morse). The specification states that the unit will decode c.w. at from 15 to 250 w.p.m. I have no means of checking the accuracy of this statement but I have no reasons to doubt it. Every transmission that I attempted to decode at whatever the speed, was presented on the screen. The display again is of a different format to the other two modes in that when the c.w. mode is selected, a l.e.d. will illuminate at the far left of the tuning bar. As the signal is tuned in, this l.e.d. will be driven to the far right of the display and both ends will fluctuate in time with the Morse transmission, one end off the other end on and so on. Again, there was no trouble in copying whatever I thought I would. I just turned the receiver dial and the traffic appeared.

One Small Problem

Only one little trouble occurred, and I describe it for the benefit of readers who might meet up with the same situation. The output from the unit is in serial form (RS232), and my printer—an Epson RX-80F/T—has a parallel input. After enquiries with Epson, I found that I could get a serial interface board which was designed to fit over the main board on pillars already in place. This was duly obtained, but since the RS232 output logic from the AFR-2010 was 1 start bit, 8 data bits, 2

stop bits and no parity, certain alterations had to be made to the serial interface switches. Having overcome these, I then discovered that the unit sent out its own "carriage return/line feed" characteristics, and as my printer also did the same thing, I had two line feeds with every line. In order to overcome this and also enable me to continue to use the printer in the normal way with parallel input, a double-pole changeover switch had to be attached to the back of the printer, one way being "line feed off" and "serial on" and the other way being "line feed on" and "parallel on". So all I have to do now to go from using the AFR-2010 output in serial form to the normal parallel input from the computer is to move the switch and change the input leads. So in the end, all was well.

Conclusion

In conclusion, I would say that to anyone who might want to experience an added facet in radio, particularly a shortwave listener, the POCOMTOR AFR-2010 would provide a lifetime of interest. There are a number of variations in the Pocom range starting from the AFR-1000 right up to the AFR-8000, so the unit I have reviewed is in the middle. I liked it and during the time I had it, I copied a number of very interesting transmissions. The unit can, in fact, be used with any computer having RS232 or t.t.l. interfaces, but I did not try this as I used both the video and printed output direct from the AFR-2010. The price of the AFR-2010 without the video option is £533.84, and with the video option £640.61. Carriage is extra and is £4.50 by insured parcel post or £10.00 by Datapost. Thanks are due to Dewsbury Electronics, 170 Lower High Street, Stourbridge, West Midlands, Tel: 0384 390063 for the loan of the AFR-2010 for the purpose of this review. **PW**

*For more details see the
Dewsbury Electronics
Advertisement on
Page 23*



Ten Metres—Our Most Versatile Band

In these times when there is much enthusiasm for the new 50MHz (6m) band allocation, A. J. Nailer T.Eng, FSERT, G4CFY started to wonder what this new band had to offer. The more he looked, the more it became obvious to him that 28MHz (10m) will do all that 50MHz can and more.

The 28MHz band is the largest of the h.f. amateur bands yet, except at sunspot maximum, it is largely neglected. The potential of the band is enormous including all the popular modes of both h.f. and v.h.f. bands—c.w., s.s.b., f.m., RTTY, SSTV—together with the added features of international beacons, satellite downlink and repeaters. In addition, what other band regularly enjoys all the propagation modes of ground wave, tropospheric scatter, tropospheric ducting, aurora and skywave by E, F1 and F2 layer reflection. These facts add up to a versatility ranging from short range ground wave mobile operation up to working Australia on QRP phone during sunspot maximum.

On the border between h.f. and v.h.f., it has similarities with both in respect of construction techniques and antennas. Unfortunately the older valve transceivers in general use up to and including the last sunspot maximum of about 1979 were often poor performers on 28MHz especially regarding receive sensitivity and noise figure. Furthermore the majority had no more than three 50kHz sections on 28MHz. On transmit the versions using a 5 to 5.5MHz v.f.o. and band crystals would often produce a partially amplitude and frequency modulated spuri about 1MHz above the main s.s.b. signal at an amplitude only 20dB down. This was a mix of the v.f.o. directly with the band crystal falling within the passband of the output stages and modulated by supply line variations—see Table 1.

Equipment

Modern synthesised h.f. transceivers are probably excellent for output signal purity, and using solid state technology are probably as good on 28MHz as any other band. Unfortunately they are extremely expensive. On the other hand the purpose built illegal multimode CB rigs are ideal as 28MHz monoband transceivers when converted, especially the ones with the $V_{XO} \pm 5$ kHz coarse tune which together with the 10kHz step channel change gives complete coverage.

The converted rigs have a dual purpose, as 28MHz transceivers and as

Table 1

The 9MHz i.f. is mixed with a 24.4MHz band crystal to give 33.4MHz, this is then mixed with the v.f.o. to give 27.9MHz–28.4MHz. This is the wanted frequency.

Additionally the 24.4MHz feeds through the first mixer to add directly with the v.f.o. to give 29.4–29.9MHz.

transverter drivers, and a lot safer than using a 180W amateur h.f. rig for the job. I'm sure many a transverter has been "life tested" by a forgetful operator tuning up for a bit of DX work on the 28MHz band.

Stability of the converted rigs is superb and power consumption is low on receive which makes them ideally suited to the monitoring of beacons and calling frequencies. As monoband rigs, even when converted, maximum sensitivity on receive and efficiency on transmit are easily achieved. Purity on transmit is excellent in most cases due to the many stages of filtering, often more than in amateur multiband rigs. Signal punch is better than all but the latest and most expensive amateur rigs due to almost universal use of on-board audio compression.

Table 2

Freq (MHz)	Use
28-00–28-20	c.w.
28-05–28-15	RTTY
28-06	QRP c.w. calling
28-105	Local c.w. working
28-20–28-30	Beacons
28-305	Local s.s.b. calling
28-30–29-70	c.w. and phone
28-50	DX s.s.b. calling
28-675–28-685	SSTV
28-885	QRP s.s.b. calling
29-31–29-40	f.m. working
29-40–29-55	Satellite downlink
29-55–29-70	f.m. working
29-60	f.m. calling

Where to find what on the 28MHz band

Operating a Converted Multimode CB

Operation in the c.w., beacons and s.s.b. DX portions of 28MHz is tiresome needing alternate use of channel switch and coarse tune for a full search. On the f.m. portion it is ideal as everyone is near enough on the same frequencies and the policy of moving up or down in 10kHz or 20kHz steps is well suited to the rig. The channel readout rather than frequency is terrible, especially with rigs which have not had the American channel sequence altered. Even with a straight step sequence of channels it is often easier to refer to a channel-to-frequency cross reference chart rather than try to work it out as you go. The best rigs in this respect are the WKS 1001 and the Midland 7001 which have frequency readouts which can be modified during conversion to give direct readout on 28MHz. Other good rigs are the Superstar 2000 series with four 50 channel bands which readily convert to give four 500kHz sections on 28MHz and are consequently easy to read.

Repeater shift, I believe, is a lot of nonsense on 28MHz as there are no 28MHz repeaters in the UK and no need for them either with the saturation coverage supplied by 144MHz and 430MHz band repeaters. I believe the nearest 28MHz one is in the Cape Verde Islands. Of course there are plenty in the USA but from Britain if you can access them with low power you can probably work the world anyway using simplex.

QRP enthusiasts will find the converted multimode is almost custom made as it is a simple matter to turn the rig down to less than 5W input. The dedicated QRP'er could even fit a power output control to the pre-driver stage as shown in Fig. 1.

Modifying these sets to drive transceiver converters entails removing the supply from the driver and power amplifier stages and taking an output to a phono socket from the pre-driver. A p.t.t. switching signal can also be coupled through from the microphone socket to the often unused p.a. socket.

Transverting to 144MHz, 70MHz or 50MHz using kit or home-brew converters together with the converted CB as an exciter can provide an effective low cost station for the newcomer or similarly for the established amateur who wants to be operational on a new band—see Fig. 2.

28MHz Band FM

Activity on 29-6MHz f.m. is on the increase due to large numbers of easily convertible rigs such as the LCL, DNT, JWR and Icom being available at reasonable prices. The majority of rigs can now be converted over by a number of firms with prices ranging from £27.50 inc. p&p to over £40 by others. These are best if the readout channel 1 is made to equal 29-31 and 40 equal to 29-70MHz, thereby giving a fairly easy to follow readout. In many areas there is more activity on 28MHz band f.m. than on 144MHz simplex. Of course, the converted CB makes an ideal mobile rig.

The performance of many of the legal 40 channel f.m. rigs is poor due to lack of adjacent channel selectivity and overload problems, especially the ones containing the MC3357 mixer i.f. amplifier and discriminator i.c. Fitting a 2-pole crystal filter and matching circuit board does much to reduce these effects.

Homebase Antennas

Antennas developed for CB provide high efficiency on 28MHz both for the mobile and base station. Base fed verticals such as the halfwave, five eighths wave and three quarter wave Sigma 4 antennas are excellent if you are able to put them up without upsetting your neighbours. The Thunderpole type of shortened quarterwave vertical with three full quarterwave ground radials has a low angle of radiation and due to its method of mounting often lets it out perform a vertically mounted centre-fed dipole. Modification of the shortened base loaded radiating element of the Thunderpole into a full quarterwave element gives a worthwhile increase in performance—see Fig. 3.

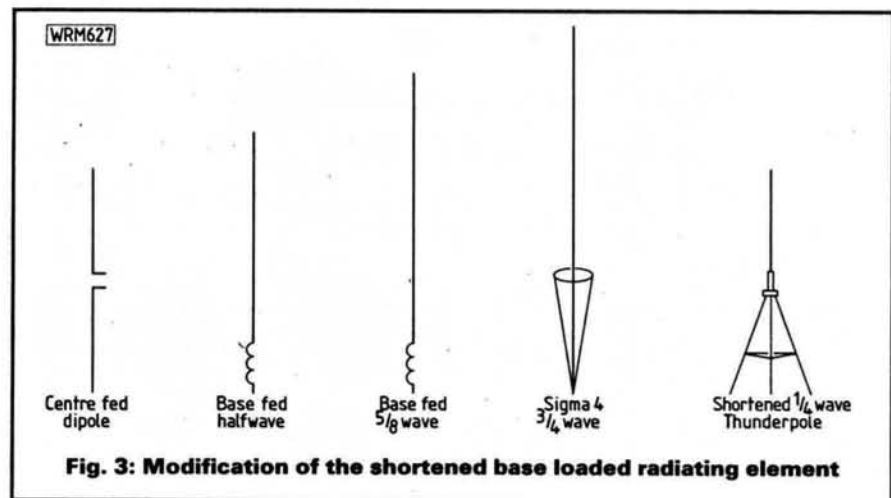


Fig. 3: Modification of the shortened base loaded radiating element

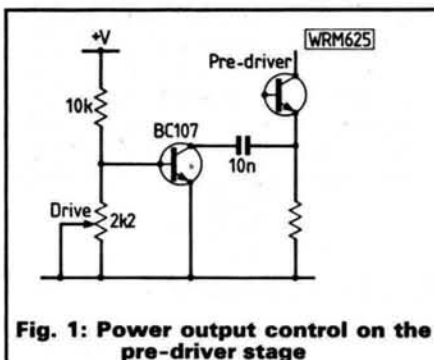


Fig. 1: Power output control on the pre-driver stage

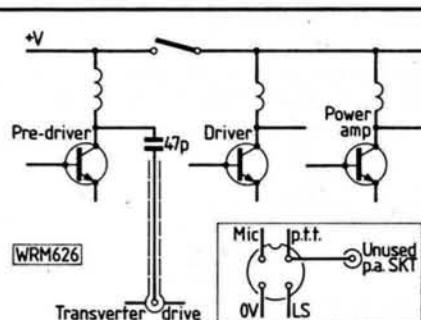


Fig. 2: Transverting from 28MHz

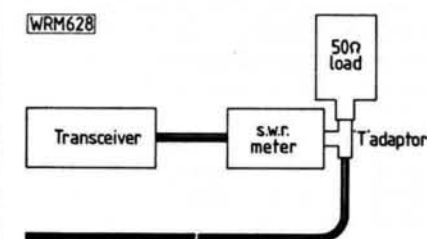


Fig. 4: A 50Ω dummy load fitted to check the s.w.r.

Mobile Antennas

Top loaded mobile antennas are the most efficient but tend to be fragile or unsightly and the marginally less efficient but more robust and professional looking centre fed antennas are to be preferred. Mounting is best done on the roof by means of a stud mount and sited where the antenna will see 2-5m of metalwork in at least one direction. Magnetic mounting of top loaded and centre loaded antennas is risky and if stud mounting is unacceptable then gutter mounting should be used.

Bonnet and boot mounting is less efficient but may be more practical for garaging the vehicle and using multi-storey car parks. DV27 mounts with adapters are useful both for swivelling the whips down to clear low overhead structures as well as being easy to remove by the owner if the vehicle is to be left in a high-theft-risk area.

Finally bumper mounting of antennas should only be done as a last resort due to the shielding effect of your and others cars.

Antenna SWR Adjustments

Before attempting to set up an antenna, first check your meter by applying a 50Ω resistive load to check 1:1 and secondly use a 100Ω resistive load to check the 2:1 calibration point. Many meters sold for CB and amateur purposes will fail this test but they can be calibrated by equally adjusting the internal line matching resistors. Quite a number of meters sold by CB dealers actually read 1:1 during both tests.

In order to get the s.w.r. of the antenna correct you must use coaxial cable cut for a multiple of a halfwave at the operating frequency during initial setting up. This is because at each electrical halfwave the impedance will be the same as at the end of the cable. Halfwave-lengths of the RG58 or RG8 are 3.5m at 28.5MHz, 3.45m at 29MHz and 3.39m at 29.5MHz.

The method for finding the correct length is to connect the meter to the rig with a short patch lead, less than 0.45m, and connect a coaxial "tee" piece to the antenna end of the meter. Measure the required length of coaxial cable and round up to the nearest halfwave length and add a further 50mm for every halfwave of cable. Terminate the end with the appropriate connector and fit to one port of the "tee" piece. Fit a 50Ω dummy load to the other port and check the s.w.r. at the required operating centre frequency, Fig. 4. Unless the reading is 1:1 (unlikely) start cropping the cable to length using the rule that the higher the s.w.r. the longer the length to be cropped and the lower the s.w.r. the smaller the length be cropped. When the cable is right it can be connected to the antenna and the antenna adjusted for an equal minimum s.w.r. at the operating band edges. Once the antenna has been matched in this way the cable can be cropped to the exact length required although I would recommend keeping the cable length the same to enable periodic antenna s.w.r. tests to be made or in case in the future you may decide to experiment with different antennas.

During cable cropping and antenna s.w.r. adjustments do not coil the cable up as this affects its electrical length. Excess cable can be folded backwards and forwards on itself without effect due to the cancellation of the magnetic fields. After the antenna system is

tuned the excess cable may be coiled as the electrical length is no longer of any concern and if heavier coaxial cable such as RG8 or RG213 is being used this is the only practical way.

Propagation

Propagation is by all modes but dependant upon distance, time of day, time of year, and period within the eleven year sunspot cycle.

Typically at present most contacts are mobile to mobile or mobile to base using 5W f.m. and omnidirectional antennas. Distance up to 30km is achieved over non-optical paths with better coverage into shielded areas than possible with the same e.r.p. on the 144MHz band. Tropospheric ducting and auroral mode contacts are common during the hot summer months with distances up to 500km again using 5W and omnidirectional antennas. Tropospheric scatter over ranges 100 to 400km are possible with 25W e.r.p. from a 3-element Yagi even during sunspot minimum.

Skywave communications, using 10W s.s.b. to an omnidirectional antenna, are possible when sunspot

activity allows as I proved in September 1983 when I called in on a QSO between an Australian YL and an American. The Australian was running 30W to a 6-element quad, that is 480W e.r.p. and the equivalent of a 12dB pre-amp on receive. My report to her was R5 and S5 and I received R5 and S1.

Disadvantages

Although when open the band gives more km per watt, it is usually the last band to become operational as sunspot maximum approaches and the first to drop out after sunspot maximum.

Where antenna systems have been set up for h.f. multiband use it is often forgotten that 30-5m of RG58 loses 50 per cent of the transmit power and adds 3dB to the receive system noise figure. I uncovered this fact in 1982 and promptly moved my vertical antenna closer to the shack and switched to RG213, my signal went up 4 S-points in New York.

A disadvantage of the 28MHz band compared with the 144MHz band is the size of the antennas and with ever increasing pressure on the visual aspect of domestic antennas together

with the size of our gardens and the ever watchful eye of the Council planning department, lucky is the amateur who can put up a 4-element 28MHz Yagi measuring 5m span and 6m boom length. This means to achieve the same e.r.p. and consequently the same ground wave coverage and tropo-scatter results as a 144MHz station the 28MHz station would have to run much more power to a lower gain antenna.

Conclusion

The illegal 26/27MHz s.s.b. pirates demonstrated to us all that skywave propagation was possible more often than normally assumed. Furthermore the large imports of multimode CB's have provided the amateur with a supply of relatively cheap transceivers, a situation which has not existed since the Second World War surplus equipment was made available.

Then as now was an unusual situation which is to our advantage. The enormous numbers of both multimode and f.m. only CB radios now unused, with conversions available for most of them, gives us the means of putting 28MHz to good use. **PW**



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Next Month: Receiver Special

Watertight Connections!

Have you ever removed the antenna connector from your prized transceiver to find to your horror that water is dripping from it, the chassis around the socket corroded and metres of coaxial cable ruined? Yes—then this article, by Dave Harrington G3LUL, is for you, so read on!

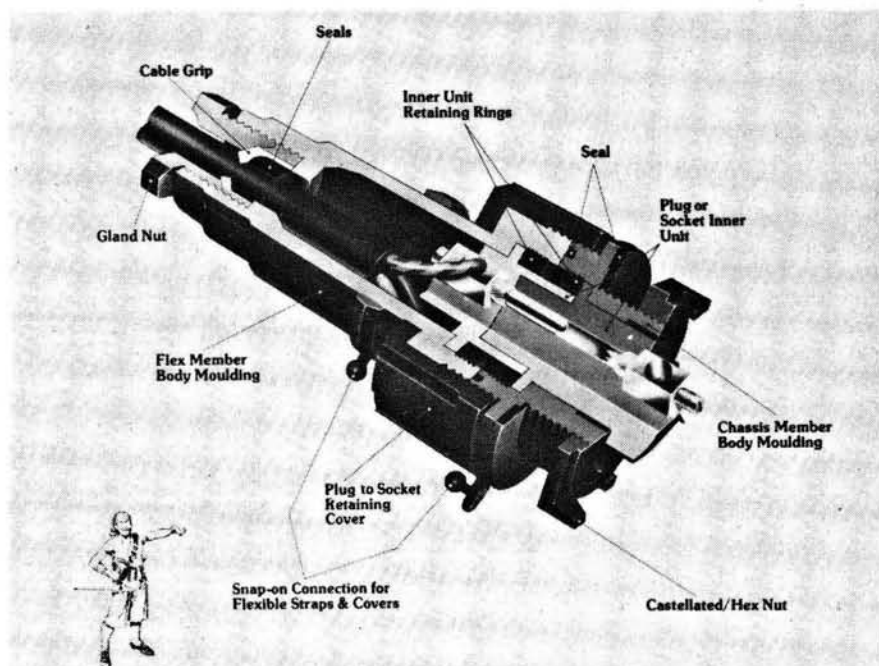
Most radio amateurs and electronics enthusiasts are faced from time to time with the problem of joining or terminating cables in adverse outdoor environmental conditions, often completely exposed to direct driving rains which creep into the joint with time causing damage or leading to potential electric shock hazards.

Traditionally the jointing of say two coaxial or multicore cables is carried out using whatever suitable standard connectors are to hand (usually plug and socket in back to back configurations or terminal blocks) which are then weather proofed by binding with pvc tape, or, if available, self-amalgamating rubber tape.

Unfortunately, the traditional methods are often found to be far from satisfactory for a number of reasons and even more unfortunately their failure is often only evident once irreparable deterioration has occurred.

The most obvious difficulty with the "embalming" process is that it can not readily be checked for soundness and in any event with the passage of time an initially sound job may fail due to deterioration of jointing tape or adhesive particularly when exposed to the ravages of sunshine (uv light) and frost.

If one accepts that a reasonable joint might be made using the traditional techniques, it is still essential to refurbish the joint periodically to ensure reliability with the passage of time and in hazardous locations—the coaxial feeder cable connection to baluns or matching units on a beam antenna at the top of the mast or tower being



classic examples. The weather-proofing of the connection becomes extremely difficult to carry out in situ and future maintenance a chore which one never seems to get around to until failure actually occurs.

In view of the problems of waterproofing joints many of us shy away from having to make them in the first place but if a sure method were available by which we could quickly break into the coaxial cable at a convenient point at the base of a tower for v.s.w.r. measurements, or break the run of multicore cables to the rotator for ease of maintenance, then life would be so much easier and a better installation would result.

A Wide Range

Professional standard waterproof coaxial and multipin connectors are of course listed in the glossy brochures of manufacturers which are specifically designed for such applications—regrettably at prices most of us could not afford even if we could purchase on a one-off basis!

This fact was recognised some time ago by a British company who identified a need in the market place for a range of reasonably priced waterproof connectors which could be used in the general electrical and electronics fields

A cut-away view of a Buccaneer waterproof connector manufactured by A. F. Bulgin & Co PLC

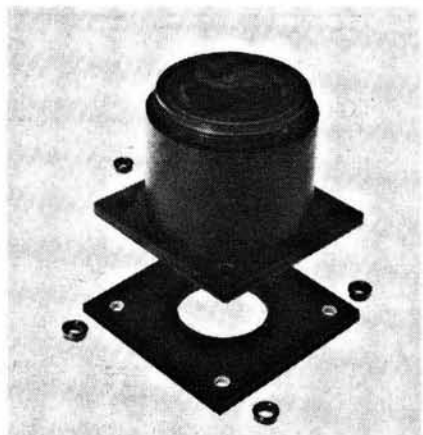
by enthusiasts and professionals alike, with wide ranging interests, where connections must be made in hostile environmental conditions.

Marketed under the trade name Buccaneer, these connectors are produced in a range of multipin and coaxial variants which meet the needs of users in the d.i.y., amateur electronic, marine and indeed even the gardening scene (pool pumps and electrically powered tools).

The basic connector and associated family of panel, flange, bulkhead mounting and in-line socket configurations are all moulded in a glass filled nylon material which adds up to a very tough, durable and, most importantly, corrosion proof product able to withstand considerable abuse and give guaranteed long life repeatable performance.

Water and dustproofing of the connectors is achieved through the clever use of Neoprene "O" rings, compression sealing grommets and washers.

To suit varying user needs, the connector inserts are available with optional screw-down or crimp-pin terminals of high quality materials to ensure reliable contacts with excellent corrosion resistant properties.

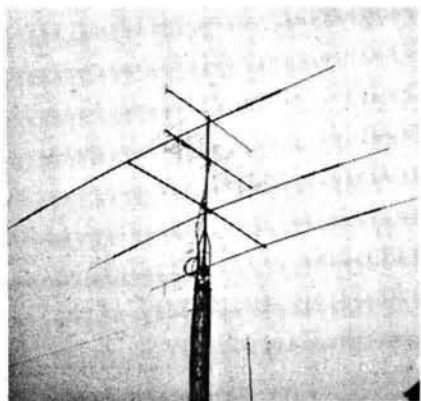


A wall or bulkhead mounting version of a Buccaneer waterproof connector from Bulgin

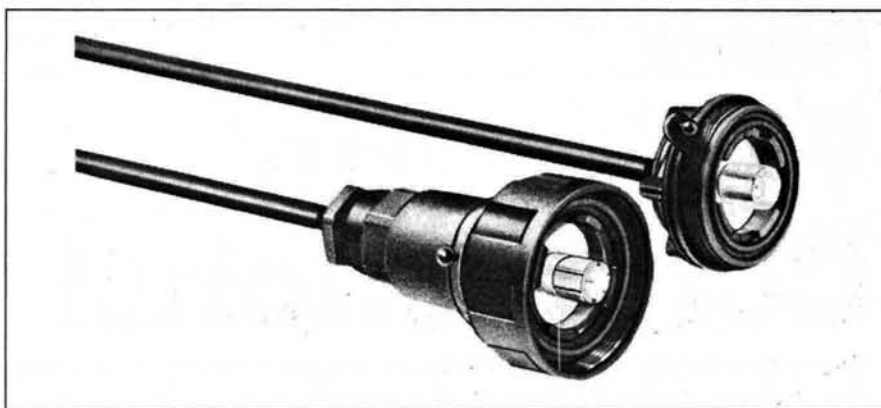


A chassis mounting socket and free plug Buccaneer connector assembly

The manufacturer's data sheets for Buccaneer show that they have been made and tested for BS specifications IP66/67, that is that they provide dustproof and watertight protection from heavy seas or water projected in powerful jets which must not penetrate in harmful quantities. IP67 provides for the added protection of being tested for watertightness under defined conditions of immersion and time. Selected by the Design Council and carrying the approval of Lloyds Register of Shipping this range of connectors certainly meets the most stringent needs of the average amateur user.



Typical amateur radio station lattice tower with 3-element tri-band h.f. beam plus v.h.f. arrays mounted above. Suitable Buccaneer applications on this installation are a balun connection to 50Ω coaxial cable and rotator control cables



A coaxial version of Buccaneer waterproof connector

Coaxial variants employ 50 or 75Ω BNC style inserts, cleverly located within the main body mouldings, to give a truly waterproof joint with assured impedance matching properties.

A unique feature of the design is that the sealing caps, essential if one is to dismate the connector from time to time, and which protect it from ingress of water, have a castellated side which is used as the insert assembly tool.

Inserts are available for 2, 3, 4, 6, 7 and 9 pole in addition to the BNC styles, with ratings from 3A/150V to 10A/250V providing true versatility. Incidentally, all inserts can be interchanged by the user to provide reverse male/female functions to both plugs and sockets and any selection of variants available, all within common housings.

To complete the range of accessories, 3 cable gland nuts are available to accommodate diameters 6–8mm, 5–7mm and 7–9mm. Coaxial cables RG58/CU, URM43/76 and URM70 are all acceptable sizes. Where cable stress is likely to be encountered, e.g. on portable power tools, etc., a cable support sleeve is also available.

Buccaneer provides the complete answer to outdoor connection of antenna feeders, interswitching of phased antenna matching units, remote control of antenna tuner units, mains supplies to outdoor shacks and of course a host of hazardous environ-

ment uses such as power tools, garden tools, etc.

When one considers that the cost is no more than a few packets of cigarettes or a few metres of coaxial cable this device rates high on my list of "musts".

Information supplied by the manufacturer clearly sets out the panel cut-out sizes, methods of terminating coaxial cable and general assembly instructions.

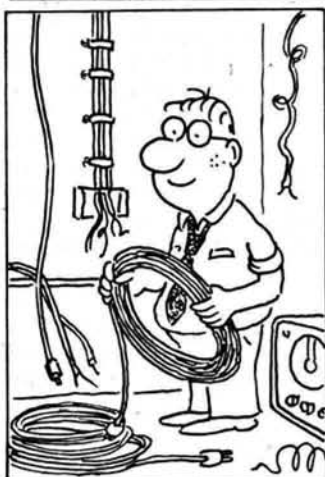
The complete Buccaneer range can be obtained, in one-off quantities, from a number of regular advertisers in the popular range of amateur electronics journals.

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The end caps double as assembly tools on Buccaneer waterproof connectors

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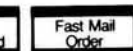
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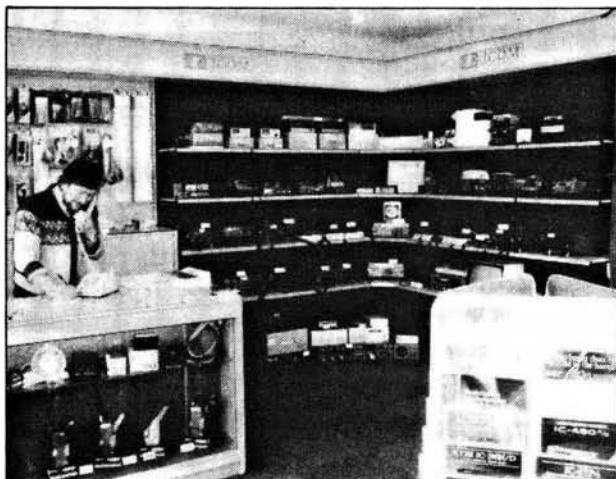
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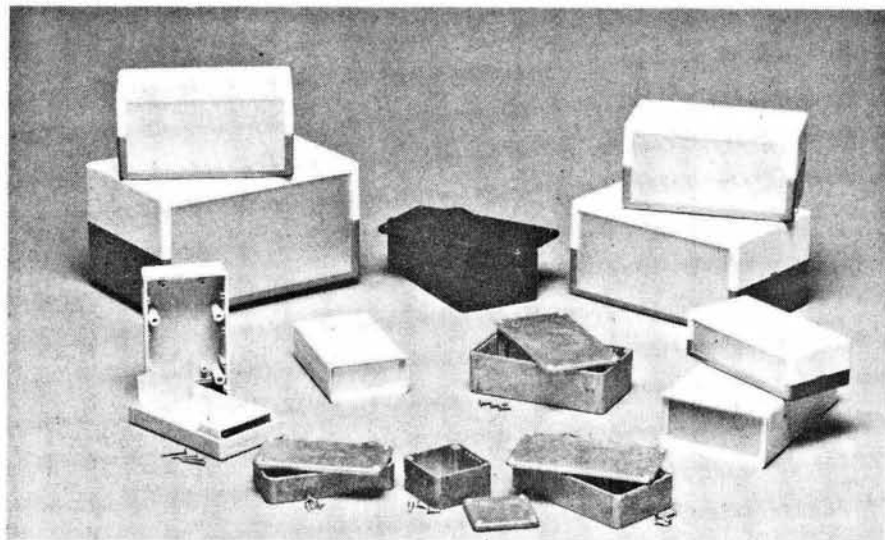


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Kit Construction— It's Easy (*Boxing it up*)



Some of the more popular enclosures used by the hobbyist

Turning a home-brew project into a piece of equipment to be proud of isn't really difficult. What it does take is patience and careful planning says Elaine Richards G4LFM.

This article isn't intended to be the "be-all and end-all" of how to box your project, it's a few hints and ideas I've discovered that really work. If I have to sit in the radio room and look at a piece of kit I do like to see it neat and properly finished, otherwise it tends to be confined to the cupboard, out-of-sight and never used.

Patience is a virtue—or so the old saying goes. That is certainly true when trying to design and complete the finishing touches for your latest pride and joy. But the first step is planning.

Planning

The first thing is to collect together all the components that need to be mounted on the front and rear panels—switches, variable capacitors, sockets, pots, l.e.d.s, etc. Deciding which go on the front panel and which go on the back is quite important. There's no point in having a socket on the back panel that needs to be connected and disconnected each time you use the unit.

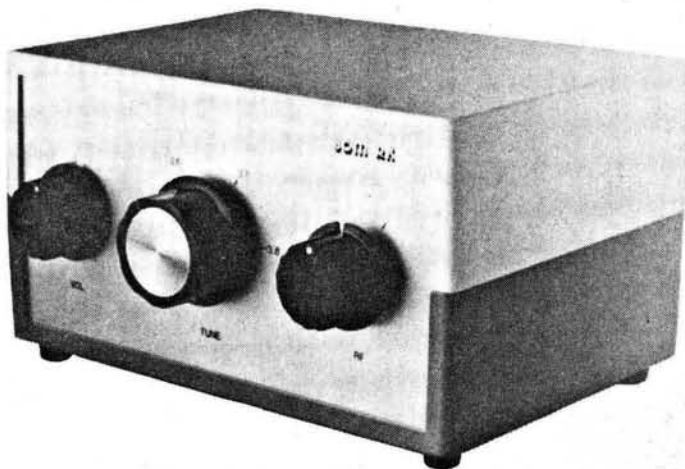
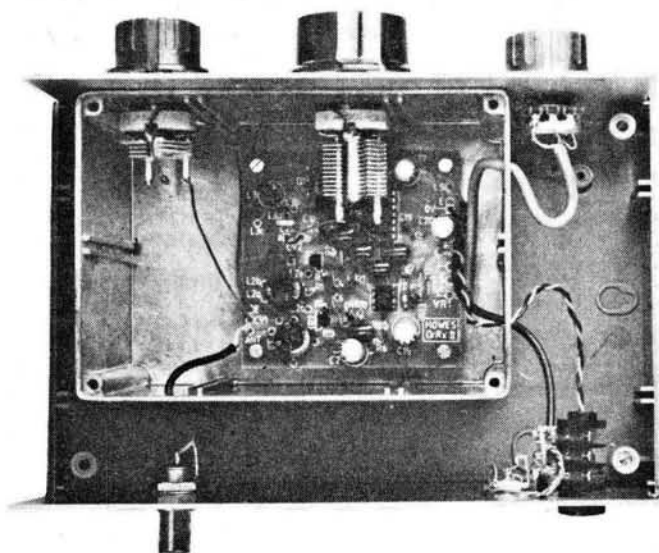
Sit down with a piece of paper and

determine the best position for all of the controls, i.e. the most frequently used on the right for a right-handed person and vice versa for a left-hander. Something to bear in mind if you're building a project for someone else. Don't be tempted to put items too close together, it won't work.

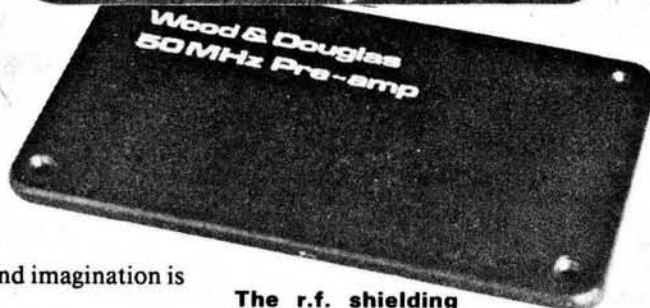
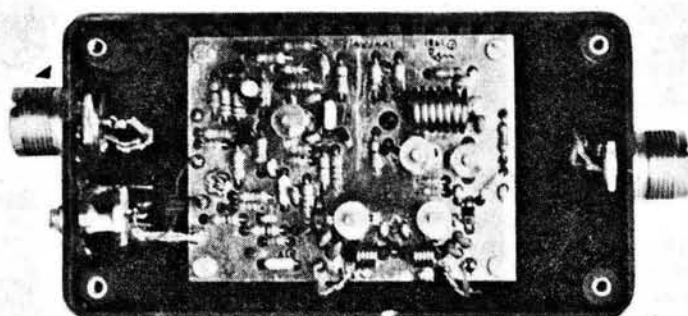
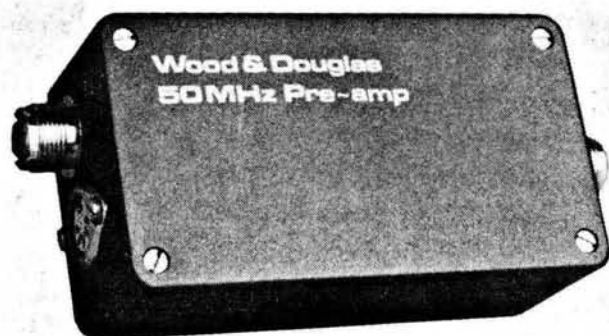
Having made a plan on paper you need to see if it's practical. Assemble all your controls, etc., on the bench as per your paper plan, things like BluTak stops them falling over. Then re-arrange them so that everything will fit, remembering that you have to make connections to these components. If you can't reach the tags on the back you can't solder any connections to them. You should now have a good idea of the minimum front and rear panel sizes needed. Assuming that your project uses a p.c.b. for the main part, you can easily determine the minimum size of the enclosure for your project.

What Type of Enclosure

There is a very large range of cases on the market today. Which you choose depends on what type of circuit needs boxing, will it be on show and how much do you want to spend, amongst other things. If the unit needs good r.f. screening then the best choice is an aluminium die-cast box, second choice would be one of the new ABS boxes with a special conductive coating. If total r.f. screening is not required then there is a large range of low cost folded aluminium boxes available in all shapes and sizes. If you have spent a lot of money on a project and



This is how we boxed the C.M. Howes receiver, a diecast box inside a Verobox



feel you want a more professional case then such firms as West Hyde and Newrad can probably help. Their addresses appear at the end of this article. Some of the cases they stock have been used as illustrations for this article and are definitely worth looking at.

Probably the most common type of enclosure on the hobbyist market is the plastics Verobox, these are available in a wide range of sizes from small portable units complete with built-in battery box to the larger instrument cases. Their quality can be gauged from the amount of commercial equipment which uses these enclosures.

One of the big advantages of the plastics case range is the continuity of colour scheme which enables one to construct a range of items for the shack in matching enclosures. Most plastics enclosures come complete with aluminium front panels which makes for simple and strong mounting of the controls, etc.

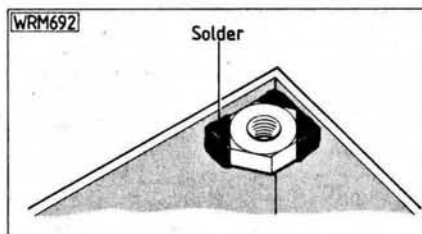
As die-cast boxes are not usually very attractive, one solution to improving the appearance of the project is to mount the die-cast box inside a smart modern plastics case. Another, more messy but cheaper, method is to use a tin of spray paint to put a nice coloured finish on the box, not forgetting to prime it first, of course.

So when planning to box the C. M. Howes 3.5MHz receiver and Wood and Douglas pre-amp we decided to use a die-cast box for the receiver and an ABS box for the pre-amp. The information given in the rest of this article is basically what was done to box the two projects, although slight

▲ The 50MHz pre-amp project

modifications were done to suit each project. No two items will ever be the same to house, so a little common sense and imagination is always needed.

You could build your own case if you wanted, and there are many "chassis bashers" who would agree. But with the high cost of aluminium and the low cost of ready-made folded boxes, it's not really worth the time and effort. One form of box construction, which is simple and cheap, is the p.c.b. enclosure. This type is very useful for screening sections of a p.c.b. or project. It is simply pieces of double-sided p.c.b. soldered together in the form of a box. The lid can be made removable by soldering brass nuts into the top corners.



Now To Work!

You've decided on the box, got all the extra bits together and are ready to start putting it all together. Assuming you only have simple d.i.y. tools at your disposal you should collect together the following tools.

The r.f. shielding ABS plastics box

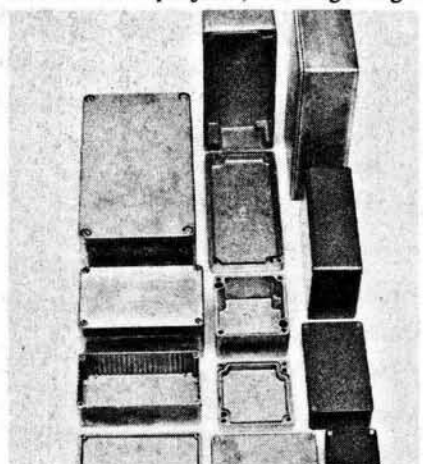
- Selection of screwdrivers
- Drill set 1.5 to 9.5mm ($\frac{1}{16}$ to $\frac{3}{8}$ in)
- Tapered hand reamer
- Hand or electric drill
- Centre punch
- Small round and flat files
- Countersink bit

After you have built a few projects you'll collect together other items to help speed up the jobs, but those mentioned above will get you started.

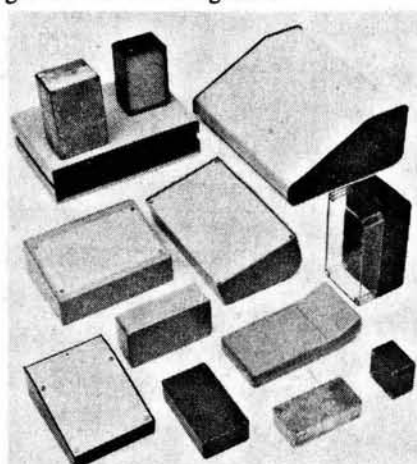
Rule No. 1—THINK BEFORE YOU DRILL! It's very difficult to correct a wrongly placed hole!

There are many proprietary types of plastics p.c.b. mounting clips on the market, some merely push fit in a hole in the p.c.b. and the enclosure base, others are stuck to the base and clip over the edge of the p.c.b. One word of caution with plastics clips is that the manufacturer's instructions regarding hole spacing and diameter must be followed exactly to achieve a mechanically sound fixing.

An alternative to plastics clips is screws and spacers. Tapped spacers are easier to use than plain spacers, but of course they also cost more. I would recommend that you stick with one screw size where possible, 6BA or



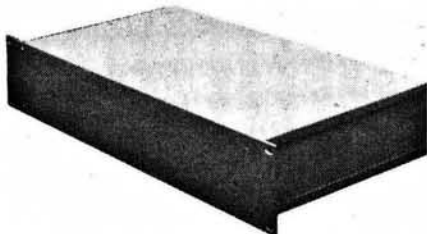
IP65 waterproof die-cast boxes with internal p.c.b. slots. Four sizes available from 40 x 52 x 75mm to 80 x 120 x 220mm, incorporating a gasket seal



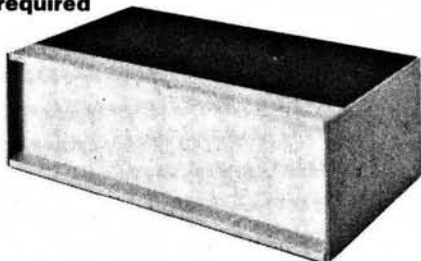
Bimboxes and Bimcases in both ABS and metal, ideal for housing instruments, keyboards, sub-assemblies, etc. Available Boss Industrial Mouldings Ltd



These cases have a 24° sloping display panel, bezel and PP3 battery compartment, useful for instrument cases. Available Boss Industrial Mouldings Ltd



The Newrad Instrument Cases Ltd range NM40, which has optional top, base covers and side panels finished in stoved optical matt-black epoxy if required



The Newrad Instrument Cases Ltd range of NM30 instrument cases

metric M2.5 is a very convenient size and the clearance holes for these are $\frac{1}{8}$ in and 3mm respectively.

If you are using a plastics Verobox (or similar type of enclosure) then you will find raised pillars in the lid and base which are designed for p.c.b./chassis mounting. Of course your p.c.b. won't align with these holes! So you need a spare piece of material, p.c.b. or aluminium, etc., which you can use as a sub-chassis. Cut the sub-chassis large enough to cover all the raised pillars and drill holes to enable it to be screwed to the base (or lid). The pillars are usually designed to accept self-tapping screws, which are often supplied with the enclosure. Having constructed the sub-chassis you can mount the p.c.b., using whichever method suits your purposes best. A look through a few component catalogues should help make up your mind. A tip here is to check the fit of each item at every stage of construction.

Front and Rear Panels

Gather together your layout plan and all the controls, etc. Make a final check that you are happy with the layout and that you haven't left anything out! Mark the position of all the holes lightly in pencil, double check your marks. Now mark all the hole centres with a centre punch, you can then start drilling. The panel must be securely clamped in a vice with a block of wood behind the panel and some wood or plastics packing pieces to protect the panel from being scratched by the vice jaws.

When clearing the swarf away from the holes, either blow it away or brush it away gently with a soft brush, a camera lens brush is ideal. Don't be tempted to brush it away with your hand as you inevitably end up scratching the panel! Holes up to about 10mm ($\frac{3}{8}$ in) can be tackled with a conventional drill, holes larger than this in a thin panel can be a little difficult.



Our home-brew RTTY and AMTOR station

The best solution is to use a chassis punch set but an alternative is the tapered hand reamer which allows you to open a hole up to any size within its range. Alternatively you could use a rasp drill. This is like a conventional drill except that the mid-range of the shaft is constructed as a round file and hence it can cut in all directions. This drill is only suitable for use in a powered drill and to achieve a good result the hole size should be clearly marked out on the panel.

If you need to cut an odd-shaped hole, the simplest method is to drill a hole near the edge of the shape you need and use an Abrafile to cut the hole. Otherwise you can drill very small holes (about 1.5mm ($\frac{1}{16}$ in) diameter) just inside your pencil marks all round the hole. When you have drilled these holes the waste material can be removed using a pair of pliers or cutters, then the hole edges can be cleaned up using a small file.

Having drilled all the holes it is important to ensure there are no burrs, especially on the exposed side of the panel. They can be removed with a countersink bit for round holes and either a special de-burring tool or a

sharp knife (exercising extreme caution) for any odd shaped holes.

If you are using a pre-finished panel and it has survived your drilling you can now move on to panel marking. For the rest of us, who either have an unfinished panel or have made a mess of our finished panel, there is more to do!

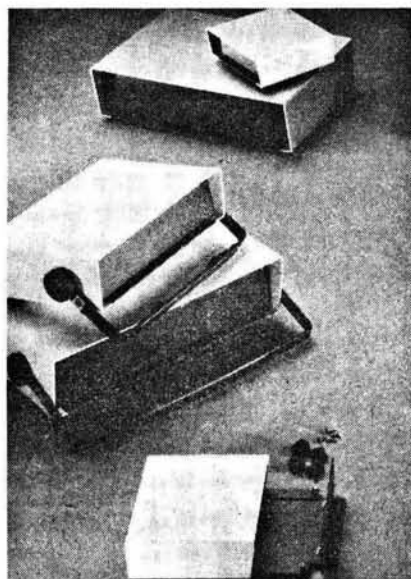
There are basically two options for aluminium panel finishing—paint it or create an attractive metal finish. If you decide to paint the panel the process is straightforward. Using 240 grade paper, key the surface and remove any scratches that may be present.

WARNING When using aerosols pay careful attention to the manufacturer's instructions. A face-mask is highly recommended and is usually available from motoring or d.i.y shops, very cheaply. Don't spray in the shack as the fine spray will end up on everything.

Thoroughly clean the panel and when completely dry spray 2 coats of primer. When the primer is dry you can build up the final colour. If you are not used to spraying you will find it quite difficult to obtain a super smooth (coachwork) finish, the best answer is not to try. One paint finish which is quite attractive on front panels is a slight hammer or orange peel finish. This is obtained by spraying many light coats from a distance greater than the manufacturer recommends. When the panel is completely dried you can move on to panel marking.

If you decide on a metallic finish (my personal favourite), it's not such a messy process. If the panel is badly scratched it will have to be rubbed down with 240 grade wet and dry. When rubbing down the panel it is vitally important to rub the panel in **one direction only** and to lubricate the paper with water. When all the scratches have been removed you should change to a 400 grade paper and continue rubbing in the same direction.

When this stage is finished the panel



Some of the more unusual enclosures by BICC-Vero Electronics

should have a fairly coarse brushed finish. If you require a finer finish the next stage is to continue rubbing using wire wool, soap and water. When complete the panel should be rinsed and left to dry.

Panel Marking

Panel marking nowadays is comparatively easy, thanks to the availability of rub-down lettering. You will need your plan again to enable you to decide what markings you need. Panel markings look much nicer if you use two types of markings, a simple and plain lettering for the bulk of the marking and a more elaborate larger style for the project title. The rub down lettering is very widely available in a variety of styles from most stationers and artists' supply shops.

If the panels are metal finish as opposed to painted, the first job after cleaning the panel is to apply two coats of lacquer (such as Spectra, available from many component suppliers). This is required as the lettering is very reluctant to stick to bare aluminium.

More scrap paper is needed at this stage, write down all the words to be used on the panel. The aim of this exercise is to establish the centre of each word or group of words so that they appear centrally under the correct control knob. When more than one word is going to be used count each space as one letter, i.e.:

FINE FREQUENCY

The ↑ shows the centre of the marking. Most makes of lettering have horizontal lines printed on the sheet to help you apply the lettering in a straight line. But do read the instructions with the lettering very carefully.

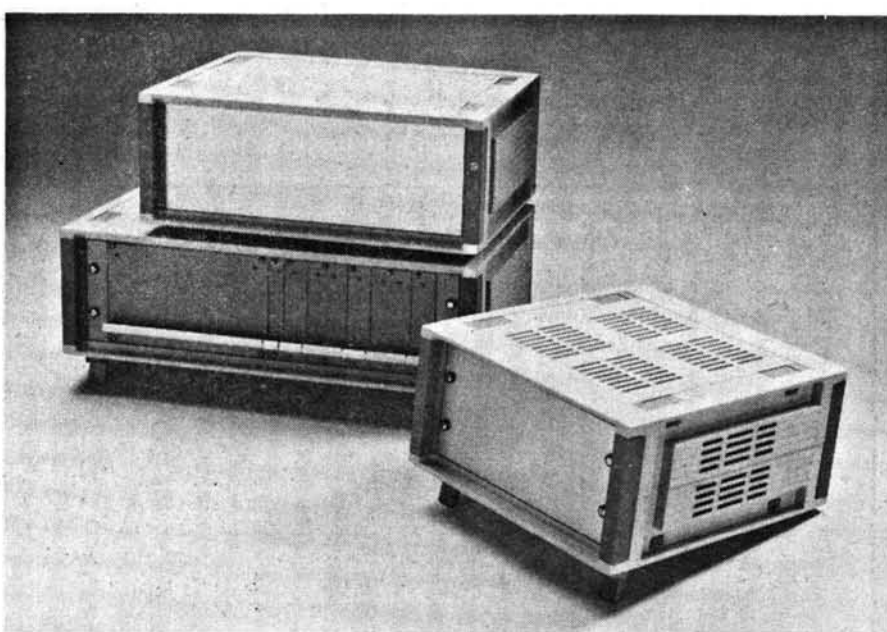
When applying the letters make sure one of the horizontal guide lines is in line with either the top or bottom edge of the panel and start in the middle of the word or group and work outwards. If you haven't written the words down beforehand you can get in a terrible mess trying to spell the word as you go. When rubbing down use the minimum force necessary to deposit the letter on the panel, as you finish each word or group check that all is well before rubbing down with the backing sheet.

One point worth mentioning here is where to place the lettering, above or below the controls? If the unit is to be used on the bench, below your eye line than panel markings above the controls will be more useful, and vice versa if the project is at eye level or above. It's all in the planning.

When all the lettering is complete the final coats of lacquer can be applied. Let the lacquer dry fully before wiring the connection on the front and rear panels. Follow the instructions for wiring with the kit or, if it is your own design, keep the wires neat and not too long.

Hopefully you should be left with a project to be proud of, why not enter for the next radio society construction trophy?

PW



The New Intercom range of 19in enclosures from West Hyde Developments Ltd



Examples from the wide range of cases and accessories sold by West Hyde Developments Ltd

Availability of Boxes

One of the biggest questions is, where can I get a box from? Just about every component retailer sells enclosures, but some companies specialise more than others. In the course of preparing this article I came across some catalogues and information sheets of some more unusual enclosures.

Boss Industrial Mouldings Ltd., James Carter Road, Mildenhall, Suffolk IP28 7DE, can supply a catalogue to readers interested in their range. They have many different types of enclosures available such as the waterproof die-cast boxes, Bimboxes and Bimcases and the 2-piece hand-held cases illustrated.

Newrad Instrument Cases Ltd., Unit 19, Wick Industrial Estate, Gore Road, New Milton, Hants BH25 6SJ deal

mainly in much larger cases. You can see from the photographs that they are much stronger than the average hobby enclosure, but very useful for the much larger projects like linear amplifiers and the like.

West Hyde Developments Ltd, 9-10 Park Street Industrial Estate, Aylesbury, Bucks HP20 1ET, their catalogue can be obtained by sending a £2 cheque or PO, for which you get two £1 vouchers for their products. Many new products are included and each is illustrated with photographs and a dimensioned drawing. The wide range of products can be seen from the photographs in this article, including 19in instrument cases, plastics, steel or aluminium hobby enclosures with many having the option of wall mounting or free standing.

★ Special Offer ★



SCARAB RTTY SYSTEM

• BBC-B • AMSTRAD • COMMODORE 64 •

The advent of home computers and their increasing use in the shack has opened up the world of RTTY to many. This month we offer our readers the chance to buy a Scarab RTTY system comprising the MPTU 1 Terminal Unit, NITE 2 RTTY Filter Unit and the RTTY software appropriate to your computer. We have arranged the packaging of the offer to give the maximum versatility—you can order a t.u. or the filter, in kit form or built-up, with or without software. The RTTY programs are among the most advanced available—offering a host of useful features both for transmit and receive—and have proved to be very popular. Our offer is for the cassette versions only. To find out how the MPTU 1 and NITE 2 units perform turn to page 42 of this issue

The MPTU 1 terminal unit is a self-contained tone decoder and encoder for use with all 5V logic systems. It combines an advanced design concept featuring phase locked loop circuitry, this provides a very stable decoder which is able to quickly lock into incoming signals. The MPTU 1 is also capable of demodulating AMTOR and ASCII signals. The encoder uses well known technology and provides a clean sinewave output. Features include: NARROW/WIDE switching, NORMAL/REVERSE logic output, i.e.d. Mark/Space indication, adjustable output level from encoder, internal power supply, input protection, supplied input and output connectors.

Specifications:

Minimum audio signal required from rig 10mV, decoded output 0—5V logic compatible, maximum input to tone encoder 5V, output nominally 100mV variable, acceptable Baud rate in excess of 250, bandwidth WIDE—450Hz NARROW—250Hz, power requirements 240V 50Hz.

The NITE 2 is a filter designed for users of existing terminal units as well as the ever growing number of computer operators who are using a software-only

approach to decoding RTTY. The software-only approach proves that computers are indeed very versatile but as most existing users are aware, they can be somewhat deaf, requiring large amounts of audio to drive the computer and also a signal rather better than 559 for perfect copy. The NITE 2 however is designed to provide a high-level, filtered output from a much lower and noisier signal than the computer is capable of decoding. Perfect as a front end to existing terminal units by providing that extra bit of amplification/filtering. It is easy to use and the controls have been kept to a minimum. Requires an external power source of between +9V and +13.8V d.c.

	BUILT	KIT
MPTU 1	£60	£42
NITE 2 Filter	£30	£25
MPTU 1 + RTTY software (cassette)	£68	£50

HOW TO ORDER

Select the units you want and complete the coupon below in ink, giving your name and address clearly in block capitals and indicate for which computer you want the software. Send it with your cheque for the total amount to: Practical Wireless, Scarab Offer, Enefco House, The Quay, Poole, Dorset BH15 1PP. If you wish to pay by credit card (Access/Mastercard/Eurocard or Visa only), please fill in your card number and sign the coupon where indicated. Prices include Recorded Delivery and VAT where applicable.

Available to readers of PW in England, Scotland, Wales and N. Ireland. Not available in the Channel Islands, Eire or overseas. Orders are normally despatched within 28 days but please allow time for carriage. The closing date for this offer is 30 November 1986.

To: PRACTICAL WIRELESS
Scarab offer, Enefco House, The Quay,
Poole, Dorset BH15 1PP

Please send me

.....MPTU-1 Built £60.00
.....MPTU-1 Kit £42.00
.....NITE-2 Built £30.00
.....NITE-2 Kit £25.00
.....RTTY (cassette only) £8.00

£ Total

POSTAGE 2.00

Please indicate:—

Total inc. carriage & VAT £

☐ BBC-B ☐ AMSTRAD ☐ C64

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My Credit Card number is

.....

Please charge my credit
card account with

£.....

Signature.....

Name

Address

Tel. No. (Home or Work).....

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PW Publishing Ltd., Poole, Dorset (Reg. No. 1980539, England)

Practical Wireless, October 1986

SCARAB RTTY
OFFER

Automatic NiCad Charger

Don't waste any time in changing NiCads with this automatic charger from James A. Brett G6EBR

Most manufacturers of Nickel Cadmium batteries recommend a charging current at the so-called 10 hour rate. This means, for example, a 500mAh battery requires charging at 50mA for 10 hours.

In practice, because NiCad charging is an inefficient operation, it is recommended that a further 40 per cent is added to the charging time. Therefore, a fully discharged battery should ideally be charged at the 10 hour rate for 14 hours, to ensure it is completely charged.

If some of the cells have not been fully discharged then an excess charge will result. However, at the 10 hour rate no harm is done. In fact this ensures that if any of the cells in the set have been discharged by a different amount they will all finish fully and correctly discharged.

Circuit

The circuit is capable of charging all the battery types listed in Table 1. Because of the true constant current charge mode, up to ten cells of the

Table 1

Cell type	Normal capacity (Ah)	Charging current (mA)
AA	0.45	45
C	2	200
D	4	400
9V(PP3)	0.11	11



same size, connected in series, may be charged at any one time.

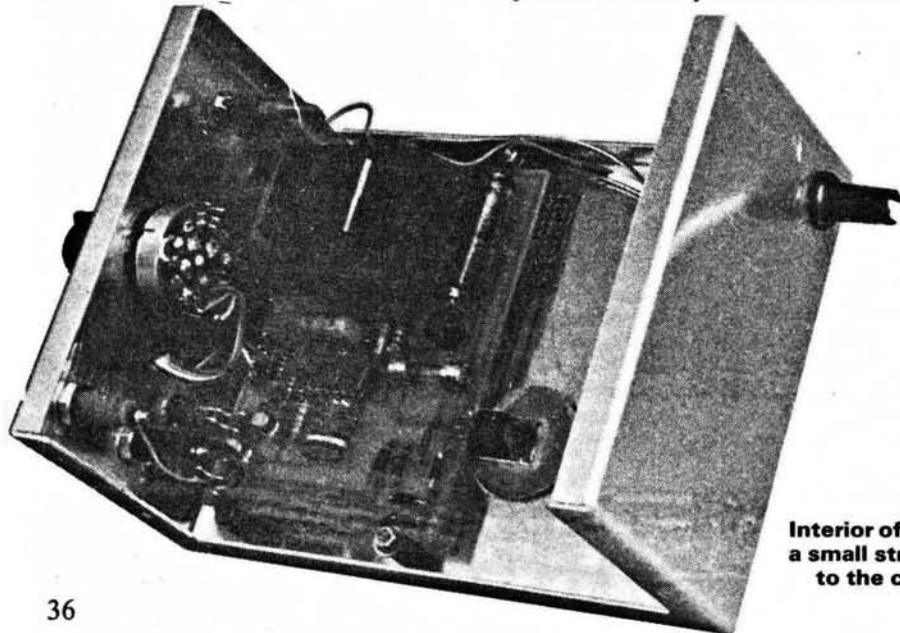
A smooth d.c. voltage is developed across the reservoir capacitor C1, this along with T1 and D1 forms the power supply for the charger. The unit's charging current is controlled by transistors Tr2 and Tr3 in the following manner. The charging current flows through Tr2 which is forward biased by R5, on the return path from the battery the current passes through a sensing resistor R9 connected in series with the negative line. The effective value of this resistor can be reduced by adding one of the resistors R6-8 in parallel with it by means of switch S2.

There will be a voltage developed across the resistor in proportion to the current flowing through it. Once the voltage drop across the sensing resistor exceeds approximately 0.6V, Tr3 starts to conduct, thus diverting some of the forward bias current of the series regulator transistor Tr2. This will result in a drop in charging current and also a drop in the voltage developed across the sensing resistor. As you can see this forms a feedback loop that controls the charging current.

An integrated circuit timer cuts off the charging current 14 hours after switch on. In addition to the mains power indicator D3, there are two other l.e.d.s, one (D9) shows that charging current is flowing, and the other (D4) shows when the charging cycle is completed. Diode D9 is illuminated by the voltage dropped across D6, 7 and 8 giving approximately 2.1V as long as there is current flowing.

The programmable timer consists of a 16-stage binary counter and oscillator, IC1. Timing is achieved by counting a selected number of oscillator cycles. The oscillator's frequency is set by R2, R1 and C2.

The 16-stage counter is programmed by soldering a link between points A and B on the p.c.b. This connection will cause the counter to count 2^{16} , i.e., 65 536. This means that for 14 hours the oscillator has to run at 1.3Hz. This



Interior of completed NiCad charger. For added safety a small strip of insulating material should be glued on to the case directly below the p.c.b. mains input

Practical Wireless, October 1986

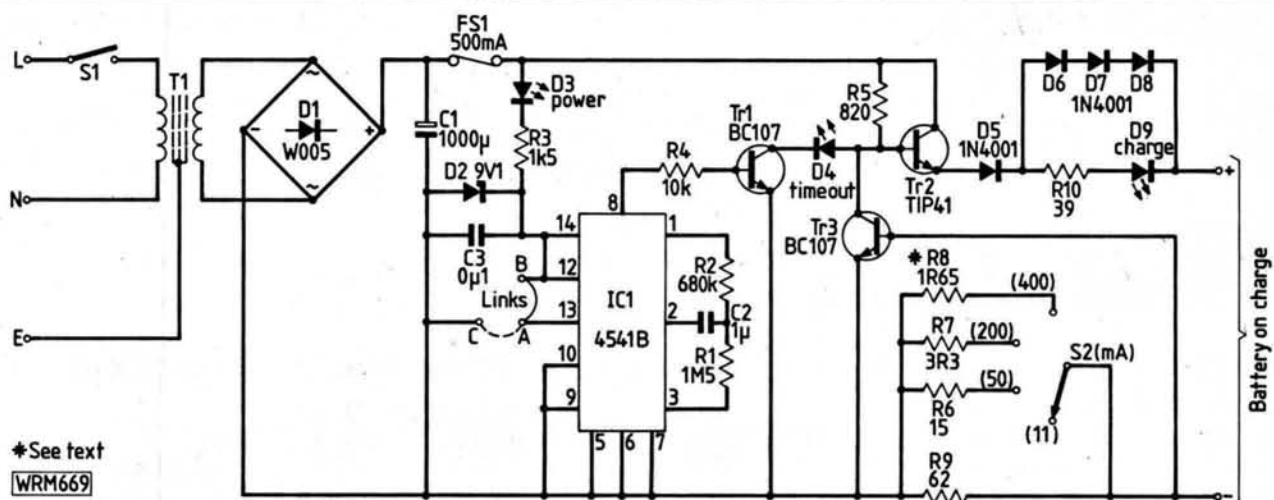


Fig. 1: Circuit diagram. Note R8* is two 3.3Ω resistors in parallel

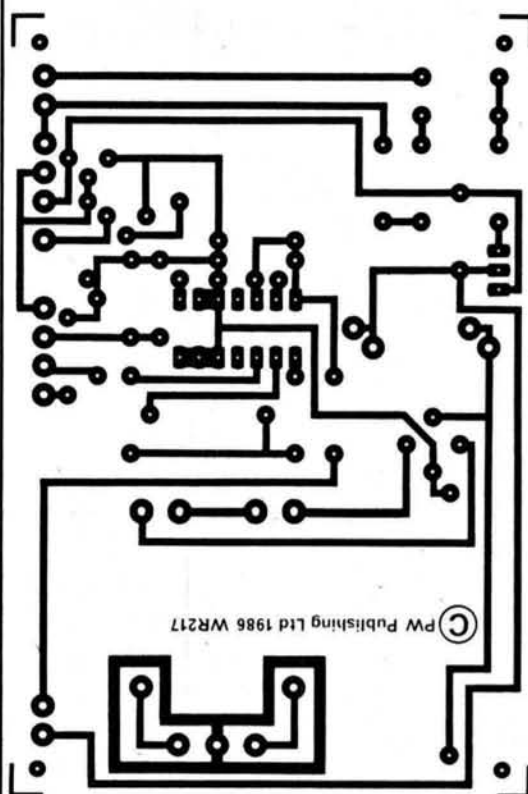


Fig. 2: Track pattern (full size)

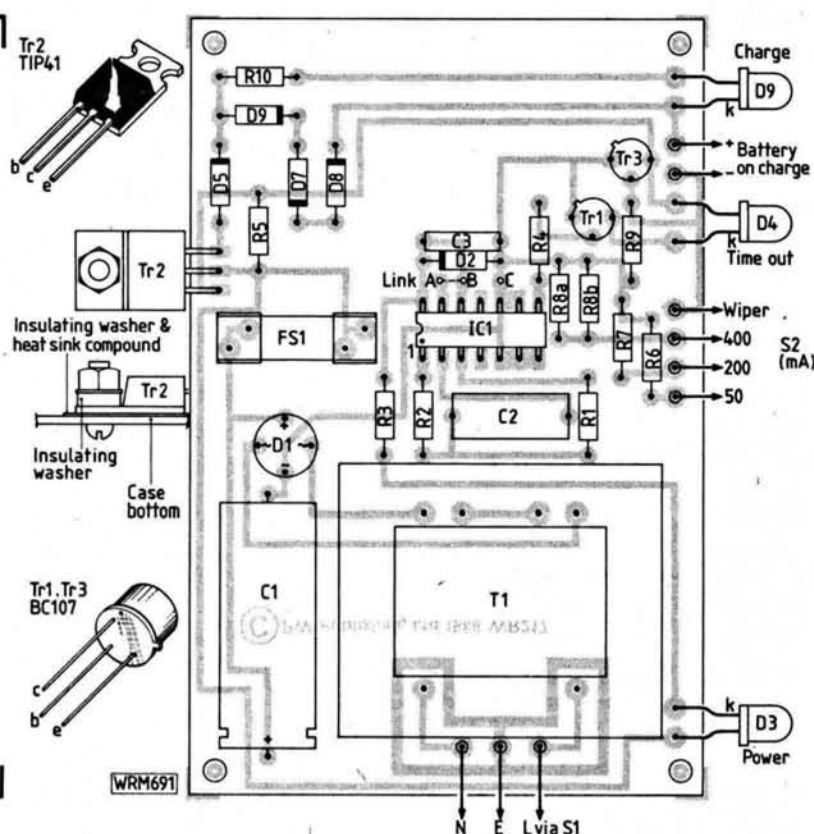


Fig. 3: Component layout

counting action starts at switch on. When the count is complete, 14 hours later, the output on IC1 pin 8 goes positive, switching on Tr1. At this point Tr1 diverts the base current from Tr2 through D4, to 0 volts, thus turning off the charge current and illuminating the TIME OUT l.e.d. The diode D5 prevents the l.e.d. D9 and the emitter of Tr2 being subjected to reverse voltage from the batteries when Tr2 turns off at the end of the charging cycle.

To enable a quick test of the timing cycle, remove the link between A and B and replace it with a link between A and C. This will cause the counter to give a count of 2^8 , i.e., 256 before turning on Tr1. A time for this shorter count of $3\frac{1}{2}$ minutes proves that approximately 14 hours would elapse for the full count of 2^{16} .

Practical Wireless, October 1986

Construction

The unit can be built into a suitable aluminium box which will serve as a heatsink for Tr2. The internal layout is not critical, with the exception of Tr2. This should be sited near the case side, so that the transistor can be mounted on the case wall. The p.c.b. must be mounted on four small pillars high enough to stop the component tails shorting out on the case. Transistor Tr2 being a plastics power device, needs only one hole to be drilled in the box, for its mounting. An insulating kit to suit a TIP41 device is necessary to keep the collector of Tr2 isolated from the metalwork of the case.

The p.c.b. layout is shown in Fig. 3. Installation of Veropins at A, B and C is recommended to make them more easily accessible. Veropins are also

used where the external wiring is connected to the p.c.b. As to fixing the cells under charge, single cell batteries can be held in battery holders with flying leads. They are available in several sizes capable of accommodating up to ten cells connected in series.

Testing

After carefully checking all the wiring and solder joints, connect a d.c. voltmeter across the output terminals of the charger and switch on the supply, a voltage of approximately 16 volts should be present irrespective of the position of S2. Check that the l.e.d. indicating the power is illuminated. Then switch off and remove the voltmeter.

Next connect an ammeter, set to a suitable range, across the output terminals of the charger and switch on.

Check that the l.e.d. indicating charge current is illuminated. At this point you can check the output current of the charger against each position of S2. They should be 11, 50, 200 and 400mA respectively, although these may differ up to ± 10 per cent due to meter and resistor tolerances. It should be noted that S2 must be a type having break-before-make contacts, this is necessary to avoid switching in two current ranges at once, thus bringing about a very high current which would damage the cells being charged. Connect several NiCads, if possible ten, in series with the ammeter and check that the current remains substantially the same as when measured with just the ammeter. This proves that the constant current feature of the circuit is working.

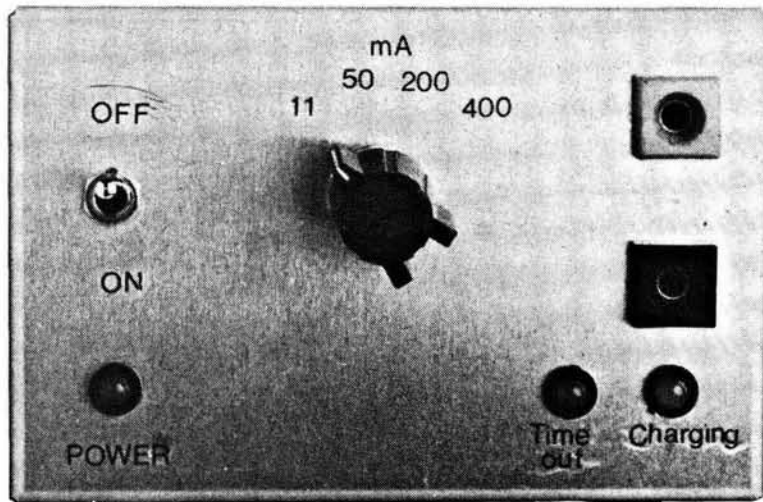
Switch off and check that the timer link is connected between points A and C. Connect the ammeter across the output terminals of the charger. Switch on and note the time. After approximately $3\frac{1}{2}$ minutes the TIME OUT indicator should light and the CHARGING indica-

tor should go out. If necessary the charging time may be adjusted by changing the value of R2 in proportion to the time required. Increasing the value of R2 gives a longer time.

Finally change the link wire from the A to C position to the A to B position. The charger is now ready to be put to

work charging all your NiCads safely.

Caution: This project has a mains voltage connection and every effort must be made to insulate all live joints on the mains switch and primary of the transformer by means of sleeving. It is also recommended that the mains plug be fitted with a 2A fuse. **PW**



Front panel of completed NiCad charger.

SHOPPING LIST

Resistors

0.25W 5% carbon film

15 Ω	1	R6
39 Ω	1	R10
62 Ω	1	R9
1.5k Ω	1	R3
10k Ω	1	R4
680k Ω	1	R2
1.5M Ω	1	R1

0.6W 1% metal film

3.3 Ω	1	R7
3.3 Ω	2	R8*
820 Ω	1	R5

Capacitors

Min polyester film

0.1 μ F	1	C3
1 μ F	1	C2

Electrolytic 25V

1000 μ F	1	C1
--------------	---	----

Semiconductors

Diodes

BZY88C9V1	1	D2
W005	1	D1
1N4001	4	D5,6,7,8
Green	1	D4
l.e.d. 0.2in		
Red l.e.d.	1	D9
0.2in		
Yellow	1	D3
l.e.d. 0.2in		

Transistors

BC107	2	Tr1,3
TIP41	1	Tr2

Integrated circuits

4541B	1	IC1
-------	---	-----

Miscellaneous

Aluminium box 76 x 114 x 152mm (1); 12 volt (0-6V/0-6V) 6VA per secondary YJ52G* transformer (1); transistor mounting kit (1); 20mm 500mA fuse (1); 20mm p.c.b. mounting fuse clips (2); s.p.s.t. 250V toggle switch (1); single pole 4-way rotary switch

(break-before-make) (1) see text; pointer type knob (1); insulated terminal red (1); insulated terminal black (1) and plugs to suit; p.c.b.; stand-off pillars (4); Veropins; cable strain relief bush (1).

*Maplin number.



This project has been designed in accordance with UK practice and safety standards at the time of publication. Overseas readers contemplating construction must ensure that they make any modifications necessary to comply with their local and/or national regulations and conditions.

SWAP SPOT

Have 10GHz klystrons, 25mW output, 2 off. Would exchange for 2 legal CB handhelds, 2-channel PP3 battery type preferred. G4FFO. Tel: Cambridge 860150. **B593**

Have marine handheld transceiver SS6000 with speaker/mic, NiCads, charger etc. Crystalled for coastguard use Ch. 0, 73, 10, 6, 67 and 16, with helical and 1/4 wave antenna. Would exchange for scanning receiver or Datong auto d.f. unit. Nigel G4PJJ. Tel: 0452 75542. **B609**

Have Electron computer plus Electron data recorder, as new. Also books and tapes. Would exchange for general coverage RX, FRG-7, R100 etc. Tel: 0703 898675. **B613**

Have Wayne-Kerr a.f. signal generator, type S121, 10Hz-120kHz. Would exchange for h.f. receiver with s.s.b. or good airband receiver. **B615**

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

If so, why not advertise it FREE here. Send details, including what equipment you're looking for, to "SWAP SPOT", Practical Wireless, Enfield House, The Quay, Poole, Dorset BH15 1PP, for inclusion in the first available issues of the magazine.

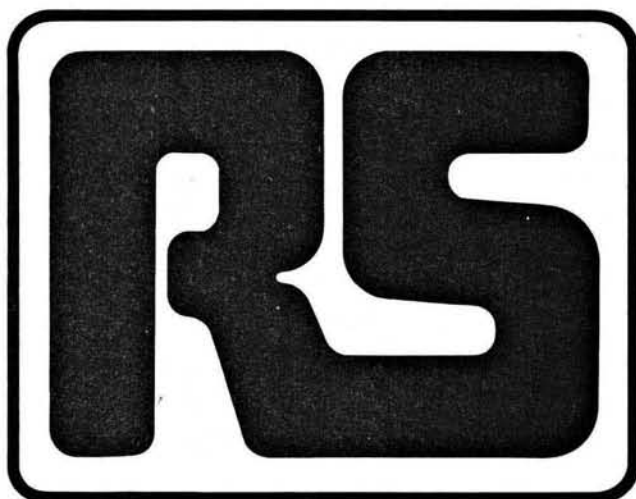
A FEW SIMPLE RULES: Your ad. should follow the format of those appearing below, it must be typed or written in block letters; it must be not more than 40 words long including name and address/telephone number. Swaps only—no items for sale—and one of the items MUST be radio related. Adverts for ILLEGAL CB equipment will not be accepted.

The appropriate licence must be held by anyone installing or operating a radio transmitter.

Jones, 12a London Road, Shenley Church End, Milton Keynes MK5 6AL. **B615**

Have complete f.m. legal CB base station, Murphy CBH1500 rig, modulator Saturn base antenna, 7m coaxial cable, Breml 3A p.s.u., s.w.r./power meter. Would exchange for Plus 4 printer or disc drive. Graham Johnson, 95a Coventry Road, Nuneaton, Warwicks CV10 7AA. Tel: 341368. **B619**

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Semiconductors
Service aids
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Technical books and videos
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Tools & production aids
Transformers and wound components
Wiring accessories
Workshop equipment

E.R.P. Calculations and 50MHz Part 2

*What use will this band be with the present restrictions imposed by the DTI?
F. C. Judd concludes his look at 50MHz*

Even though it has been officially allocated to UK Class A licence holders, the answer from the DTI is in Amateur Radio Information Sheet No. 2 "At 50MHz on an experimental basis, 100 permits were issued to interested amateurs while the final allocation was being decided. Those experiments have shown some very interesting characteristics on sunspot activity, E and F layer reflections (and presumably refraction), temperature inversions and meteor scatter work."

I think that we should respectfully remind the DTI that radio amateurs were well aware of all this way back in 1946!

At that time British TV signals were being picked up in the USA on 45MHz and signals from there were being heard in Europe on frequencies as high as 47MHz. Towards the end of 1946 and on mornings when conditions were favourable, American radio amateurs were transmitting on 50MHz towards Europe and listening for replies on 28MHz. There was no allocation for 50MHz at that time on this side of the Atlantic.

24 November 1946

A test transmission (50MHz) by W1HDQ, West Hartford, Conn. produced a reply by Denis Heighman

G6DH of Clacton-on-Sea in Essex, "I'm hearing you on 50MHz" and the first "amateur" v.h.f. transmission across the Atlantic was confirmed. The following year, and with special permission from the licensing authority at that time (the Post Office), G6DH was the first British station to achieve a two-way transatlantic QSO on 50MHz. This was also confirmed by G5BY, near Plymouth, who joined the QSO shortly after. The list of 50MHz "DX" firsts goes on.

Shortly after noon on the same day two American stations made the first USA transcontinental QSO via the "F" region. In January 1947 KH6DD

Fig. 2.2

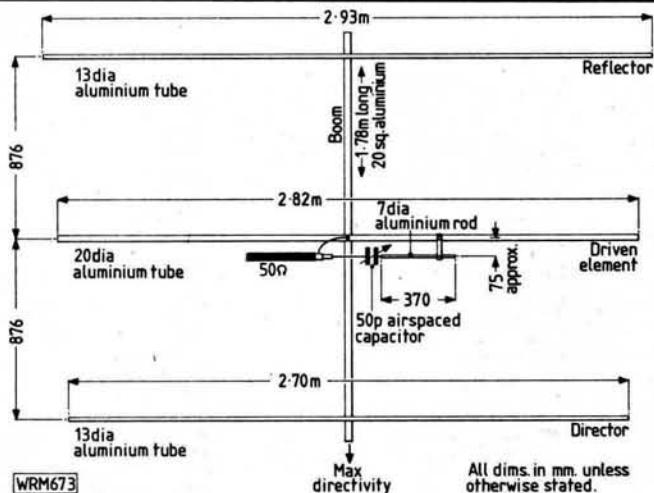
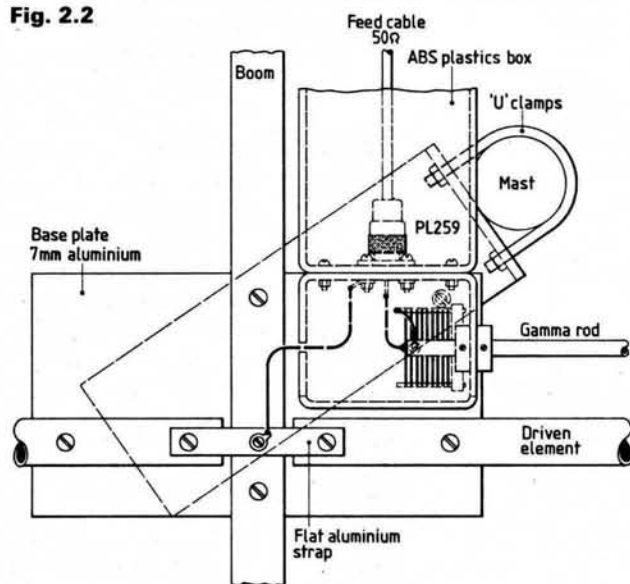


Fig. 2.1: General details of a simple 3-element beam antenna for 50MHz with a gamma match feed system

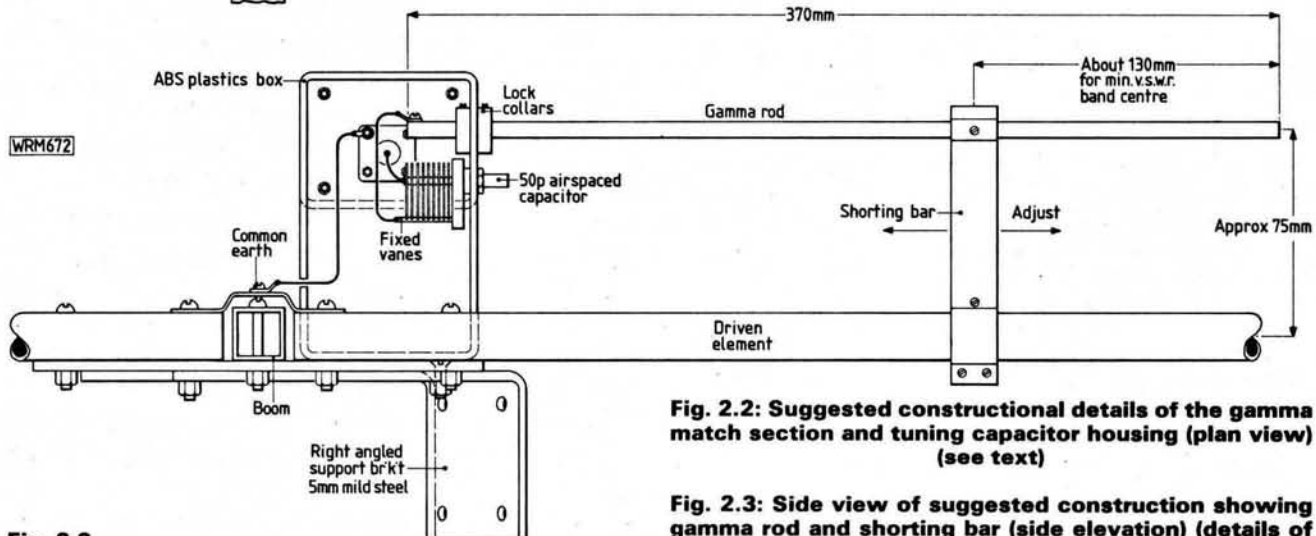


Fig. 2.2: Suggested constructional details of the gamma match section and tuning capacitor housing (plan view) (see text)

Fig. 2.3: Side view of suggested construction showing gamma rod and shorting bar (side elevation) (details of shorting bar shown separately)

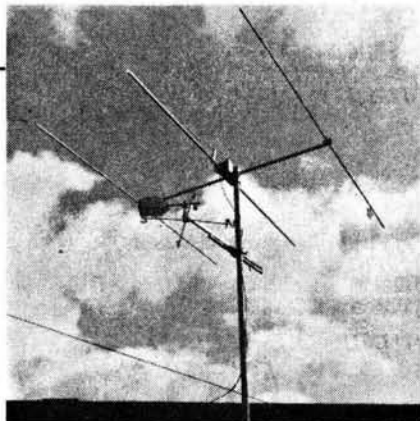


Fig. 2.4: Photograph of the prototype 50MHz 3-element beam. The item beneath the antenna is a wind direction indicator

spanned the Pacific during a QSO with J9AAK Okinawa, extending the 50MHz DX record to 7400km. Eventually this was exceeded by W7ACS/KH6 to VK5KL, setting a new record of 8530km! It must be admitted that this was during a solar cycle peak period but here a reminder that our next one is on the way.

Propagation on 50MHz

No radio amateur band occupies a better place in the spectrum of frequency allocations than 50MHz from the point of view of variation in propagation modes. This band is uniquely placed between the h.f. "DX" bands and the higher v.h.f. region, normally considered as mainly for local working but with occasional "tropo" and possible propagation DX as a bonus. The 50MHz band allows much more than this. Consistent coverage over a range of 160km is the norm but tropospheric conditions alone can extend this by two or three times.

Sporadic-E (Es) offers DX in the region of 650 to 1950km and multi-hops may at times extend this to up to 4025km or more. Auroral propagation is quite common in the higher latitudes covering distances of 1600km or so and DX via the F region is possible during a solar cycle peak period (mentioned previously) over distances of well over a 3200km. Then there is F region "back scatter" and scatter from meteor trails making it possible to operate over distances of 970 to 1930km quite regularly, it would take a small book to cover in detail the various propagation modes possible on 50MHz, hence references to further information are included at the end of this article.

Antennas for 50MHz

One of the DTI regulations is that antennas for 50MHz must be horizontally polarised and at a height not exceeding 20m above ground. Portable operation is not allowed. Radiated power allowed is in terms of e.r.p., that is power radiated from the antenna

and which was dealt with in Part 1. Commercially made antennas are available, including 5-element beams with considerable forward gain. On the other hand there are transceivers available with enough r.f. power output to exceed the e.r.p. power restriction using only a single half-wave antenna. The r.f. power output of most, if not all, such transceivers is controllable.

With a maximum transmitter mean power of 100 watts (20dBW) available the antenna need be only a half-wave dipole (assuming s.s.b. transmission only). On the other hand a rotatable uni-directional antenna is desirable since this would reduce radiation toward Europe whilst allowing directivity over a 180° arc from 360° due North to due South. It is, of course, up to the operator to choose a combination consisting of a beam antenna with fairly high gain (an advantage during reception) and adjust transmitter power accordingly, or go for a simple low gain beam antenna plus sufficient transmitter power to attain the allowed e.r.p.

A Simple Three-Element Beam for 50MHz

The general details and dimensions are given in Fig. 2.1, the antenna consisting of a gamma matched dipole for a 50Ω feed plus a reflector and director. Maximum forward gain will be in the region of 7 to 8dBd and the horizontal radiation pattern as in Fig. 2.6. If desired the dipole alone can be used, as the gamma match will cater for a direct 50Ω feed.

This antenna uses relatively close spacing between elements (0.15λ). The active or driven element is made from 20mm diameter aluminium tube and the reflector and director from 13mm diameter tube. The boom is about 1.78m long and is of 20mm square aluminium tube. A photograph of the prototype is shown in Fig. 2.4 and suggested constructional details of the gamma match and feed point assembly are illustrated in Figs. 2.2 and 2.3. The tuning capacitor (50pF miniature air-spaced) is housed in an ABS plastics box about 100 × 62 × 35mm with a lid to keep out water. Attached to the back of this is another plastics box with a cutaway in one end for entry of the

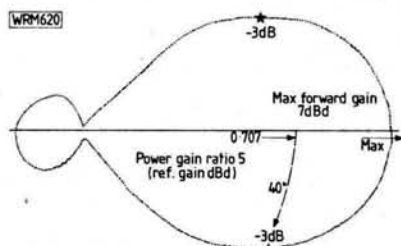


Fig. 2.6: Polar radiation pattern of the 3-element beam in horizontal mode

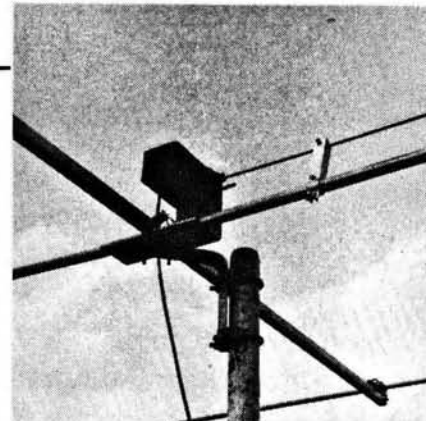


Fig. 2.5: Close up photograph of the gamma match assembly, capacitor housing and feed cable connection

50Ω coaxial feed cable (preferably UR67 or similar) to a PL259 or BNC type socket mounted on the outside of the capacitor housing box. The object of the second box, mounted upside down and without the lid, is to prevent water getting onto the coaxial connector. A close-up of this assembly is shown in Fig. 2.5.

The only dimensions to adhere to are those of the three elements, the spacing between them and the gamma match rod. Construction of the capacitor housing may be varied to suit available materials but the gamma rod must be 370mm long.

"Shorting Bar" Details

Details of the "shorting bar" (gamma rod to driven element) are shown separately in Fig. 2.3. Again construction may be varied but the spacing between the gamma rod and the driven element should be approximately 75mm as indicated.

Element lengths are suitable for the band 50 to 50.5MHz and it remains only to adjust the gamma shorting bar together with the 50pF capacitor to obtain a v.s.w.r. of virtually 1:1 across the band.

As already mentioned, the driven element can be used by itself as a dipole or, it may be used with just the reflector. In either case, the gamma match will adjust v.s.w.r. for a 50Ω coaxial feed cable. Gain with a reflector only will be in the region of 3 to 4dBd. **PW**

References

VHF/UHF Manual by G. R. Jessop. Published by RSGB.

ARRL Antenna Handbook. Available from RSGB Books Dept.

The Beam Antenna Handbook by W. I. Orr W6SAI. Radio Publications Inc. USA.

The Radio Amateurs VHF Manual. ARRL. Available RSGB Books Dept.

PW REVIEW

Elaine Richards G4LFM looks at this month's special offer.

We managed to get our hands on the Scarab "Special Offer Package" about six weeks ago, which gave us the chance to see just what it was like. The "package" consisted of an MPTU 1 kit and a ready-built NITE 2.

The MPTU 1 Kit

The kit arrived through the post, well packaged and therefore undamaged. All the components were supplied inside the main case (A Verobox), which had been protected by polystyrene. The front and rear panels of the box come ready drilled and marked so the need for careful packing is most noticeable here.

When you purchase a kit, it usually doesn't stop there, it seems you always need one or two other bits before you can get going. Not with this kit, everything is supplied, including connecting wire, tinned wire for links and even some 22 s.w.g. solder—the only thing missing was the soldering iron! Other unexpected parts supplied with the kit were things like mains lead, retaining grommets and even sleeving to protect the exposed connections on the mains fuse and power switch.

All resistors were good quality, five per cent or better, the capacitors were also of good quality. To help with capacitors identification the components list identifies them as, for example, 0-022 μ F (223K).

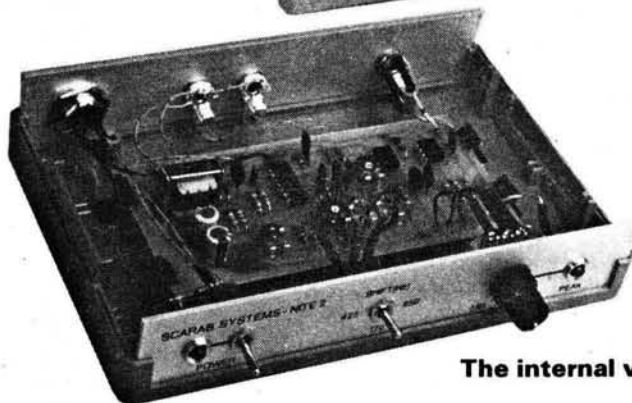
The p.c.b. is made from high quality glassfibre, silk screen printed and lacquered. The hole sizes and spacing were all correct, but some leads did need dressing—not an arduous task.

It should be noted that all components supplied for the kits are identical to those used in the "ready-built" units. So, assuming you follow the instructions carefully, there is no reason that a home-built version shouldn't measure-up to the ready-built type.

Construction

The instructions supplied with the kit are very detailed, and each step is explained well enough for a beginner to be able to successfully build the project. One point to make here is that the unit is mains powered and so anyone not confident to work on such a kit should be very wary. Although, some help may be needed on the setting up side of the instructions, but what are radio clubs and other radio amateur

The internal view of the MPTU 1



friends for? All construction details, notes and setting-up instructions are in an A5 size booklet, bound and stapled.

To unpack and check the components and p.c.b., then fit the resistors took one hour. The p.c.b. was completed in a total of two hours. These times are for an experienced constructor who had thoroughly read the instructions beforehand, so you can adjust that as necessary for each constructor.

Nothing untoward came to light when building the MPTU 1, all the instructions were easily followed and only a few components needed dressing. When it came to the interconnection wiring of the project, the instructions in the booklet are very precise—like none I've ever come across before. You are told the lead lengths you will need and the colour if it is important, there are also written location details and an interconnection diagram. Hence it would be very difficult to make a mistake unless the constructor was determined to do so, or very careless.

The front and rear panels of the case were given an extra coat of lacquer to protect the markings. Spectra lacquer appeared to cause no ill-effects and has been used with much success on many other home-brew projects.

If you do this, don't forget to allow plenty of drying time otherwise the

The internal view of the NITE 2

fingermarks will be there forever, which spoils an otherwise good front panel.

Alignment

As the unit uses a phase locked loop system, the terminal unit alignment is very simple. It requires the adjustment of only one pre-set resistor to complete the receive alignment. For the transmit direction, it requires two pre-set resistors to be aligned to set the mark and space frequencies of the f.s.k. oscillator.

It is recommended that a frequency counter is used for the alignment, but an accurately aligned Toni Tuner could be used instead. This part of building the kit is very important, it's difficult to get people to talk to you if you are off frequency or using the wrong shift!

If you are not sure about setting up the kit, ask at your radio club if anyone can help. There is usually someone there who is a RTTY buff and willing to lend a hand. For best results the unit should be lined up within 10Hz.

Other checks can be done if you have a signal generator, like checking the mark and space i.e.d.s brilliance. If you have an oscilloscope you can check the output of the comparator for a square wave of equal mark to space ratio.

Practical Wireless, October 1986

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EF55	3.50	PCF805	1.70	UL84	1.75	6CW4	8.00	811A	16.33
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EF184	2.00	PCL85	2.50	Z803U	25.00	6F6	3.00	2050	7.50
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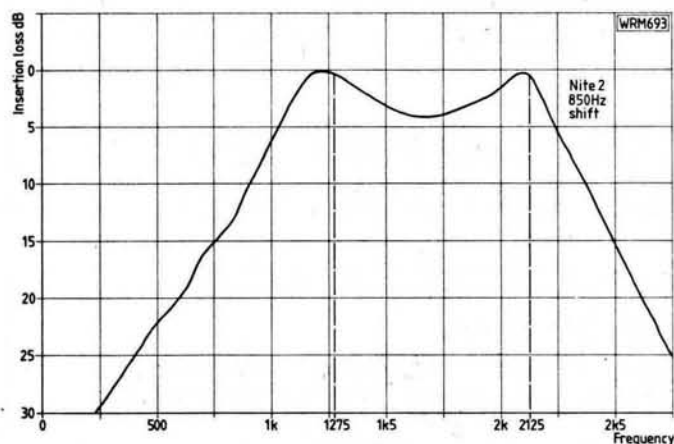
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The filter response with 850Hz shift

If all else fails and you find you really can't set the unit up, it can be returned to Scarab for checking and setting up. The charge for this service is £7.50, and that includes fault finding, component checking and/or replacement and return postage.

The NITE 2

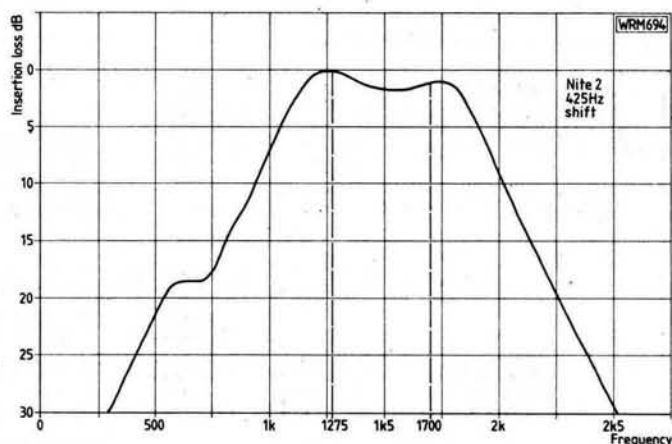
The NITE 2 filter is provided with a small booklet which gives some background reasons for using a filter, a circuit description and construction details.

The constructional details in the booklet are rather sparse and aimed at the experienced constructor. Although, if you applied the same construction principles as described in the booklet for the MPTU 1, there should be no real problems. Also the NITE is 12V powered and not mains.

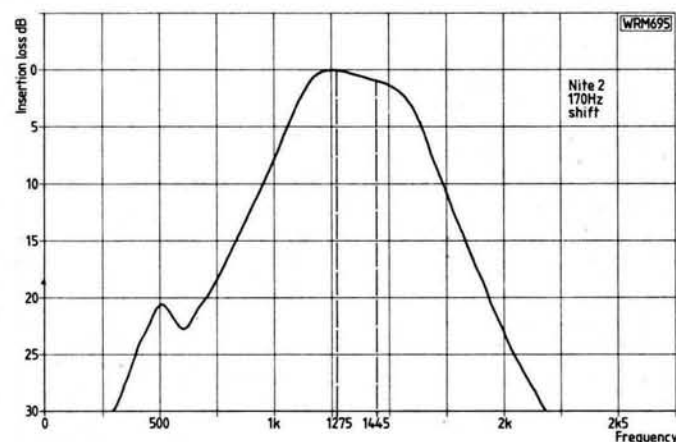
Once again the p.c.b. was good quality glassfibre with tinned track. We know this as, although the unit was ready-built when it arrived, we dismantled it to have a look! All the components were very good quality and the case matched the MPTU 1.

The mechanical construction of the filter was very simple, the p.c.b. was mounted using stick-on clips. This type of p.c.b. mounting makes fault finding (when and if necessary) and servicing much easier. All indicators, controls and sockets are mounted on the front and rear panels which are very well marked, like the MPTU 1. Once again they were given an extra coat of lacquer to further protect the marking. This was necessary in this case as the units have been transported between the home QTH and the office on numerous occasions for photography and the like—with no ill effects, too.

If you have an MPTU 1, there is a further option for housing the filter. It can be removed from the Verobox and mounted inside the MPTU 1 case. The instructions for this modification are included in the NITE 2 instruction booklet, and don't seem very difficult. The NITE 2 mounts inside the lid of the MPTU 1 and the filter shift switch replaces the original NRW/WIDE switch on the MPTU 1, this function is therefore lost when opting for this method.



The filter response with 425Hz shift



The filter response with 170Hz shift

Alignment

The alignment of the filter is very simple (although the ready-built version arrived aligned) but you do need a variable frequency audio oscillator and either an oscilloscope or an a.c. voltmeter.

Test Results

The response graph in Fig. 1 shows how useful the filter is. Each graph shows that the filter response is well controlled, with minimum passband ripple, and it has good out of band attenuation. The unit performed well providing useful gain and effective suppression of out of band noise, giving the terminal unit a good chance to resolve weak stations. All in all it seems like a very useful addition to just about any RTTY station. Most of all, to those who are using "terminal-less software".

On Air Testing

As mentioned previously, we got hold of the MPTU 1 and NITE 2 about six weeks ago. All the subsequent on-air-tests were carried out on the h.f. bands as they are the most demanding for a RTTY terminal, i.e. high QRM, QSB and multi-path!

By using a change-over switch, the output of the Scarab terminal unit and the reference terminal unit were both connected to the computer, enabling some direct comparisons to be made. The MPTU 1 and NITE 2 fared very

well, equalling the filter terminal unit on all but the noisiest of signals, and most of those weren't worth the effort.

The first evening's operation resulted in RTTY contacts with C31ON in Andorra, I0GIA in Perugia and DL3IR in Passau. The station was also used successfully for AMTOR QSOs, in conjunction with an AMTOR Mk 2 board. This goes to show that the unit is suitable for 100 baud transmissions.

AMTOR

Since then the unit has been used extensively for the past few weeks for RTTY and AMTOR activity on all the h.f. bands—including DL1SQ on 10MHz—yes really 10MHz! A quick look at the RTTY column in On the Air this month will show how much work was done using the MPTU 1. We don't do much on the air unless its RTTY, AMTOR or c.w. at the home QTH.

The on-air test set-up comprises:

Antenna—halfwave dipole on all bands 3-5-28MHz

Rig—Icom IC-720A (modified for AMTOR)

AMTOR—AMTOR Mk2 board (home-brew)

Computer—Vic 20.

My thanks to Scarab Systems, 39 Stafford Street, Gillingham, Kent ME8 5EN, for the special offer package. You can find details and the coupon on page 35.

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Getting Started... The Practical Way

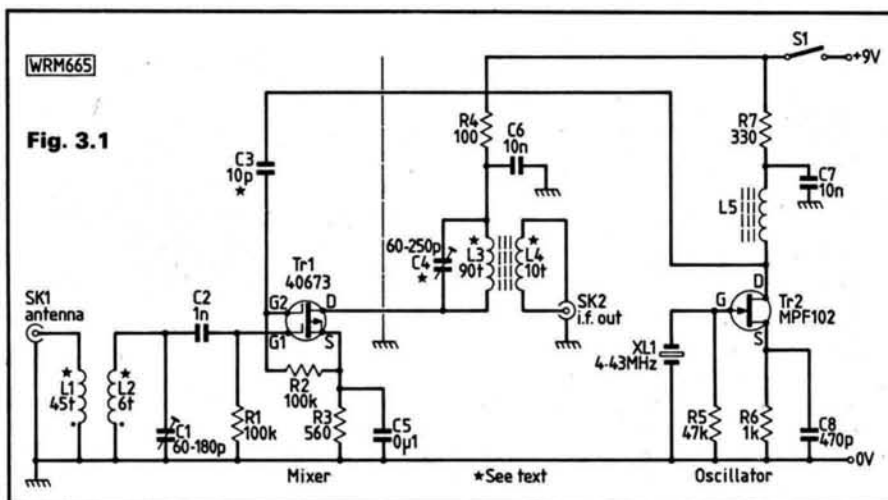
In Part 3 of this series Rob Mannion GM3XFD describes how to build a simple low-cost converter to enable you to listen to the 3-5MHz amateur band on a Medium Wave broadcast receiver.

The circuit diagram of the converter is shown in Fig. 3.1 and I claim no originality for it. There is nothing difficult about the circuit as it is a very basic "mixer" with a separate "crystal controlled oscillator". Both the mixer and oscillator transistors are cheap and by choosing a widely available quartz crystal the price of this item can also be kept low. The recommended crystal is normally employed in generating the 4-43MHz sub-carrier for colour television decoding. Of course, you might already have a suitable crystal removed from that "retired" colour TV which you have managed to collect.

Crystal Oscillator

First-time builders are strongly encouraged to build the converter using the crystal oscillator, as by so doing you will probably save much time and frustration. Aligning a variable frequency oscillator (v.f.o.) to produce the correct intermediate frequency (i.f.) output can be difficult, and the crystal oscillator shown will give the correct i.f. first time.

With this circuit and a 4-43MHz crystal the oscillator voltage injected into the mixer, via Tr1 gate 2, heterodynes with the incoming 3-8MHz sig-



nal to produce the i.f. signal.

Most modern superhet receivers have a fixed i.f. with the wanted transmissions being selected by adjusting the local oscillator frequency in step with the tuning control. This keeps the i.f. constant, no matter what the frequency of the incoming signal.

However, we are going to fix the receiving end and tune the i.f.—in our case the car radio. Because of the conversion process the tuning of this combination will be inverted. Simply

stated, this means that with a 4-43MHz crystal you will have to tune the car radio to 930kHz to receive 3-5MHz and 630kHz to receive 3-8MHz. In other words, you will be tuning UP the 3-5MHz band by tuning the receiver DOWN the medium waveband! In practice, it will not be very noticeable and is a small price to pay for being able to take advantage of readily available crystals. Using a crystal lower in frequency than 3-5MHz would give conventional tuning but will probably cost

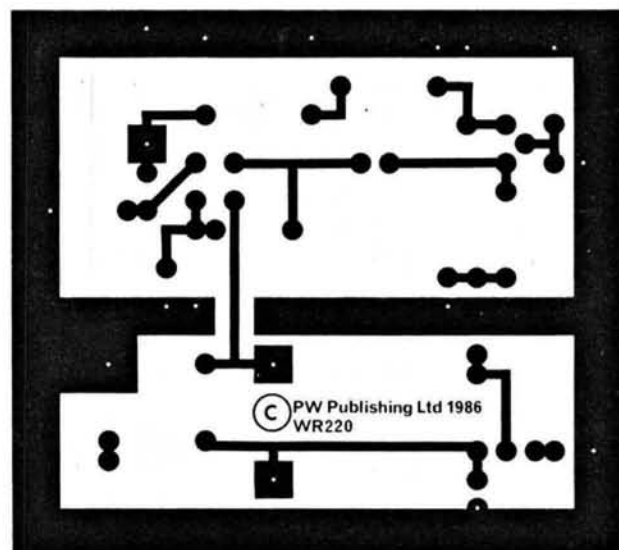
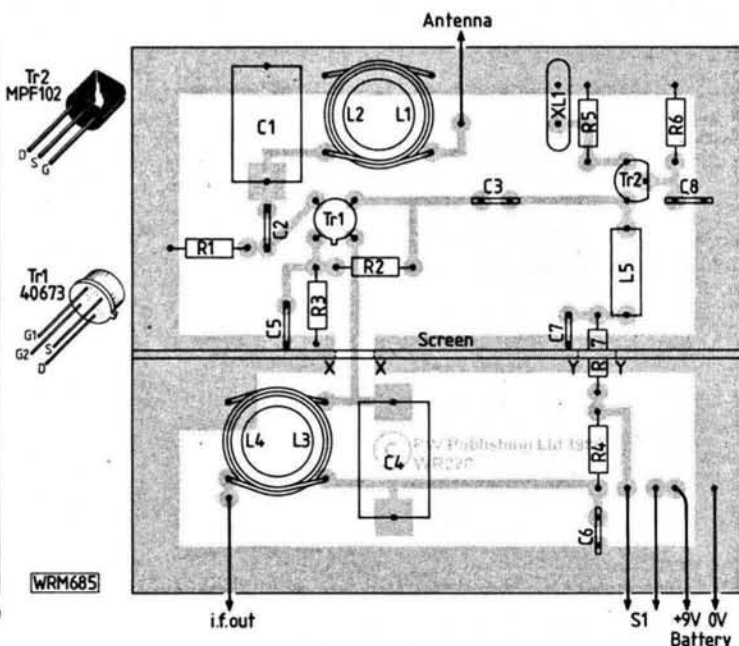


Fig. 3.2: Layout of p.c.b. with the components on the copper track side of the board



a lot more and be more difficult to obtain.

The incoming 3.5MHz signal is tuned and transferred from the antenna by the coil and trimmer capacitor combination L1/L2/C1. By using your g.d.o. a coil may be wound and tuned for resonance on approximately 3.6MHz. A fully variable capacitor is not a necessity here as we will be covering a relatively narrow band of frequencies—L1/L2 being sufficient for this coverage. As a guide to winding the coil using a 12.5mm diameter former without a core, some 45 close wound turns in a single layer sufficed for L2 while L1 needs around 6 turns over L2 in the same direction. Virtually any wire from 22 to 34 s.w.g. can be used. The g.d.o. will allow you to experiment and resonate the coil to exactly the right frequency.

Do not wind L1 over L2 until resonance is approximately correct, as unwinding both coils can be a nuisance! To ensure that you can identify the antenna input end, solder the earthy end of L1 to the corresponding end of L2. It is good practice to adjust the coil so that resonance is obtained with the trimmer set to mid-range as this allows the circuit to be "peaked" after installation in its metal box.

Along with other mixing products, our wanted i.f. appears in the drain circuit of Tr2 where the combination of L3 and L4, being broadly resonant over the part of the medium waveband we are interested in, extracts the energy we are after.

With a local oscillator frequency of 4.43MHz giving an i.f. of 930 to 630kHz, L3 will require approximately 90 to 100 turns of 28 s.w.g. wire with a trimmer capacitor of 250pF. If you cannot find a 250pF trimmer in your box try soldering a "padder" capacitor across a smaller trimmer to make up 250pF—e.g. 68pF + 180pF = 248pF. Once resonance has been achieved, using the f.e.t. dipper, of course, L4 can be wound over L3. Six to ten turns should prove adequate to couple the i.f. into the coaxial feed to the car radio.

Reliable Starter

The local oscillator is a very reliable starter and works well with many crystals. It should be pointed out here that crystals often show a marked reluctance to work! Bearing in mind that they actually vibrate mechanically—in our case at around 4 430 000 times per second—to generate the r.f. energy it is not that surprising! This is something that you have to bear in mind, for no two crystals, even from the same batch, show the same output when used in an oscillator circuit. An old crystal, especially a surplus one, may well be a sticky job!

For this reason we must be prepared to vary the value of the coupling capacitor C3 to ensure that there is enough oscillator injection.

The 4.43MHz r.f. voltage appearing

at the drain of Tr2, when faced with the high impedance of L5, follows the easier path via C3 to the Gate 2 input of Tr1. L5 offers a very low resistance d.c. path for the 9V powering the oscillator.

To prevent possible feedback oscillation between the output of the mixer device and its input, a screen, made from a piece of unetched p.c.b. material 95 x 45mm with two small slots cut to clear the gap in the track at XX and R7 at YY, is soldered to the p.c.b., shielding L3/L4 from L1/L2. This feedback process is simple to understand, as you will almost certainly have met it before with public address amplifiers.

If the microphone is placed too close to the speakers, the familiar *howl-around* develops. This is caused by amplified sound from the speakers re-entering the system via the microphone, so repeating the cycle. The rate or frequency of the howl is governed by many factors. Exactly the same process occurs in radio frequency circuits.

Sometimes feedback is necessary, as in r.f. or a.f. oscillators, and controlled feedback can be very useful—but often it isn't, and is very troublesome to cure. The screen greatly reduces the risk of this effect as the coils cannot "see" each other directly. The grounded copper board virtually eliminates any radiation from L3/L4 to the input.

Printed Circuit Board

The recommended p.c.b. technique is unusual but very straightforward. The track pattern is drawn with an etch-resist Dalo pen and, after the ink has dried, etched in a ferric chloride solution, made up exactly as per the manufacturer's instructions. A small plastics photographic developing dish is ideal for etching this board. Rocking the dish carefully in a "see-saw" fashion over a pencil helps to speed up the etching process. After all of the unprotected copper has been removed by the ferric chloride the board can be washed in clean running water—but not in a glazed sink which will be permanently stained brown!

Instead of drilling the board the components will be soldered directly onto the copper pads. For many applications this is a useful aid for the inexperienced. It allows the circuit to be followed in a much easier fashion, and does not need accurate placing of

drill holes. In this instance it also helps to secure the copper laminate screen to the foil on the main board.

There are disadvantages in the system, but by taking precautions they can be minimised. Possibly the main problem could be caused by leverage of the components, lifting the thin foil with the heat of soldering. This does not happen with the leads passing through the holes in the board. However, by increasing the mounting area of copper and laying component leads as close to the copper as possible by pre-forming the ends this trouble is unlikely to occur.

Boxes

Various cases have been used, die-cast aluminium boxes, such as the Eddystone ones, being a favourite. Small baking tins, tea caddies, etc., are all workable alternatives. I have also used copper-clad p.c.b. material to construct a small box in the past.

Switching on the unit, the local oscillator signal will be found, either on its fundamental frequency, or harmonics, on a short wave radio and the oscillator should be heard clearly as a loud rushing sound. As it produces an unmodulated carrier it should be easily identifiable. Once you have found it at nearly 8.9MHz, removing the power supply from the unit should prove the point. A dipper with the power off will detect the r.f. energy from the oscillator. Using the dipper in this way it becomes an absorption wavemeter.

Sniffer

Alternatively, you can construct a sniffer and keep it for further use in your tool box. A sniffer is simplicity itself. Take one length of stiff, insulated wire of, say, 12 to 16 s.w.g., and wind a large coil of about six turns around a broom handle. Leave about 100mm of wire at the ends of the coil and to one end solder a small diode. Solder a length of insulated wire to the other end of the diode to form one meter lead and cover the diode and its soldered joints with insulated sleeving. Another length of insulated wire soldered to the other end of the sniffing coil forms the other meter lead. The whole assembly is fitted into a discarded felt-tip pen case. (Fig. 3.3)

With the two leads connected to your multimeter you can use the sniffer as a wand to "sniff out" r.f. without

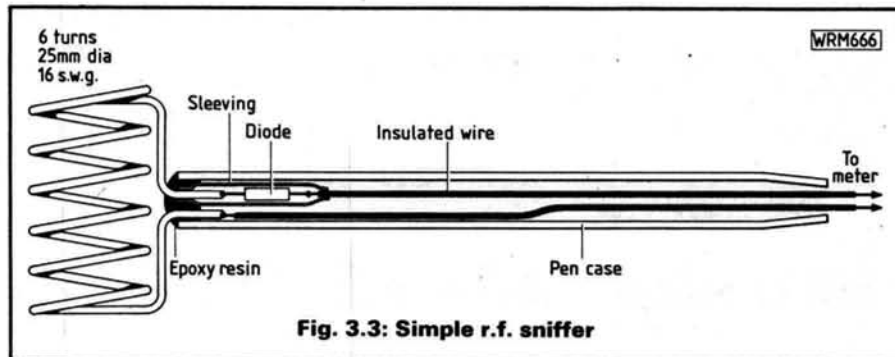


Fig. 3.3: Simple r.f. sniffer

having to actually touch any part of the circuit.

Start with the meter on the 12V d.c. range and switch down ranges until a suitable reading is obtained. Radio frequency energy is picked up by the coil, rectified by the diode and indicated by the meter. The polarity of the diode is immaterial as you can easily swap the leads over at the meter. Placing the sniffer coil near the oscillator transistor and L5 will give some indication of the relative level of its output.

Tuning across the lower part of the medium waveband, the "bleeps and burps" of RTTY (radioteletype) signals on 3.5MHz should be heard. An antenna resonant at 3.5MHz is highly recommended to help with reception while minimising breakthrough from the many powerful broadcasting stations on m.w.

Using a non-magnetic screwdriver—try a filed-down plastics knitting needle—adjust C1 for maximum signal. After peaking the input in this fashion, do the same for C4. This is best done in the evening when there are far more transmissions to be heard. The converter has been found to have adequate sensitivity, but an add-on r.f. amplifier will help and one will be described later in the series.

Experiment

The separate b.f.o. works on the first i.f. (the medium waveband) and is coupled via the tobacco tin interface shown in Part 2 of this series. The dipper can also be used in this fashion by employing the m.w. coil. Carefully tune the dipper over the m.w. until a beat note is heard. This is produced by the heterodyne effect between the two signals. By experimenting it should be possible to find the best input frequency for the dipper. There will be a number of frequencies where a beat is heard and you should choose one where the b.f.o. or dipper does not obliterate the wanted signal. If the b.f.o. signal is too strong the car radio will respond by adjusting its sensitivity. This it does using its automatic

gain control (a.g.c.), and in a well-designed radio is very effective.

To defeat the a.g.c. we have to tread carefully! For clarity of speech reproduction with s.s.b. a relatively strong b.f.o. signal is required, but remember the a.g.c. action! For this reason the input on medium wave will perhaps provide better results. As the converter provides some gain, the strong b.f.o. signal could result in the a.g.c. operating to our disadvantage.

Fun

Have fun building the unit, and hopefully you will be tempted to experiment and build others for different bands. The 4.43MHz crystal can be used to advantage on the 14MHz band

Semiconductors

Transistors

MPF102	1	Tr2
40673	1	Tr1

Miscellaneous

4.43MHz crystal (see text); Printed circuit board (see text); RF choke 1nH; Coil formers (2) (see text); Wire; Metal box (see text); Sockets (2); Toggle switch s.p.s.t.

SHOPPING LIST

Resistors

$\frac{1}{4}$ W 5% Carbon Film

100Ω	1	R4
330Ω	1	R7
560Ω	1	R3
1kΩ	1	R6
47kΩ	1	R5
100kΩ	2	R1,2

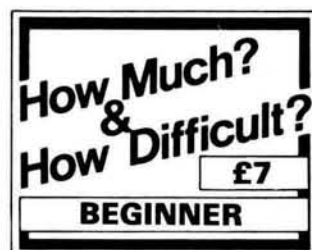
Capacitors

Ceramic Plate

10pF	1	C3 (see text)
470pF	1	C8
1nF	1	C2
10nF	2	C6,7
0.1μF	1	C5

Compression Trimmers

60–180pF	1	C1
100–250pF	1	C4 (see text)



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Have Bolex H16 RXVS without instruction book, also Nizo Integral Ten 8mm sound cine, c/w editor, splicer, accessories, etc. Would exchange for Yaesu FT-290 or Standard C58 multimode, w.h.y.? Fred. Tel: 0673 843127. B672

Have BBC B computer, disc drive, 48K sideways RAM, speech chips, disc doctor, lots of mags, software and ROMs on disc and books. Would exchange for FRG-7700 or other receiver. Steven, 331 Loraine Walk, Newton Aycliffe, Co. Durham DL2 7NU. B675

Have Icom 260E 144MHz multimode. Would exchange for DG5 and TV502, both to suit TS-520S series or someone to fix my existing DG5. Tel: 0743 241191 between 0900 and 1800. B693

Have Sony ICF-2001 RX, Leader dipmeter 1.5–250MHz, SEM auto h.f. pre-amp, FT-200 crystal filter, FT-101Z fan, all v.g.c. Would exchange for Heathkit RA-1 receiver. N. Cameron, 16 St. Mary's Crescent, Westport, Co. Mayo, Eire. B695

Have SX400 scanner (new). Would exchange for good video recorder or Yaesu FRG-9600 scanner RX. Tel: Aberystwyth 615446. B696

Have 10GHz wavemeter, professional micrometer type in WG16. Would exchange for 2 CB handhelds, 2-channel PP3 battery type preferred. G4FFO. Tel: Cambridge 860150. B706

Have Realistic DX302 receiver. Would exchange for Vega Selena or similar, or a small communications receiver. J. S. Wood, "Sylvania," Enzie, Buckie, Banffshire, Scotland AB5 2BN. B714

Have Yaesu FT-207R handheld with pouch and two batteries, YM-24C speaker mic, NC-2 charger. Would exchange for 144MHz mobile. Cradley Heath 64745. B736

County Antrim

Lagen Valley ARS: Jim Jackson G14TCS (Hillsborough 682474). Meets 2nd Mondays, 7.30pm in Rathvarna Teachers Centre, Antrim Road, Lisburn.

Avon

Bath & District ARC: L. Lear G3FIH (Bath 837539). Meets alternate Wednesdays, 7.45pm in the Englishcombe Inn, Englishcombe Lane, Bath. Next meetings Sept 17 & Oct 1.

Bristol ARC: D. Gully G4YOC (Bristol 4116). Meets Tuesdays, 7.30pm in the YMCA, 6 Park Road, Kingswood, Bristol.

City of Bristol RSGB Group: Colin Hollister G4SQQ (Bristol 508451). Meets 4th Mondays, 7.30pm in the small lecture theatre, Queens Buildings, UoB, Clifton.

North Bristol ARC: Alan Booth G4YQQ (Bristol 690404). Meets Fridays, 7pm in the Self-Help Enterprise Centre, 7 Braemar Crescent, Northville. Sept 12—Bring and Buy; 19th—Talk and Films on GWR by Ron Gardner; 26th—QSL Card Display; Oct 3—Microwave Modules.

Bristol (Shirehampton) ARC: Ron Ford G4GTD (Bristol 770504). Meets Fridays, 7.30pm in Twyford House, Lower High Street, Shirehampton.

South Bristol ARC: Len Baker G4RZY (Whitchurch 834282). Meets Wednesdays, 7.30pm in Whitchurch Folkhouse, East Dundry Road, Whitchurch. Sept 17—Computer Bring & Buy and Activity Evening; 24th—Preparations for the Bristol Rally; Oct 8—Packet Radio Activity Evening.

Bedfordshire

Bedford & District ARC: Chris Lenn G4VHF (Bedford 751763). Meets 1st and 3rd Thursdays, 8pm in the Allens Club, Hurst Grove, Queens Park, Bedford.

Dunstable Down RC: Philip Morris G6EES (Dunstable 607623). Meets Fridays, 8pm in Room 3, Chews House, 77 High Street South, Dunstable. Sept 21—National AR Car Boot Sale.

Buckinghamshire

Chesham & District ARS: John Allbridge G4UXA, 95 Rose Drive, Chesham. Meets Wednesdays, 8pm at Bury Farm, Pednor Road, Chesham.

Milton Keynes & District ARS: Dave White G3ZPA (Milton Keynes 501310). Meets 2nd Mondays, 7.30pm in the Meeting Place, Hodge Lea, North Milton Keynes. Oct 13—AGM.

Cambridgeshire

Cambridge & District ARC: Brian Davy G4TRO (Cambridge 353664). Meets Fridays, 7.30pm in the Visual Aids Room, Coleridge CC, Radegund Road, Cambridge. Sept 12—Medical Electronics by G6KND; 13th—Club Demo station at Coleridge CC; 19th—Informal; 26th—Maritime Mobile in a Narrow Boat by G8VCN; 27th—Club Demo Station at County Scout Rally; Oct 3—Informal; 10th—Junk Sale.

Greater Peterborough ARC: Frank Brisley G4NRJ (Peterborough 231848). Meets 4th Thursdays, 7.30pm in Southfields Junior School, Stanground, Peterborough. Sept 25—Space Shuttle Video.

Central

Falkirk & District ARC: Brian Waddell GM4XQJ (Falkirk 31258). Meets 1st and 3rd Wednesdays, 7.30pm in the Grange Centre, Redding Road, Brightons-by-Falkirk.

Practical Wireless, October 1986

CLUB SECRETARIES, PLEASE NOTE

Future editions of *Club News* will be compiled in our Poole Editorial offices. Please send details of forthcoming events to Elaine Richards G4LFM, *Practical Wireless*, Enefco House, The Quay, Poole, Dorset BH15 1PP. (Please mark "Club News").

Our thanks go to Eric Dowdeswell G4AR for his help in launching and developing the *Club News* feature over recent years.



CLUB NEWS

Cheshire

South Cheshire ARS: Chris Wiseman G1PUV (Kids Grove 73185). Meets 2nd and 4th Mondays, 8pm in the Crewe LMR Sports Club, Goddard Street, Crewe. Oct 13—AGM.

Chester & District ARS: Dave Hicks G6IFA (Chester 336639). Meets 2nd, 3rd, 4th and 5th Tuesdays, 8pm in the Chester RUFC, Hare Lane, Vicars Cross, Chester. Sept 16—Satellite Comms Video and Packet Radio by Ian Wade; 23rd—How an IBA Local Radio Station Works by Julie Hallam of Marcher Sound; 30th—Visit by Lowe Electronics.

Warrington ARC: Paul Forster G0CBN (Warrington 814005). Meets Tuesdays, 7.30pm in the Grappenhall CC, Bellhouse Lane, Warrington. Sept 16—Home-brew Test Equipment by G0CBN.

Clywd

Conwy Valley ARC: J. N. Wright GW4KGI (Abergele 823674). Meets 2nd and 4th Thursdays, 8pm in the Green Lawns Hotel, Bay View Road, Colwyn Bay. Sept 11—A Club Quiz.

Rhyl & District ARC: Melfyn Allington GW1AKT (Nantglyn 469). Meets 1st and 3rd Mondays, 7.30pm in the Mona Hotel, Market Street, Rhyl. Sept 15—Programme Planning; Oct 6—Activity Night.

Cornwall

Cornish RAC: Tony Bevington G4ZUI (Stithians 860572). Meets 1st Thursdays, 7.30pm in

the Church Hall, Treleigh. Computer Section meets following Mondays and Constructors Workshop on 3rd Mondays.

Cumbria

Carlisle & District ARS: Tony Leach G4WQQ (Scotby 500). Meets 1st and 2nd Mondays, 7.30pm in Upperby Parish Hall, Upperby Road, Carlisle.

Eden Valley RS: Alison Telford G4XP0, 2 Station Road, Culgaith, Penrith. Meets 3rd Thursdays, 7.30pm in the Ulswater Centre, Penrith. Sept 18—Simple Receivers by G4AFU.

South Lakeland ARS: Dave Warburton G6LKB (Barrow-in-Furness 54982). Meets 1st and 3rd Thursdays, 8pm in the Norweb S&SC, Ormskill Hotel, Barrow-in-Furness. Oct 2—AGM.

Westmorland RS: Gordon Chapman G1HIE, 61 Rusland Park, Kendal. Meets 2nd Tuesdays, 8pm in the Strickland Arms, Sizergh, nr Kendal.

Derbyshire

Bolsover ARS: David Fleetwood G1GNC (Chesterfield 824061). Meets Wednesdays, 7.30pm in the Black Bull, Bolsover.

Buxton ARS: Tony Briggs G8YHZ (Buxton 6800). Meets alternate Wednesdays, 8pm in the Haddon Hall Hotel, London Road, Buxton and the High Peak College of FE, Harpur Hill, Buxton. Sept 17—Hadden Hall; Oct 1—High Peak College.

Derby & District ARS: Jack Anthony G3KQF (Derby 772361). Meets Wednesdays, 7.30pm at 119 Green Lane, Derby.

Glossop & District RG: Geoff Sims G4GNQ, 85 Surrey Street, Glossop. Meets last Thursdays, 8pm in the Nags Head, Charlestown Road, Glossop. Sept 25—Visit by Lowe Electronics.

Nunsfield House CA ARG: John Robson G4PZY (Derby 767994). Meets Fridays, 7.45pm in Room 7, Nunsfield House, Boulton Lane, Alvaston.

Tor ARA: Clive W. Rawlings G1SDY (Matlock 3503). Meets alternative Tuesdays, 7.30pm at the Jackson Tor House, Matlock. Sept 16—Secret War by G4MHB; 30th—Clandestine Radio by G3BA.

Devon

Axe Vale ARC: Bob Newland G3VW (Lyme Regis 5282). Meets 1st Fridays, 7.30pm in the Cavalier Inn, West Street, Axminster. Oct 3—AGM.

Exmouth ARC: Hugh Edwards G4RUT (Exmouth 273157). Meets alternate Wednesdays, 7.30pm in the 6th Exmouth Scout Hut, Marpool Hill, Exmouth. Sept 24—Relays in Amateur Radio by G3GC; Oct 8—Visit to Royal Observer Corps.

Plymouth Polytechnic ARS: D. C. Derham, Students Union, Plymouth Polytechnic, Drake Circus, Plymouth. Meets Wednesday afternoons in the Science Block, top floor. Oct 26—DF Hunt, 10am at Students Union.

Torbay ARS: Brian Wall G1EUA (Teignmouth 78554). Meets alternate Thursdays and Fridays plus last Saturdays, 7.30pm in the ECCSC, Ringslade Road, Highweek, Newton Abbot. Sept 20—Film Show.

Dorset

Flight Refuelling ARS: Ashley Hulme (Bournemouth 872503). Meets Sundays, 7.30pm at the FR S&SC, Merley, Wimborne. Sept 28—Pairs of Stars by Colin Pither.

Plessey Christchurch ARC: C. E. Compton, K Block, Plessey Christchurch, Grange Road, Christchurch. Meets 1st Thursdays, 7pm at Plessey, Christchurch.

Poole RAS: Phil Dykes G4YX, 68 Egmont Road, Poole. Meets last Fridays, 7.30pm in Commander House, Constitution Hill Road, Poole. Sept 26—Amateur Radio in Australia.

County Down

Mid-Ulster ARC: Sam White (Craigavon 22855). Meets 2nd Sundays, 3pm in the Guide Hall, Castle Hill, Gilford.

Dumfries & Galloway

Maxwelltown ARC: Trig Rodgers GM4NNC, 5 Elder Avenue, Lincluden, Dumfries. Meets 1st and 3rd Wednesdays, 8pm in the Tam O'Shanter Inn, Dumfries. Sept 17—Final Arrangements for GB800; 20—28th—GB800 for Dumfries Octocentenary; Oct 1—Committee Meeting and Social; Oct 15—AGM.

Dyfed

Aberporth RAC: Frank Thomas GW6RDR (Cardigan 87274). Meets Thursdays, 7pm in Building 17, Royal Aircraft Establishment, Aberporth.

Carmarthen ARS: A. F. Dowling GW3GUE (Carmarthen 883460). Meets 2nd and 4th Fridays, 7.30pm in the Carmarthen Boat Club, The Quay, Carmarthen.

Pembrokeshire RS: Paul Delaney, Rosedale, Studolph, Steynton, Milford Haven, Dyfed SA73 3UN. Meets Thursdays in the FE Centre, Tower Hill, Haverfordwest.

Essex

Braintree & District ARS: Dave Willicombe G0DEC (Braintree 45058). Meets 1st and 3rd Mondays, 7.30pm in the Braintree CC, Victoria Street, Braintree. Sept 15—Arrow Electronics G3LST; Oct 6—Consumer and Public Protection.

Havering & District RC: D. St J. Gray G0B0I (Hornchurch 41532). Meets Wednesdays, 8pm in Fairkytes, Billet Lane, Hornchurch. Sept 17—Informal; 24th—Radio Communication by The Editor.

Loughton & District ARS: Dave Thorpe G4FKI, 44 Townfield Road, Flitwick. Meets alternate Fridays, 7pm in Loughton Hall, Rectory Lane, Loughton.

Stanford-le-Hope & District ARC: J. Allan G4LTH, 13 Vincent Close, Corringham, Stanford-le-Hope. Meets Mondays, 8pm in St Joseph's Parish Rooms, Scratton Road, S-I-H.

Fife

Dunfermline RS: Donald Ingram GM10IN (Inverkeithing 414283). Meets Thursdays, 7.30pm at Outh Wireless Station, Knockhill. Lifts from Dunfermline can be arranged.

Glenrothes & District ARC: Anne Edmondson GM4TCW (Glenrothes 744449). Meets Wednesdays and 3rd Sundays, 7.30pm in Provosts Land, Leslie.

Glamorgan

Barry College of FE RS: John Cooper GW0ACH (Wick 710). Meets Thursdays, 7.30pm in the Annex, Weycoch Cross, Barry.

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

Rhondda ARS: John Howells GW4BUZ (Tonypandy 432542). Meets Thursdays, 7.30pm in the NUM Club, Tonypandy. Sept 18—Worked All USA Counties Award by GW3CDH; Oct 16—SWR and All That by John Case.

Gloucestershire

Cheltenham ARA: Tim Kirby G4VXE (Cheltenham 36723). Meets 1st and 3rd Fridays, 7.30pm in the Stanton Room, Charlton Kings Library, Cheltenham.

Cirencester & District ARC: G. R. Hayter G0AZD (Cirencester 5015). Meets alternate Thursdays, 8pm in the Phoenix Centre, Cirencester. Next meetings are Sept 11; 25; Oct 9.

Stroud ARS: P. R. Gainey G0DZM, Prencott, Harley Wood, Nailsworth, Stroud. Meets in Nelson School, Stratford Lodge, Stroud. Next meetings Sept 17; Oct 1.

Greater Manchester

South Manchester RC: D. Barber (061-873 0395). Meets Mondays and Fridays, 8pm in the Sale Moor CC, Norris Road, Sale. Sept 12—TV Sound on OBs by G4MYB; 19th—Using and Abusing 4CX250Bs by G4FRX; 26th—Junk Sale; Oct 3—Video Lecture by WOORE; 10th—Six Metre Update 2 by G4HON.

Stockport RS: Mel Betts G4FFW (061-224 7880). Meets 2nd and 4th Wednesdays, 8pm in the Magnet Inn, Wellington Road, Stockport. Sept 17—Natter Night; 24—Frequency Meters by G8CZW; Oct 8—Logic Circuitry by G8OHM.

Trafford ARC: Graham Chadwick Oldfield (061-748 9804). Meets Thursdays, 7.30pm in the Stretford & Urmston Sea Cadets HQ, Bradshaw Lane, Stretford.

Gwent

Abergavenny & Nevill Hall ARC: J. B. Davies GW4XQH (Abergavenny 4655). Meets Thursdays, 7.30pm in Pen-Y-Fal Hospital, above Male Ward 2. Sept 16—Visit to Satellite Earth Station at Madley.

Gwynedd

Holyhead & District ARS: Mrs B. Anziani, 12 Beach Close, Morawelon, Holyhead. Meets alternate Sundays, 7.30pm in the Forresters Arms, Kingsland Road, Holyhead.

Merion ARS: Brian Viney GW4KDP, 10 Heol Meirion, Barmouth. Meets 1st Thursdays, 7.30pm in the Dolserau Hall Hotel, Dolgelau. Oct 2—Japanese Morse.

Hampshire

Andover RAC: Mike Adams G0AMO (Andover 51593). Meets 1st and 3rd Wednesdays, 8pm in the Wolversdene Club, Love Lane, Andover. Sept 21—Club Barbecue; Oct 1—A Night of Conversation.

Basingstoke ARC: Dave Burleigh G4WIZ (Tadley 5185). Meets 1st Mondays, 7.30pm in the Forest Rings CC, Sycamore Way, Winklebury, Basingstoke. Sept 13—Bishops Chandler School Fete Demo station; Oct 6—AGM.

Binstead ARS: A. F. Knight G4RTT (IOW 295951). Meets Wednesdays, 7.30pm in the 1st Ryde/1st Binstead Scout HQ, Binstead.

Fareham & District ARC: Alan Chester (Fareham 288139). Meets Wednesdays, 7.30pm in the Porchester CC, Westlands Grove, Porchester. Sept 17—Natter Nite; 24th—Home-brewing the legal limit on 144MHz by G4XZL; Oct 1—Natter Nite; 8th—Packet Radio by G4JCO.

Farnborough & District RS: Peter Taylor G4MBZ, 12 Dunbar Road, Paddock Hill, Frimley, Camberley. Meets 2nd and 4th Wednesdays, 7.30pm in the Railway Enthusiasts Club, Access Road, Hawley Lane, Farnborough. **Horndean & District ARC:** Dan Bernard G4RLE, 36 Guildford Road, Fratton, Portsmouth. Meets 1st Thursdays, 8pm in Marchiston Hall, London Road, Horndean. Oct 2—AGM.

Itchen Valley RC: M. E. Cheeseman G1IPQ (Southampton 736783). Meets alternate Fridays, 7.30pm in The Scout Hut, Brickfield Lane, Chandler's Ford, Eastleigh. Sept 12—Propagation by G3LTP; 26th—QRP by G4BUE; Oct 10—The repeater Group by Dave Chater-Lea.

Three Counties ARC: Keith Tupman G0BTU (Petersfield 66489). Meets alternate Wednesdays, 8pm in The Railway Hotel, Liphook. Sept 17—Amateur Television by G8LES; Oct 1—HF Antennas and Feeders by G5RV.

Winchester ARC: Gordon Crittall G4ZNO (Southampton 772191). Meets 3rd Saturdays, 7.30pm in The Log Cabin, Stockbridge Road, Winchester. Sept 19—Talk by McKnight Crystals.

Hereford & Worcester

Bromsgrove ARS: Alan Kelly G4LVK (021-455 2088). Meets 2nd and 4th Tuesdays, 8pm in the Aston Field WMC, Stoke Road, Bromsgrove.

Bromsgrove & District ARC: Norman Westwood G4NYH (Bromsgrove 73847). Meets 2nd and 4th Fridays, 8pm in The Avoncraft Art Centre, Bromsgrove. Morse classes Thursdays, 7–9pm. Sept 12—Junk Sale; Oct 10—Marine Radio by Mic McConville.

Droitwich ARC: Gordon Taylor G4HFP (Stourport-on-Severn 3818). Meets 2nd Mondays, 8pm in the Club Shack, 17 Ombersley Street West and 4th Mondays, 8pm in the Scout HQ, Union Lane, Droitwich.

Hereford ARS: F. E. G. Cox, 35 Thompson Place, Hereford. Meets 1st and 3rd Fridays, 8pm in the County Council CD HQ, Gaol Street, Hereford. Oct 3—Antenna Radiation Patterns by G3PGQ.

Kidderminster & District ARS: Tony Hartland G8W0X (Kidderminster 751584). Meets 1st and 3rd Tuesdays, 8pm in the Harrier FC, Hoo Road, Kidderminster. Sept 16—VHF Propagation by G8BKL; 30th—An Evening with G3PGQ.

Vale of Evesham RAC: M. J. Butler G4UXX, 16 Clevedon Green, South Littleton, Evesham. Meets 1st Thursdays in the Round of Gras, Badsey and 3rd Thursdays at The Anchor.

Hertfordshire

Borehamwood & Elstree ARS: Tony G0DDJ (01-207 3809). Meets 2nd Mondays, 7.30pm in The Organ Hall Club, Bairstow Close, off Theobald Street, Borehamwood.

Cheshunt & District ARC: John Watkins G4VMR (Dane End 250). Meets Wednesdays, 8pm in the Church Room, Church Lane, Wormley.

Harpenden ARC: Peter Simons G1BJC (Harpenden 2455). Meets 2nd and 4th Tuesdays, 8pm in The Silver Cup, St Albans Road, Harpenden. Sept 23—Natter Night.

Welwyn Hatfield ARC: Dave Fairbanks G0AII (Welwyn Garden 326138). Meets 1st and 3rd Mondays, 8pm in Knightsfield Scout HQ, Welwyn Garden City. Sept 15—Special Event Station Analysis and Informal Night; Oct 6—The Work of the RSGB by G4FRX.

Humberside

Grimsby ARS: George Smith G4EBK (Grimsby 887720). Meets Thursdays, 7pm in the Cromwell SC, Cromwell Road, Grimsby. Sept 18—Weather satellites by G4KAL; 26/28th—Hobbies For All; Oct 2—AGM and Awards Night.

Hornsea ARC: Richard Gutteridge G4YTV (Skirraugh 62498). Meets Wednesdays, 7.30pm in The Mill, Mill House, Atwick Road, Hornsea. Oct 19—ELOHEX 86.

Hull & District RS: David Potter G0DMP, 102 Normandy Avenue, Beverley. Meets Fridays, 8pm in the West Park RC, Walton Street, Hull. Oct 10 and 17—No meeting.

Kent

Biggin Hill ARC: Bob Senft G0AMP (Downe 57848). Meets 3rd Tuesdays, 7.30pm in Downe Village Hall, High Street, Downe. Sept 16—The Work of the RIS.

Bredhurst R&TS: Kelvin Fay G0AMZ (Medway 376991). Meets Thursdays, 8.15pm in Parkwood CC, Parkwood Green, Rainham. Sept 11—Construction/Natter Night; 25th—Construction/Natter Night.

Cray Valley RS: B. Rowe G4WYG, 19 Maderia Park, Tunbridge Wells. Meets 2nd and 3rd Thursdays in The Christchurch Hall, Eltham.

Darenth Valley RS: L. F. W. Thomas (Swanley 63368). Meets last Wednesdays, 8pm in the Crockenhill Village Hall, Swanley. Sept 24—Talk by Editor and Staff of HRT; Oct 8—Disposal Sale.

Edenbridge ARS: J. Grevatt (East Grinstead 24748). Meets 2nd Wednesdays in the Scout Hut, High Street, Edenbridge. Oct 8—AGM and Judging the Construction Contest.

Hilderstone RS: Annette Penfold G0BEX (Canterbury 812723). Meets Fridays, 7.30pm in the Hilderstone AEC, St Peters, Broadstairs.

S.E. Kent YMCA ARC: John Dobson (Dover 211638). Meets Wednesdays, 7.45pm in the Dover YMCA, Godwynehurst, Leyburne Road, Dover. Sept 17—Natter Nite; 24th—Scarab; Oct 1—Natter Nite; 8th—Fire Service Communications.

Maidstone ARS: Peter Pickering G3ORP (Maidstone 29462). Meets Fridays, 7.30pm in the YMCA Sports Centre, Melrose Close, Cripplegate Street, Maidstone. Oct 3—Mobile Rally Briefing; 10th—Natter Nite and RAE.

Lancashire

Bury RS: Miss C. J. Ashworth G1PKO (061-764 5018). Meets Tuesdays, 8pm in the Mosses Y&CC, Cecil Street, Bury. Oct 14—Construction Competition.

Fylde ARS: H. Fenton G8GG (Lytham St Annes 725717). Meets 1st and 3rd Tuesdays, 7.30pm in the Kite Club, Blackpool Airport. Sept 16—Informal Meeting with Morse Class.

East Lancs ARC: Stuart Westall G6LXU (Accrington 887385). Meets 1st and last Tuesdays, 7.30pm in the Conservative Club, Cliffe Street, Rushton.

Rosendale RC: Bernard Murray G4VVK (Rosendale 229026). Meets Wednesdays, 8pm in the Huntsman, Loveclough, on the A56.

Wigan & District ARC: Jim Cooke G6YTB (Wigan 214969). Meets Wednesdays, 7.30pm in St Judes Club, Poolstock Lane, Wigan.

Wigan-Douglas Valley ARS: Dave Snape G4GWG (Wigan 211397). Meets 1st and 3rd Thursdays, 8pm at 30 Culcross Avenue, Highfield, Wigan. Sept 18—Joddrell Bank Visit; Oct 2—Club Hot Pot.

Lincolnshire

Bourne Amateur Radio Society: A. T. Johnson G4RQK (078 087 326). Meets 1st and 3rd Tuesdays in Edenham Village Hall, Edenham, Bourne.

Lincoln SW Club: Pam Rose G4STO, c/o Club Address. Meets 3rd Wednesdays, 8pm in The City Engineers Club, Central Depot, Waterside South, Lincoln.

Louth & District ARC: Frank Smith G1IZB (Marsh-chapel 595). Meets 1st and 3rd Wednesdays, 8pm in the Charterhouse Club, Manby, Near Louth.

Sleaford & District ARC: Dave Beilby G2HHK (Sleaford 304454). Meets 3rd Sundays, 7.45pm in Hale Magna Village Hall, Great Magna. Sept 21—Talk by G4EFO of Microwave Modules.

Practical Wireless, October 1986

London

Acton, Brentford & Chiswick ARC: W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London. Meets 3rd Tuesdays, 7.30pm in the Chiswick Town Hall, High Road, Chiswick, London W4. Sept 16—Home Construction Techniques by G4GD.

Ealing & District ARS: Anton Berg G4SCR (01-997 1416). Meets Tuesdays, 7.30pm in Northfields CC, 71a Northcroft Road, London W13. Shack now refurbished, antennas overhauled and a new RTTY set up ready for members and visitors.

Grafton RS: John Kaine G4RPK (01-267 1000). Meets 2nd and 4th Fridays, 8pm in the Haringey Sea Cadet Corp, Training Ship Wizard, White Hart Lane, Wood Lane, London N22. Sept 12—SSB Post Mortem; 26th—Open Evening.

Southgate ARC: D. C. Elson G4YLL (Waltham Cross 30051). Meets 2nd and 4th Thursdays, 7.45pm in the Holy Trinity Church Hall, Green Lanes, Winchmore Hill N21. Sept 11—The Quick and Painless Way to Learn CW by G3ZVW; 25th—Informal Evening.

Wimbledon & District ARS: George Cripps G3DWW (01-540 2180). Meets 2nd and last Fridays, 7.30pm in the St John Ambulance HQ, 124 Kingston Road, London SW19.

Lothian

Leith Nautical College AR&EC: Susan Beech GM4SGB, c/o Club Address. Meets Tuesdays, 5-7pm in T2-4 Electronics Lab, Leith Nautical College, 24 Milton Road East, Edinburgh.

Merseyside

Wirral ARS: R. E. Bridson G3VEB, 14 Zig Zag Road, Wallasey. Meets 1st and 3rd Wednesdays, 8pm in the Club HQ, Ivy Farm, Arrowe Park Road, Birkenhead. Sept 17—Protection in the Electrical Generating Industry by G8RIX; Oct 1—AGM.

Middlesex

Echelford ARS: Peter Coleson G4VAZ (Sunbury 783823). Meets 2nd Mondays and last Thursdays, 7.30pm in The Hall, St Martins Court, Kingston Crescent, Ashford.

Edgware & District RS: John Cobley G4RMD (Hatfield 64342). Meets 2nd and 4th Thursdays, 8pm in the Watling CC, 145 Orange Hill Road, Burnt Oak, Edgware. Sept 25—Floating QTH Construction by G0CAJ; Oct 9—Syntony by G4HFL.

RS of Harrow: Tony Armstrong G0DIN (01-861 0419). Meets Fridays, 8pm in the Harrow AC, High Road, Harrow Weald.

Northamptonshire

Nene Valley RC: M. P. Bayles G6UWS (Wellingborough 71189). Meets Wednesdays, 8pm in the Prince of Wales, Well Street, Finedon. Oct 8—Nuclear Energy by Dr Graham CEGB.

Northumberland

Borders ARS: Matty Bottomley GM1IRN, 4 Home Farm Cottages, Ladykirk, Berwick-on-Tweed. Meets 1st and 3rd Fridays, 8pm in the Tweed View Hotel, Berwick-on-Tweed. Sept 19—Top Band Working by GM3KMR and G3YOG.

Nottinghamshire

ARC of Nottingham: Jim Towle G4PJZ (Nottingham 624764). Meets Thursdays, 7.30pm in the Sherwood CC, Woodthorpe House, Mansfield Road, Nottingham. Sept 11—CW Best Thing Since Sliced Bread by

G4NZU; 18th—Talk on Narrow Band TV; 25th—Activity Night; Nov 2—Activity Night; 9th—23cm Night.

Workshop ARS: Carole Gee G4ZUN (Workshop 486614). Meets 2nd and 4th Tuesdays, 7.30pm in the Sub-Aqua Club, The Maltkins, Gateford Road, Workshop. Sept 26—Visit to Maltby for Quiz Night; Oct 7—Maltby visit for Return Quiz!

Shropshire

Salop ARS: Simon Price G0E1Y (Shrewsbury 67799). Meets Thursdays, 8pm in the Olde Bucks Head, Frankwell, Shrewsbury. Sept 11—Fox Hunt; 18th—Natter Night; 25th—Slow Scan TV by G4IUT; Oct 2—Club Station on Air; 9th—AGM.

South Shropshire RC: G. Cowan BRS 87564 (Telford 581130). Meets Tuesdays, 8pm in the Broseley SC, Broseley.

Telford & District ARS: Tom Crosbie G6PZZ (Telford 597506). Meets Wednesdays, 8pm in the Dawley Bank CC, Bank Road, Dawley. Sept 17—HF Propagation by G3USF; 24th—Home-brew Testing and Measuring by G0CZD; 25th—Morse Tests; Oct 1—Natternight and Committee Meeting.

Somerset

Street & District ARS: Colin Webber G4SCD (Street 45145). Meets 1st Tuesdays, 7pm in the Toc H Hut, Brutach Terrace, Street.

Yeovil ARC: Eric Godfrey G3GC (Yeovil 75533). Meets Thursdays, 7.30pm in the Recreation Centre, Chilton Grove, Yeovil. Sept 18—Inductance by G3MYM; 25th—Natter Nite; Oct 2—Amateur Radio Quiz chaired by G3MYM.

Staffordshire

Cannock Chase ARS: B. Robinson G0FEC (Cannock 70053). Meets Thursdays, 8pm in the Bridgetown War Memorial Club, Union Street, Bridgetown.

North Staffs ARC: David Morgan G6MLI (Stoke-on-Trent 332657). Meets Mondays, 8pm in the Harold Clowes CC, Dawlish Drive, Bentilee, Stoke-on-Trent.

Stoke-on-Trent ARS: Dave Barber (Stoke 47962). Meets Thursdays, 8pm at 2A Racecourse Road, Oakhill, Stoke.

Strathclyde

Helensburgh ARC: Dave Reid GM0BZF (Cardross 841452). Meets Thursdays, 7.30pm Cairndhu Nursing Home, Old Cairndhu Hotel, Rhu Road, Helensburgh.

Kilmarnock & Loudoun ARC: John Walker GM0DJG (Irvine 72762). Meets alternate Tuesdays, 7.30pm at the Gelfield Social Club, Queens Drive, Kilmarnock. Sept 23—Home-brew Equipment by GM6JIC.

West of Scotland ARS: Des Canaway GM0DZP (041-776 2814). Meets Fridays, 7.30pm at 154 Ingram Street, Glasgow.

Suffolk

Felixstowe & District ARS: Paul Whiting G4YQC (Ipswich 642595). Meets alternate Mondays, 8pm in the Feathers, Walton High Street, Felixstowe. Sept 22—Talk by G3NYK; Oct 6—Social.

Ipswich RC: Jack Tootill G4IFF (Ipswich 44047). Meets 2nd and last Wednesdays, 8pm in the Rose & Crown Club Room, 77 Norwich Road, Ipswich. Oct 8—Planning for JOTA.

Surrey

308 Radio Club: Bob G1JRR (01-391 0788). Meets Tuesdays, 8pm in The Coach House, St Marks Church, Church Hill Road, Surbiton. Oct 7—AGM.

Coulsdon ATS: Alan Bartle (01-684 0610). Meets 2nd Mondays and last Thursdays, 7.45pm in St Swithuns Church Hall, Grove, lands Road, Purley, Surrey.

Dorking & District RS: J. Greenwell G3AEZ (Newdigate 77236). Meets 2nd Tuesdays, 8pm in the Star & Garter Hotel, Dorking and 4th Tuesdays, 8pm at Ashcombe School. Sept 23—RAYNET; Oct 14—Informal.

Surrey Radio Contact Club: J. L. Simpkins (01-657 0454). Meets 1st and 3rd Mondays, 8pm in The Waldrons, TS Terra Nova, South Croydon.

Sutton & Cheam RS: Geoff G4FKA (Epsom 21349). Meets 3rd Fridays, 7.30pm in the Downs LT Club, Holland Avenue, Cheam. Sept 19—Visit to Guildford Police Station; Oct 6—Natter Night in Downs Bar; 17th—Junk Sale.

Thames Valley ARS: John Pegler G3ENI (East Horsley 4279). Meets 1st Tuesdays, 8pm in the Thames Ditton Library, Watts Road, Giggshill, Thames Ditton.

Sussex

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

Crawley ARC: David Hill G4IQM (Crawley 882641). Meets 2nd and 4th Wednesdays, 8pm in the United Reform Church, Ifield Drive, Ifield. Sept 24—RSGB by G4VEC.

Hastings E&RC: Dave Shirley G4NVQ (Hastings 420608). Meets 3rd Wednesdays, 7.45pm in the West Hill CC, Croft Road, Hastings, and on Fridays, 8pm in the Club House, Downey Close, St. Leonards-on-Sea. Sept 17—Talk from G4KYQ.

Southdown ARS: R. Wilson G1BAB (Eastbourne 890234). Meets 1st Monday, 7.30pm in Chaseley Home, Southcliff, Eastbourne, and Tuesdays and Fridays in the Wealdon Council Offices, Vicarage Field, Hailsham. Sept 20—Activity Weekend GB2SAR; Oct 6—Surplus Equipment Sale.

Worthing & District ARC: Roy Jones G4SWH, POB 599, Worthing. Meets Wednesdays, 7.30pm in Lancing Parish Hall, South Street, Lancing. Sept 17—Ragchew Evening.

Warwickshire

Atherstone ARC: Roy Fuller G6YQU (Nuneaton 370600). Meets 2nd and 4th Mondays, 7.30pm in the Physics Lab, Atherstone Upper School, Long Street, Atherstone. **Stratford upon Avon & District ARC: David Boocock G8OVC (S-u-A 750584).** Meets 2nd and 4th Mondays, 7.30pm in the Baptist

Church, Payton Street, S-u-A. Sept 22—Introduction to RAYNET; Oct 13—How Safe is Your Shack?

Mid-Warwicks ARS: Stan Hobbs G6XRI (Kenilworth 53099). Meets 2nd and 4th Tuesdays, 8pm at 61 Emscote Road, Warwick. Sept 23—A Night with Norman by G8CXL.

West Midlands

South Birmingham RS: Matthew Twyman G6KOA (021-458 1941). Meets 1st Wednesdays, 7.45pm in West Heath CC, Hamstead House, Fairfax Road, West Heath.

Coventry ARS: Robin Tew G4JDO (Coventry 73999). Meets Fridays, 8pm in Baden Powell House, 121 St Nicholas Street, Radford, Coventry. Sept 12—Treasure Hunt and Barbecue; 19th—Night on the Air; 26th—A Visit; Oct 3—AGM.

Dudley ARC: John Tisdale G4NRA (Kingswinford 278300). Meets 1st, 2nd and 4th Mondays, 7.45pm in the Allied Centre, Greenman Alley, off Tower Street, Dudley.

Midland ARS: Tom Brady G8GAZ (021-357 1924). Meets every week night in Unit 5, Henstead House, Henstead Street, Birmingham 5. Sept 16—Junk Sale.

Mirfield RC: Mrs. K. F. Field, c/o Club Address. Meets every week night, 7.30pm in the Mirfield CC, Yockleton Road, Lea Village, Birmingham.

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

West Bromwich Central RC: G. Kitson G4ZAD (Bilston 48263). Meets Sundays, 8pm in the Victoria, Lyng Lane, West Bromwich.

Willenhall & District ARS: John Phillips G4UPF (Wombourne 782076). Meets Wednesdays, 8pm in the Cross Keys, Prouds Lane, Willenhall.

Wolverhampton ARS: Keith Jenkinson G10IA (Wolverhampton 24870). Meets Tuesdays, 8pm in the Wolverhampton Electricity S&SC, St Marks Road, Chapel Ash, Wolverhampton. Sept 23—Antennas and Feeders by G8MWR; 28th—DF Hunt; 30th—Night on the Air and Discussion Groups; Oct 7—AGM.

Wiltshire

Blackmore Vale ARS: Bill Bailey G1GRG, 11 Brines Orchard, Templecombe. Meets 2nd and

Cover Date	Deadline	For events after
December Jan '87	Sept 5 Oct 3	Nov 13 Dec 11
Feb '87	Nov 28	Jan 8

4th Tuesdays in The Old Coachhouse, Bell and Crown, Zeals.

Devizes & District ARS: Peter Greed G3MQD, 18 Nurstead Park, Devizes. Meets Fridays, 8pm in the Devizes Football SC, Devizes.

Swindon & District ARC: Francis Neufville, 1 Bungalaw Park, Bradenstoke, Chippenham. Meets Thursdays, 7.30pm in Oakfield School, Marlowe Avenue, Swindon. Sept 11—Radio & TV Broadcasting in the USA by G4YQZ; 25—Antennas by G4RZF.

Yorkshire

Halifax & District ARS: D. L. Moss G0DLM (Halifax 202306). Meets 3rd Tuesdays, 7.30pm in the Running Man, Pellon Lane, Halifax. Sept 16—AGM.

Keighley ARS: Kathy Conlon G1IGH (Bradford 496222). Meets last Tuesdays, 8pm in the Victoria Hotel, Keighley. Sept 30—Talk by Senior Transmitter Area Manager BBC.

Maltby ARS: Ian Able G3ZHI (Rotherham 814911). Meets Fridays, 7pm in the Church Building, Church Lane, Maltby. Sept 12—Quiz by G1PQW; 19th—Repairing Computers by G0EPX; 26th—Visit from Workshop Radio Club; Oct 3—Activity Night; 10th—Ex-War Receivers and Aligning Them by G1GAQ.

Pontefract & District ARS: Colin Mills G0AAO (Pontefract 43101). Meets Thursdays, 8pm in the Carleton CC, Pontefract. Sept 11—North Wakefield RC Junk Sale; 20th—RAYNET Exercise; 25th—RAYNET Talk by G3PSM.

Sheffield ARS: Peter Cardwell (Sheffield 581766). Meets 1st and 2nd Mondays, Firth Park Pavilion. Sept 17—RAE and RAYNET; 24th—Committee Meeting; Oct 6—QRP Techniques by G3RJV; 13th—AGM.

Todmorden & District ARS: Val Mitchell G16ZB (Todmorden 7572). Meets 1st and 3rd Mondays, 8pm in the Queen Hotel, Todmorden. Sept 15—Chat Night; Oct 6—Surplus Equipment Sale.

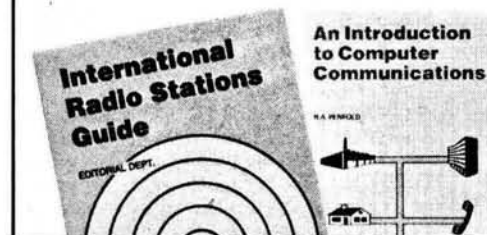
Wakefield & District RS: Walter Parkin G8PBE (Wakefield 378727). Meets alternate Tuesdays, 8pm in the Ossett CC, Prospect Road, Osset. Sept 30—Demo for Muscular Dystrophy.

North Wakefield RC: S. Thompson G4RCH (Mortley 536633). Meets Thursdays, 8pm in the White Horse, East Ardsley. Sept 11—Junk Sale; 18th—Contest Operating by G3ZXZ, G4IAU and G4RCG; Oct 9—On the Air Night.

White Rose ARS: Kevin Cleary G4ATZ (Boston Spa 842790). Meets Wednesdays, 8pm in the Moortown RUFC, Moss Valley, King Lane, Leeds. Sept 17—Natter Nite; 24th—Satellite Communications Video.

Practical Wireless BOOK SERVICE

For details of the PW Book Service see page 35 last month and for PW Publications see page 31 last month. Alternatively send an s.a.e. for full details.



ON THE AIR

AMATEUR BANDS



By Eric Dowdeswell G4AR

I am very sorry to report that this is my last contribution to "On the Air—Amateur Bands", from next month John Fell GOAPI (lately Technical Editor of PW) will take over the feature.

I have enjoyed writing for you over the years and want to thank all those who have written in, enabling me to keep the feature going. It is also gratifying to know that quite a few readers who wrote to me, wanting to know what amateur radio is all about, have finished up with a transmitting licence.

In spite of the fact that we are at the bottom of the sunspot cycle readers have persevered with bad conditions and continued to send in monthly reports of DX heard or worked. They will get their reward in a few years time when we reach the peak of the sunspot cycle and the 28MHz band will be chock-a-block with DX from all over the world instead of being virtually dead as at present.

Some readers have expressed doubts about going to the trouble of getting a transmitting licence because of the eventual cost of getting on the air. I have always pointed out that something around £25 is sufficient to buy a simple transceiver kit for low power c.w. work and which can give quite remarkable results with a simple wire antenna. Regular correspondents like Phil Dykes G4XYX, Mike Willgoss G4XRR and Brian Fields G4XDJ all using QRP have sent in logs of DX worked every month in spite of the present poor conditions, so expense is no excuse for not getting on the air.

Many clubs and technical institutes run courses for the Radio Amateurs' Examination and those seeking a licence should enrol for one of these courses rather than trying to study at home. A previous knowledge of electronics is not a requirement although obviously it will help. Candidates from schoolboys to senior citizens pass the RAE so age is no barrier.

Finally, make every effort to join a radio club where help and advice on every aspect of amateur radio will be found and willingly given. For the newcomer the "surplus equipment sales" are a lovely source of radio gear at very low prices.

General

An unusual happening is reported by Allan Jones GW4VPX of Pencader, Dyfed, who was looking across the 21MHz band when he heard a CQ on 21.210MHz from VK6GX/AM who was flying at 10 000m over the Atlantic. Captain of the 747 jumbo jet was Ian Shepherd G4LJF and as can be seen from his QSL card has accumulated a number of callsigns in his travels. The resultant QSO was 59 both ways with VK6GX/AM using 400W to a suppressed antenna on the aircraft, probably in the leading edge of the tail fin.

An appeal from Tom Hillier of 23 Palace Avenue, Paignton, Devon, for a copy of

the manual for the vintage Hallicrafters 130 SW receiver, or help in replacing the drive cord of the bandspread tuning control.

Otherwise, he says, the receiver is working o.k. Any advice or help direct to Tom please.

John Allen GODET of Sheffield was surprised to find out what he could do with his 2½W of f.m. from his FT-290R transceiver on 144MHz. The Barnsley repeater GB3NA was off the air and other Gs were working German and Dutch stations through the Oldenburg repeater near Bremen. John managed a QSO with DC1LN in Kiel. The lift conditions lasted until the early hours of the following morning when a G1 was worked in Kent. John's antenna is a Slim Jim made from car brake piping located inside in the apex of the roof space.

DX Bands

Phil Dykes G4XYX continues to find the 28MHz band full of surprises with the band opening up as early as 0800Z with signals from such as IT9 and EA8. South Americans appeared after 1500Z but mostly subject to very heavy fading going from S9 to S1 in 30 seconds. Reflection of signals from aircraft is not uncommon on v.h.f. and u.h.f. but Phil had an example of it on 28MHz when he was working G4WEY/M who was only about 25km away behind some hills but quite weak. The signal suddenly peaked to S9 for a few seconds and then fell away again. Half a minute later an aircraft appeared from the direction of the mobile station which Phil thinks confirmed his observation.

Phil runs a modified CB rig with 10W p.e.p. into a two-element quad or dipole. In his log I found C30BBP/P and C30CYA/P both QSL via PA3BMJ, CE3HFI (POB 13630, Santiago), CN2AQ, CN8LY (QSL POB 6705, Casablanca), EA8AMT, IOSNY/ZB2, OD5PL (QSL POB



The Stratford-upon-Avon & District ARC went along to a demonstration of satellite communications given by the Royal Signals. The manpack satellite receiver on the table delivers 2W of r.f. at approximately 7GHz

Photo by GOCHO

Commencing with our November 1986 issue, *Amateur Bands* will be compiled each month by John M. Fell GOAPI. Future reports for incorporation into the column should be sent to John at 14 Rectory Avenue, Corfe Mullen, Wimborne, Dorset BH21 3EZ.

Our thanks go to Eric Dowdeswell G4AR for his work on the column in recent years. You'll still be seeing his name in the pages of *PW* though, as he's planning to contribute the occasional article from time to time.



George Dorling was chairman of the South London Mobile Club. The G3PGA trophy in his memory was recently presented to the chairman of the Wimbledon & District ARS, Jim Todd G4XLM, right, by RSGB Region 7 rep Robin Sykes G3NFV, left. The trophy will be awarded to the winner of the club's annual construction contest

90726, Beirut), OH0MD/OJO, ZB2IH (QSL POB 292, Gibraltar) and 4U1ITU and QSL via DL4DNC. Phil's gotaways included PY, LU, YV, 8R, HK, VE1, W2, 3, 4 plus 3CO.

Angela Sitton BRS88639 of Stevenage has been busy decorating (haven't we all!) so her log is a bit thin. She and the OM BRS88837 have an HR106 receiver and dipole for 14, 21 and 28MHz plus long wires for 3-5/7. On 28MHz she logged EA3CUD and DK1FW, with V44KQ on St Kitts, and J87CD with cards to POB 975, Kingston, St Vincent.

Mike Willgoss G4XRR is in his new QTH, still in Weymouth, Dorset. For the moment he is using a vertical dipole for 28MHz, where his FT-902DM transceiver



Operators Phil G4XVG, left, David G1ADW, and Dave G4SYT, right, ran special event station GB2TDR (Thames Ditton Railway) to celebrate the 50th anniversary of the Malden & District Society of Model Engineers



Chesham & District ARS ran special event station GB2SCC (School of Chesham Carnival) with well over 100 contacts being made in the afternoon. Visitors included Chesham Town Mayor Cllr Mrs Jo Franks, ITN reporter Jeremy Hands, with the op here being Chris Dunn G8KVI

Photo by G4UXA

worked, on s.s.b., DH9NAK, IV3KUP, UZ6AXJ, EA5ELC, I0SNY/ZB2, CT4NZ, WB3FDU, LX1NJ/EA, C30C plus CT1DIA on f.m. A mobile jaunt using a converted Cobra CB rig running at 10W p.e.p. produced DL4LU, EA3FGR, UA2FX, YU2QS, I0SNY/ZB2, LX1NN/EA, C30C, and surprise, surprise G4SKJ/MM while Mike was sitting in the car at Fleet service area on the M3.

Seems 28MHz was pretty lively over the weekend of the HF NFD with the Bredhurst RTS in Kent working PZ1DV for a rare one, from their station G0BRC/P.

A welcome first log from **Les Robertson G4WTL** of Brighton but unfortunately he didn't supply any info on his rig. Worked on 14MHz s.s.b. were VQ9RN,

TU1BQ, 6W1TMG/ST, ON7IP/ST2, ZK1RE, A4XZF, AL5BL, 3C0A, V31PE, Z21BA, VK6RV, VK7LG, 5Z4BP, EL2CE, ZP5CF, PP5DC, ZS5VF and ZS6RF plus the World Cup station 6F1OT in Mexico City.

Elaine G4LFM of PWs staff at Poole plus husband **Mike G4WNC** run an IC-720A transceiver running up to 100W into dipoles for the h.f. bands 3-5 to 28MHz with a dipole for Top Band due up soon. Activity tends to be concentrated on c.w., RTTY and AMTOR operation. Stuff worked on the 28MHz band on c.w. included OZ1CRT, IK5GUE, OE6WTD, YU1WDY, SM6LKT, EA1OJ, HB9CTH, Y23CO, UA2FBD.

A lot of stations operating portable in the c.w. HF NFD in June will lose points for working what many thought was GOAOL/P on 3-5MHz. The actual call was GOAOL/PA/A but it was obvious that many G ops got it wrong!

George Hitchins BRS88435 in Frimley, caught a rare one in JV4HRR in Mongolia on 14MHz with his Panasonic RF3100LBE driven by a 40m-long wire antenna plus FRT-7700 antenna tuning unit. QSLs received recently included TI2ANL, VE2PAB4U on the Golan Heights, CP5LE and VK5BVJ. Calls logged on 21MHz included HK5AZA, LU6KS and ZP5LOY all showing the characteristic propagation path to S. America at this time. On to 14MHz and Y11BGD (QSL POB 24093, Baghdad), A4XYQ in Oman, C30BBP in Andorra, JV4HRR, 4U1VIC UN station in Vienna, 4X8T in Israel, and 9L3WO. Only catches of note on 3-5MHz were S79BV and 7X2VMK.

Arthur Greenwood up in Rochdale uses a Trio R600 receiver with a long wire of unspecified length and, I hope, an a.t.u.?

VK6GX	ZLI BIO	VS6 GX
VK6GX/AM		
5Z4 DG	Ian Shepherd, G4LJF, MBE/TNX QSL and for the QSO during my world wide travels as a 747 Captain, 73 and good Dx	
G4 LJF/KLT		
TO G4WVPX	GMT 1620	DATE 14.6.88
	MHz 21.110	SSB 59
G4 LJF/ZS	G4 LJF/VE	G4 LJF/W

The QSL card received from VK6GX/AM by GW4VPX, see text

Not much on 28MHz except EA1EAO and OZ4LP, and similarly on 21MHz just PY7ZZ and 9L1NS. The 14MHz produced AP9GI and S79CW with just YB0WR for a good one on 3-5MHz.

Other titbits from here and there include C30C, QSL F8RV, on 21MHz and 6W1AD, BV2B, and ZK1XP all on 14MHz, plus VQ9GB on Diego Garcia, and TA1A on 14MHz c.w. around 1530Z.

Good luck and good DX on the h.f. bands.



**Radio Amateur
Invalid and
Blind Club**

Find out how you can obtain help or how you can help others by sending a sae to the hon secretary, Mrs Cathy Clark G1GQJ, 9 Conigre, Chinnor, Oxford OX9 4JY.

RTTY

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

Over the past decade, the British Amateur Radio Teleprinter Group have gone from strength to strength and in my view, their quarterly journal—**DATA COM**—should adorn any data enthusiasts bookshelf. The magazine contains all types of articles of interest to members from FAX to Packet Radio and news to members ads.

Membership of BARTG is open to all licensed amateurs and s.w.l.s. The Group have recently introduced a special progressive award for inter-membership communications. The basic requirement for the Members Award certificate, Fig. 1, is the submission of proof of having worked or heard a minimum of 25 different BARTG members using RTTY. Contacts may be made on any mixture of amateur bands, although the award can be endorsed for one band if requested. More details available by sending an s.a.e. to Ted Double G8CDW, 89 Linden Gardens, Enfield, Middx EN1 4DX.

"My first introduction to RTTY was 20 years ago when I acquired an old Creed machine which, along with a Yaesu FRD-400 receiver, a Spacemark tuning unit completed my RTTY receiving station," wrote **Roy Aitken G4VCT** from Morecambe. Recently Roy purchased a Spectrum computer and software and enjoys working RTTY with local stations on 144MHz. "I am very pleased with the Technical Software program which I use for receive only on the h.f. bands and have logged some good stations," said Roy. He

also finds the c.w. section of the program excellent.

Mike and Elaine Richards (G4WNC and G4LFM respectively) from Ringwood use an IC-720A, Vic 20, the Scarab "Special Offer Package", BMK software and dipole antennas for each h.f. band.

Between June 15 and July 14 they worked five countries ranging from Europe to South America on AMTOR and 5 Europeans using RTTY. One worthwhile contact was DL1SQ on 10MHz RTTY—a shock to both sides of the QSO! Countries heard during this period were five on 3-5MHz, two on 7MHz and 10 on 14MHz



by Ron Ham BRS15744



Fig. 1: BARTG Members' Award

Country (Prefix)	Band (MHz)			
	3-5	7	14	21
Andorra (C3)			X	
Argentina (LU)			X	
Brazil (PP, PY)			X	
Bulgaria (LZ)			X	
Canada (VE)			X	
Canary Is (EA8)			X	
Ceuta & Melilla (EA9)			X	
Denmark (OZ)		X	X	
Egypt (SU)			X	
Eire (EI)	X			
England (G)	X		X	
Finland (OH)			X	
France (F)			X	
Germany (DF, DJ, DK, DL)	X	X	X	
Greenland (OX)			X	
Indonesia (YB)			X	
Italy (I, IK, IT)			X	
Kuwait (9K)			X	
Netherlands (PA)			X	
Nigeria (5N)			X	
Northern Ireland (GI)			X	
Oman (A4X)			X	
Portugal (CT)			X	
Scotland (GM)			X	
Spain (EA)			X	
Sudan (ST)			X	
Sweden (SM)			X	
Switzerland (HB)			X	
USA (K, W)			X	X
Wales (GW)	X			

Fig. 2: The AMTOR chart

using AMTOR, then using RTTY it was two countries on 3-5 and 7MHz and 34 on 14MHz showing almost worldwide coverage. The station usually runs home-brew AMTOR and RTTY terminals.

On 28MHz I copied both sides of a RTTY QSO between EA4CPM (using QRP) and IK8HCM at 1945 on July 8 and an EA, plus

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two DLs calling CQ around 1935 on the 9th.

"Data mode loggings, although spanning the world, have not been so prolific as the past two months," writes **Len Fennel** G4ODH from Wisbech. However, he did copy AMTOR signals from Germany on 3.5MHz; Denmark, Germany and Switzerland on 7MHz; 22 countries on 14MHz and the USA on 21MHz. Then using RTTY he logged Germany on 3.5MHz; France and Germany on 7MHz; 39 countries on 14MHz and Chile, Finland, Hungary, Italy and Spain on 21MHz. While the RTTY section of 14MHz was extra good during the evening of July 4, Len added Korea and Nigeria to his score.

RTTY on 14MHz was also very active at 0059 on June 18 and within a few minutes I had KA2ZAL, KW2P Wake Island—a first for me—W2JGR and WB2GOK in the log.

**BRITISH
AMATEUR
RADIO
TELEPRINTER
GROUP**



**Details of subscriptions from
John Beedie, Ffynnonlas, Sa-
lem, Llandeilo SA19 7NP**

Country (Prefix)	Band (MHz)					
	3-5	7	10	14	21	28
Aaland Is (OH0)				X		
Andorra (C3)				X		
Annobon (3C0)				X		
Argentina (LU)				X		
Ascension Is (ZD8)				X		
Austria (OE)		X		X		
Balearic Is (EA6)				X		
Belgium (ON)		X		X		
Brazil (PP,PT,PY)				X		
Bulgaria (LZ)				X		
Burundi (9U)				X		
Canary Is (EA8)				X		
Central Africa Rep (TL)				X		
Ceuta & Melilla (EA9)				X		
Chile (CE)				X	X	
Czechoslovakia (OK)				X		
Denmark (OZ)				X		
Dominican Rep (HI)				X		
East Germany (Y2-Y9)				X		
Eire (EI)				X		
England (G)	X			X		
Equatorial Guinea (3C)				X		
Finland (OH)				X	X	
France (F)		X		X		
Germany (DF,DJ,DL)	X	X	X	X	X	X
Gozo & Comino (9H4)				X		
Greece (SV)				X		
Hungary (HA)				X	X	

Under similar circumstances at 0850 on July 6 I copied RTTY from Aaland Is, Austria and the Canary Is.

My thanks to all those who sent in detailed logs which enabled me to compile Figs. 2 and 3.

Don't forget to look for DX during the RTTY section of the European DX-Con-

Country (Prefix)	Band (MHz)					
	3-5	7	10	14	21	28
Israel (4X)				X		
Italy (I,IK,IT)		X		X	X	X
Ivory Coast (TU)				X		
Japan (JA)				X		
Korea (HL)				X		
Malta (9H)				X		
Martinique (FM)				X		
Namibia (ZS3)				X		
Netherlands (PA)		X		X		
Nigeria (5N)				X		
Northern Ireland (GI)		X				
Norway (LA)				X	X	
Paraguay (ZP)				X		
Poland (SP)				X		
Portugal (CT)				X		
Rumania (YO, YP)				X		
Scotland (GM)	X	X				
Sicily (IT9)				X		
Spain (EA)				X	X	X
Sweden (SM)				X	X	
Switzerland (HB)				X		
Turkey (TA)				X		
USA (K,W)				X		
USSR (UA,UB,UZ)				X	X	
Wake Is (KW)				X		
Wales (GW)		X				
Windward Is (VP2)				X		
Yugoslavia (YU)				X		

Fig. 3: The RTTY chart

test, which takes place from 0000GMT on November 8 to 2400GMT on the 9th. Further details for this annual event are available from the organisers; The Deutscher Amateur radio club, WAEDC Committee, Postbox 1328 D-8950 Kaufbeuren, W. Germany.

SPACE & SATELLITE

Reports to: Pat Gowen G3IOR, 17 Heath Crescent, Hellesdon, Norwich, Norfolk NR5 5XD.



by Pat Gowen G3IOR

OSCAR-10 Troubles

At the time of writing, the commanders and programmers of OSCAR-10 are fighting hard to keep the satellite alive. In addition to the radiation damage effecting the memory of the IHU, an additional possibility has been theorised, in that a charge may have accumulated in the memory or circuitry that is holding up a digital "1" charge that will not disappear and permit a return to "0". The answer to this may be to deliberately discharge all the battery cells, and then to allow them to re-charge (or bring in the spare battery) followed by an attempted reload of the program. This cure is not without risk, and will not be undertaken lightly.

As the satellite, without any magnetorquer orientation control, will automatically come into a 90 degree sun-angle (meaning no solar power available) around 19 September this year it is quite possible that the transponder may self-decide to come on again. The command via the IHU program would be unable to switch it off, undoubtedly with alligator users seizing the opportunity presented. By the end of October or early November, when the sun-angle improves, it could just be that we shall have a fully operational OSCAR-10 once again.

It would most certainly be an amazing occurrence to have AMSAT appeal for users to employ maximum power whenever possible in order to help the satellite keep alive!

As for the IHU amnesia, Karl Meinzer DJ4ZC stated at the recent University of Surrey Satellite Symposium that he is quite

optimistic for the OSCAR-10 future. Having run much diagnostic software through the system, a "memory map" is being

shown that would indicate that a sufficiency of RAM may still remain to perform the basic needs of the system, including attitude control and programming. Some casualties, such as the c.w. and RTTY bulletins may result.

Salyut, MIR and Soyuz

During the last days of June and early July the UK was blessed with clear skies and a sun not too far below the late night horizon, which resulted in some spectacular sightings of the MIR and Salyut-7 orbiting space stations as they passed overhead. The onboard cosmonauts Leonid Kizim and Vladimir Solovoyov chose this period to make the return trip from Salyut-7 back to MIR via the Soyuz T-15, and all three vehicles could be clearly observed from earth at magnitude +1 to +2, as well as excellent reception of the 143-420 and 143-625MHz communications frequencies.

As it is understood the engines of Salyut-7 are now in poor condition, so it may be necessary to utilise the engines of the attached Cosmos (that gives us the excellent 19-955MHz tracking signal) in order to provide the de-orbiting thrust to take the total large complex to a planned burn-out. So the re-entry of such a mass

would certainly provide some spectacular meteor shower type displays if this is the intention. As it is only quite recently that considerable efforts were made to refurbish the space station, it would be rather surprising to burn it up at this time.

UoSAT WOD & Radiation

Due to prior unreliability caused by voltage supply problems, the OSCAR-9 radiation detector, channel 3 on the WOD (Whole Orbit Data) was unfortunately switched off during the week following the Chernobyl nuclear power station accident, and thus no topical readings were possible over the most critical period.

During the following week, however, the experiment was on again, and on 6 May, very high readings were observed at some parts of the orbit.

As a result of this, the University of Surrey substituted WOD for the usual week-end bulletin, and invited reports of any unusual radiation readings. Unfortunately the Gieger-Muller tube detector experiment ceased operation again after only four days of function, but **Harold Meerza** did not lose the opportunity that was presented, and sends in some interesting data from his work.

Our Fig. 1 shows the high readings, as counts per second levels graphed against time that were taken on 6 May 1986. To produce the graph, Harold used G4IDE's Spectrum program mentioned under "DIY WOD" in our July column. He added markings to show that in fact three orbits were covered, and also indicated the most Northerly (N) and Southerly (S) points of the satellite orbit where, as normally expected, the greatest levels of activity occurred where the solar particles travelled down the earth's field lines. The point at which the satellite was nearest to the

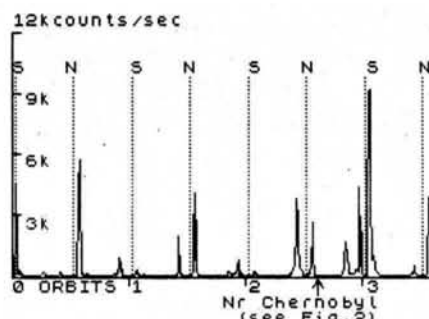


FIG. 1 UoSAT-1 WOD CH3 6/5/86

Chernobyl plant is also marked. As can be seen, no additional activity was seen here but, well to the North of this point, our expected normal peak can be seen.

An extensive area around Chernobyl with dated tracks that correspond with those passes that explored the area over the four days of function is shown in Fig. 2. It can be seen that the active pass on 6 May was when it was closest to the potential source. Harold related the pass to accurate predictions, and found that there was virtually no activity to be seen in the area during any of the passes, as readings everywhere were 001 except for one only of 002, indicated by the asterisk. High activity was found at latitudes North of the region as usual, as earlier evidenced by Fig. 1.

In the same time period as the Chernobyl accident an unspecified "event" occurred at Sellafield and a nuclear test took place at FO8. This latter potential source was coincident with other problems associated with the loss of memory of i.c.s on both OSCAR-9 and 10. It makes one wonder if e.m.p., or direct hard Gamma radiation might have been responsible, and if the OSCAR-9 radiation detection experiment would be able to serve its purpose in a nuclear test ban treaty, to permit open and unbiased evaluation.

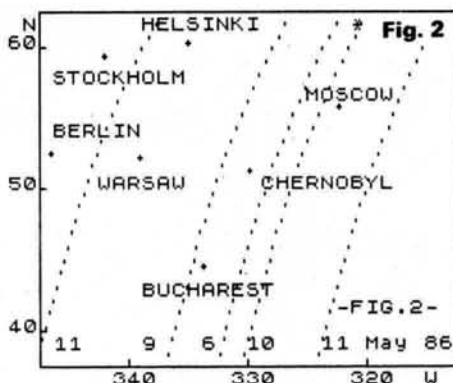
The RS Series

The RS-5 and 7 pair are, as expected, regularly switching themselves off to maintain precious battery charge when they enter the eclipse. They are running on a very limited transponder operational schedule, activity is thus rather sparse, and there is little to report this month. As the first week of August would have brought the pair back into full sunlight again, we shall have lots of activity to relate in future issues, on the proviso that they continue to survive the rigours of cold, depletion, radiation, and very tired aging batteries.

No further news is to hand regarding the forthcoming RS-9 and 10, nor ISKRA-4, so we shall dispense with the usual wide ranging topics, and concentrate on that which is new and expected to be active when you read this column. Thus, JAS-1 will be the main focus of this month's content.

Getting Started . . . on JAS-1

As Phase IIIc is now delayed, and JAS-1 is current, we will temporarily suspend our series of starting off on the high elliptical orbiters, and concentrate this time on that which is highly topical as, if the plan goes according to schedule, the brand-new spacecraft should be operational by the time that this column reaches you. Already we have covered the basics of JAS-1 in previous issues, so there now follows sufficient further information to bring you



up to date enough to start operating right away.

Our thanks to Larry NF6S and his XYL, who spent four hours each night for a month in translating much of the following information from the Japanese JARL JAS-1 handbook, and to Ross Forbes WB6GFJ, AMSAT Co-ordinator for California, a valued reader and contributor who sent the copy for our column. Ross can be seen in his shack in Fig. 3. The complete handbook (in English) which runs to some forty pages of comprehensive information will be available by the time you read this column. Send \$10 to JAS-1 Handbook, Project OSCAR Inc., P.O. Box 1136, Los Altos, CA 94023, USA.

JAS-1 was scheduled for launch at 2030UTC on 7 August 1986, and the beacon should have come alive immediately following orbit injection from the H-1 carrier rocket, on the "JA" Mode 435.795MHz frequency as analog c.w. (Later on, alternatively the "JD" Digital Mode 435.910MHz frequency may be employed. Up to some ten days may elapse before a transponder is placed on, to allow for de-gassing and stabilisation.) Thus, the telemetry can be read from the start, either as p.s.k. (phase shift keying) or as c.w. at 100w.p.m. The latter form can be copied by ear by many experienced operators, but is rather too fast to write down by hand, so a c.w. reader or an adjustable speed tape recorder is recommended for tabling the figures sent down.

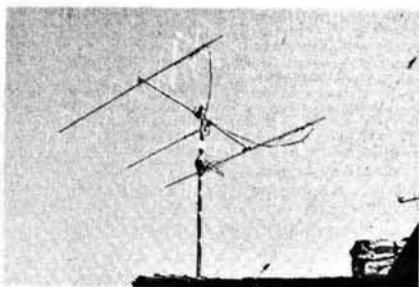


Fig. 3: Ross Forbes WB6GFJ, the second photograph shows his antenna ready for JAS-1. There is a twin KLM for h.f./v.h.f. and a single KLM for h.f./u.h.f., both with azimuth and elevation capability

The analogue telemetry has the following channel format:

Hi	Hi	1A	1B	1C	1D
		2A	2B	2C	2D
		3A	3B	3C	3D
		4A	4B	4C	4D
		5A	5B	5C	5D

The 1A, 2A and 3A lines are in the form of analogue telemetry data, whilst 4A and 5A are systems status data. After each of the 1A through 5D prefixes a three digit number is sent, which can be used for the decoding chart Fig. 4. The 4A and 5D lines are system status data, and the beacon sends a three digit number after 4A through 5D, for example 423. The first number (4) is ignored in the calculation, but the next two numbers "2" and "3" are evolved as follows:

0 = "000"	4 = "100"
1 = "001"	5 = "101"
2 = "010"	6 = "110"
3 = "011"	7 = "111"

The systems status is shown below; Items 1-5 is 4A, 6-10 4B, 11-15 4C, 16-20 4D, 21-24 5A, 25-30 5B, whilst 31-33 is 5C. For example, if the TLM beacon send us "423" then we ignore the "4", and use the "2" and the "3". The means system status table items 1-5 follows:

Systems Encoded Number from
Status Item Above

4A		1	0
1	1 JTA	ON	OFF
		1	0
2	0 JDT	ON	OFF
3	0 Blank		
4	1 Blank		
		1	0
5	1 Beacon	PSK	CW

Remember that you use only the last two digits from the encoding, i.e. instead of 0 1 0 for (2), use only 1 0, and then for the digit three use the full encoded figure, 0 1 1, thus giving the total read as 1 0 0 1 1 for items 1-5 in block 4A.

You will notice a very rapid and severe Doppler shift of frequency on the beacon frequencies, especially at the time of closest approach on the nearest to overhead passes, but your own uplink will not drift so much on the downlink, as the transponder inverts, i.e. the uplink and downlink changes do not add, but subtract. This also means that in order to have u.s.b. on the downlink, you must transmit l.s.b. on the uplink.

Those of you like GM4IHJ, G3IOR and many other keen Mode "J" fans of OSCAR-8 will know the mode well, and need no further instruction, as JAS-1 on analogue Mode "JA" will have almost identical requirements. Those of you active on OSCAR-10 will only need to change your downlinks and uplinks to and from your existing TX and RX, and marginally change your frequencies.

If you are new to the Mode, and need something simple and cheap to start with, then ten watts to a crossed dipole (such as that described on Page 56 of the April *Practical Wireless*) and a similar one scaled down for 435MHz for the downlink will work well for high angle passes. For the horizon hugging DX passes, then normal beams will work well (preferably for all angles with azimuth and elevation command, if you wish to cover a full pass from horizon to horizon, but not essential for very low angle passes of the satellite only, or if you complement the system with the crossed dipoles). Ensure that no more than 100 watts e.i.r.p. of c.w. or l.s.b. p.e.p. is used for the uplink, with no f.m. or a.m.



HAM RADIO DOES NOT HAVE TO BE EXPENSIVE!

HOWES QRP equipment offers you the chance to enjoy amateur radio without the need to spend a fortune! Take our **DeRx DIRECT CONVERSION COMMUNICATIONS RECEIVER** for example: This is an easy to build, single band receiver for CW and SSB reception. It will work from a 12 to 14V DC supply and gives up to 1W of audio output to drive a loudspeaker or headphones. For a simple receiver, the performance is quite amazing. Compare one against an expensive radio, you will be surprised! Versions are available for 160, 80, 40, 30 or 20M bands. The **DeRx** kit costs £14.80, or as an assembled PCB module, £19.90. With ready wound coils, and little alignment, this makes an excellent project for both the newcomer and the experienced operator building a QRP station. A case and a couple of tuning capacitors are the only major items to add to finish your receiver. We have suitable capacitors for all but the 160M version at £1.50 each. You can read a review of this super little kit in the July 1986 issue of Practical Wireless.

HOWES QRP TRANSMITTERS. We have three QRP CW transmitters in our range at the moment. The **CTX** transmitters are available for 40 or 80M bands, and the **MTX20** is for 20M. All three feature adjustable output power, up to about 5W on 80, 3W on 40 and 10W on 20M. The heatsinking for the output stage is onboard, and one crystal is included. There is space for two more crystals on the PCB, and provision is made for connecting a VFO. The CVF VFOs are available for 40 and 80M at the moment, the 20M version is under development. The VFOs have dual buffered outputs, so that not only will they drive the transmitter, they can also drive the DeRx receiver as well, for full transceiver operation. Voltage regulation, and IRT (clarifier) facilities are included.

CTX80 80M Transmitter Kit £12.95
CTX40 40M Transmitter Kit £12.95
MTX20 20M Transmitter Kit £19.90
CVF40 or CVF80 VFOs: Kit £ 9.30

Assembled PCB Module £18.95
Assembled PCB Module £18.95
Assembled PCB Module £26.95
Assembled PCB Module £14.90

HOWES 2M to HF TRANSVERTERS

If you have a 2M SSB/CW transceiver (an FT290 for example) you can get on to 20 or 80M without having to spend a fortune on an HF transceiver. These transverters also make HF Mobile operation much more practical, as a small 2M rig is all that has to be mounted within reach of the operator. These units deliver about 10W output from mismatch proof transistors, and do not require any fancy test equipment to set them up. A high proportion of fixed value filter components keeps alignment simple, and the output spectrum clean.

HC220 20M Kit £48.90
HC280 80M Kit £48.90

Assembled PCB Module £79.90
Assembled PCB Module £79.90

HOWES CTU30 ANTENNA MATCHING UNIT

The CTU30 is a "T" match type ATU for use with receivers and transmitters of up to 30W output on all bands from 1.8 to 30MHz. It uses two air-spaced capacitors, and 12 switched inductance settings. An unusual feature in a small ATU is the provision of a balun for feeding balanced antennas in addition to the more common unbalanced types. All the parts are PCB mounted in this novel design. Simply add a case and connectors to fit in with your station, even the knobs are included in this kit!

HOWES CTU30 Kit £24.90

Assembled PCB Module £29.90

HOWES TRF3 SHORTWAVE BROADCAST RECEIVER

The TRF principle was developed 80 years ago. Here it is brought up to date with modern silicon devices. The receiver tunes from about 5.7 to 12.8MHz in three bands, if you wind the coil as suggested in the instructions, although you can easily experiment with the coverage if you wish. The TRF3 has switchable input impedance and attenuator, so it can be used with large or small antennas. This is an excellent educational project for the "junior op", as well as providing a bit of fun for the old timer as well! You should be able to read all about building it in the September issue of Ham Radio Today.

A suitable tuning capacitor is available at £1.50

HOWES TRF3 Kit £13.90

Assembled PCB Module £18.90



All **HOWES** kits come with a good quality PCB which has the parts locations screen printed on it for easy, accurate assembly. Full, clear instructions are provided, as are all board mounted components. We think you will like the quality of our products. If you would like further information on any item, simply drop us a line, enclosing an SAE. We have a free information sheet on each product and a general catalogue.

Please add 80p P&P to your total order value. Export prices are the same as above, but add £2.00 per kit for airmail delivery outside Europe.

UK delivery is normally within 7 days.
73 from Dave G4KQH

SOUTH MIDLANDS COMMUNICATIONS



POLARPHASER II



70cms VERSION NOW AVAILABLE (£65.00)



Have you ever wanted to control the polarisation of your xy crossed Yagi from RH-LH, CIRCULAR, VERTICAL or HORIZONTAL, even whilst transmitting? Then this revolutionary product is what you have been waiting for!

The SMC POLARPHASER enables you to alter the polarisation of your aerials continuously through the full 360°.

For satellite users the benefits to be obtained from instantaneous shack control of polarisation are obvious, enabling effective utilization of receive capabilities and power resources along with the ability to reduce or even totally eliminate co-channel interference for terrestrial use.

	2 metre	70cms
VSWR	less than 1.5:1.	less than 1.3:1
Frequency	144-146MHz.	430-440 MHz
Power	150 Watts.	100 watts
Connectors	SO239 or 'N' (please specify).	'N' type

£49.00 inc VAT (SO239) £65
£54.00 inc VAT ('N')

UK Patent No. 2157894A. Manufactured by S.M.C. Design by G2HCG



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AUDIO FILTERS MODELS FL2, FL3, FL2/A

Model FL3 represents the ultimate in audio filters for SSB and CW. Connected in series with the loudspeaker, it gives variable extra selectivity better than a whole bank of expensive crystal filters. In addition it contains an automatic notch filter which can remove a "tuner-upper" all by itself. Model FL2 is exactly the same but without the auto-notch. Any existing or new FL2 can be up-graded to an FL3 by adding Model FL2/A conversion kit, which is a stand-alone auto-notch unit. Datong filters frequently allow continued copy when otherwise a QSO would have to be abandoned.

Prices: FL2 £89.70, FL3 £129.37, FL2/A £39.67

ACTIVE RECEIVING ANTENNAS

Datong active antennas are ideal for modern broadband communications receivers—especially where space is limited.

- highly sensitive (comparable to full-size dipoles).
- Broadband coverage (below 200 kHz to over 30 MHz).
- needs no tuning, matching or other adjustments.
- two versions AD270 for indoor mounting or AD370 (illustrated) for outdoor use
- very compact, only 3 metres overall length. ● professional performance standards.

Prices: Model AD270 (indoor use only) **£51.75** Both prices include mains power unit.
Model AD370 (for outdoor use) **£69.00**

MORSE TUTOR

The uniquely effective method of improving and maintaining Morse Code proficiency. Effectiveness proven by thousands of users world-wide.

- Practise anywhere, anytime at your convenience.
- Generates a random stream of perfect Morse in five character groups.
- D70's unique "DELAY" control allows you to learn each character with its correct high speed sound. Start with a long delay between each character and as you improve reduce the delay. The speed within each character always remains as set on the independent "SPEED" control.
- Features: long life battery operation, compact size, built-in loudspeaker plus personal earpiece.

Price: **£56.35**

Our full catalogue plus further details of any product are available free on request. All prices include VAT and postage and packing. Goods normally despatched within 3 days subject to availability.



DATONG ELECTRONICS LIMITED

write to dept. P.W.
Clayton Wood Close
West Park
LEEDS LS16 6OE
Tel: (0532) 744822 (2 lines)

No	Description	Analogue System	Digital System	Value Range	Decode Factor
1	Solar Cell Current	1A	0	0-2.0A	$I = N$
2	Battery Current	1B	0	-2.0-+2.0A	$I = -(1-N) \times 2$
3	Battery Voltage	1C	0	0-20V	$V = N \times 11$
4	Battery Voltage	1D	0	0-10V	$V = N \times 4.92$
5	BUS Voltage	2A	0	0-20V	$V = N \times 10.08$
6	+5V Regulated	2B	0	0-+7.5V	$V = N \times 3.004$
7	-5V Regulated		0	0--7.5V	$V = -N \times 3.004$
8	+10V Regulated		0	0-+15V	$V = N \times 6.110$
9	JTA Output Power	2C	0	0-3W	$P = N^{1.618} \times 1.101$
10	JTD Output Power		0	0-1.5W	$P = N^{1.525} \times 1.504$
11	Battery Cell Temp	3A	0	-50-70°C	$T = (1.3-N) \times 73$
12	JTD Temp		0	-50-70°C	$T = (1.3-N) \times 73$
13	Body Temp 1	3B	0	-50-70°C	$T = (1.3-N) \times 73$
14	Body Temp 2	3C	0	-50-70°C	$T = (1.3-N) \times 73$
15	Body Temp 3	3D	0	-50-70°C	$T = (1.3-N) \times 73$
16	Body Temp 4		0	-59-70°C	$T = (1.3-N) \times 73$
17	SC Panel Temp 1		0	-150-150°C	
18	SC Panel Temp 2		0	-150-150°C	
19	SC Panel Temp 3		0	-150-150°C	
20	SC Panel Temp 4		0	-150-150°C	
21	SC Panel Temp 5		0	-150-150°C	
22	-1	2D	0	0-2V	$V = N$
23	-2		0	0-2V	$V = N$
24	Offset Voltage -1		0	0-2V	$V = N$
25	Offset Voltage -2		0	0-2V	$V = N$
26	Offset Voltage -3		0	0-2V	$V = N$
27	Offset Voltage -4		0	0-2V	$V = N$
28	Temp Reg Voltage -1		0	0-2V	$V = N$
29	Temp Reg Voltage -2		0	0-2V	$V = N$
30	Temp Reg Voltage -3		0	0-2V	$V = N$

	Range	Decode Value
1A = Solar Cell Current	0-2.0A	$I = N (A)$
1B = Battery Charge Current	-2.0-+2.0A	$I = -(1-N) \times 2 (A)$
1C = Battery Voltage	0-20.0V	$V = N \times 11 (V)$
1D = L. Battery Voltage	0-10.0V	$V = N \times 4.92 (V)$
2A = BUS Voltage	0-20V	$V = N \times 10.08 (V)$
2B = +5V Regulated	0-+7.5V	$V = N \times 3.004 (V)$
2C = JTA Power Output	0-3W	$P = N^{1.618} \times 1.101$
3A = Battery Cell Temp	-50-70°C	$T = (1.3-N) \times 73$
3B = Body Temp -1	-50-70°C	$T = (1.3-N) \times 73$
3C = Body Temp -2	-50-70°C	$T = (1.3-N) \times 73$
2D = ?????? -1	0-2V	$V = N$

Fig. 4(a) ▲

◀ Fig. 4(b)

The matching uplink and downlink frequencies are given in Fig. 5. The "magic number" is 581-800, and to find your equivalent relationship, this can be used to find your given uplink on the downlink, or where to place your transmitter frequency for a given downlink. For example, if you have placed your receiver on 435-890MHz as a clear frequency, or intend to answer a "CQ" on that downlink frequency, then merely subtract 435-890 from 581-800, and you get your uplink at 145-910MHz. In reverse, if you wish to find where, say, your 145-950MHz uplink would bring you, then $581-800-145-950 = 435-850$ MHz on the downlink. (But don't transmit without monitoring first!) Note that these are zero Doppler corrected translation frequencies, only correct at "TCA" (Time of Closest Approach) and it will be necessary to finally zero in to overcome the introduced shift when the satellite is approaching or receding.

The band-plan for JAS-1 is shown in Fig. 6, similar to that of all satellites. Modes other than c.w. and s.s.b. may be employed, such as Slow-Scan TV, RTTY, FAX, and these should slot into the appropriate points of the mixed mode section. Modes like f.m. and a.m. are strongly discouraged, as they have poor communication efficiency, take far too much battery power, and are far too wide for a limited transponder passband.

You may find that due to the possible presence of your own strong third harmonic close to the downlink passband, and the proximity of your transmit field to your receive antennas, your front end may be blocked. This is easily cured by a suitable filter at the transmitter feeder, or better by a cavity filter at the receiver antenna input, such as that described in section 3.2 of the *VHF/UHF Manual*.

Tracking the Satellite

A tracker can be made for JAS-1 like that earlier described for "RS", but for a 50 degree inclination, and with the new orbital period. The same map can be used as on page 56 of the January *PW*, but the tracker, which may still be kept as a 60 minute divider (until the exact period is known), now forms a curve that will match the line drawn to meet the three points between 0 degrees at the ascending equator, the 50 degree North latitude line to the right of the pole, and 195 degrees West at the opposite equator descending.

A Plotting Table is also feasible, but as the final parameters are as yet unknown, this will have to keep for a future issue. A home computer program is the best way, and GM4IHJ has produced just this, called "jsat". It is available from SARUG (G4INP QTHR) whose profits go toward providing free programs to those who cannot pur-

Uplink (MHz)	Downlink (MHz)
146-000	435-800
145-995	435-805
145-990	435-810
145-985	435-815
145-980	435-820
145-975	435-825
145-970	435-830
145-965	435-835
145-960	435-840
145-955	435-845
145-950	435-850
145-945	435-855
145-940	435-860
145-935	435-865
145-930	435-870
145-925	435-875
145-920	435-880
145-915	435-885
145-910	435-890
145-905	435-895
145-900	435-900

Fig. 5

chase, and the RAIBC.

In addition to the Azimuth and Elevation Tracking table which gives 2 minute intervals whilst in range, 5 minutes when sub-horizon, and 15 minute steps whilst well out of range, it adds the main call areas also with access, as seen on Fig. 7. A full world Mercator map is used to give the satellite position, and Continental Maps are also supplied. It has some features that are quite new, such as Menu 4, Fig. 8, which lists all Acquisition of Signal times for the UTC day. For the Packeteer, Data dump opportunities are listed (Fig. 9) which shows the fly-over areas where your stored packet can be downloaded as stars (*) against all main call areas in time, or, alternatively, when you can receive packets uploaded when the satellite was known to be overflying another area.

More information follows on the Store-and-Forward Packet Radio Mode of JAS-1, which has the four uplink channels on FM, as:

Uplink Channel 1: 145-850MHz non-Doppler shift corrected.
 Uplink Channel 2: 145-870MHz non-Doppler shift corrected.
 Uplink Channel 3: 145-890MHz non-Doppler shift corrected.
 Uplink Channel 4: 145-910MHz non-Doppler shift corrected.

It has only the one downlink channel, as 435-910MHz when not shifted to you by the Doppler effect. The downlink uses Phase-Shift keying to optimise power efficiency, with 1200 bauds, HDLC AX.25 level 2, version 2.

If you wish to use one of your existing computer programs for JAS-1, here are the provisional Keplerian elements if all goes according to plan. These should be updated as soon as the updated actual measured parameters are issued on the nets following precise RADAR readings.

Reference Epoch Year: 86
 Reference Epoch Day: 219-8730UTC
 Inclination: 50-004°
 Right Ascension of
 Ascending Node: 244-3507°
 Eccentricity: 0-0001407
 Argument of Perigee: 2-155°
 Mean Anomaly: 330-246°
 Mean Motion: 12-412719 revs.
 per day
 Decay: 0 revs. per day/day
 Epoch Rev. or Orbit
 Number: 0
 Semi-Major Axis: 7879-56km
 Beacon Frequency: 435-795MHz
 +/- Doppler.

Solar

"What a flat month June has been," writes **Bob Anderson** from Johannesburg, with an empty sunspot log. "I almost despair of ever seeing a sunspot again," said **Patrick Moore** in Selsey, having found the sun's disc blank during his observations between June 17 and July 6. "Not much happening at all, some noctilucent clouds but no recent confirmed aurorae or storms of note," reports **Ron Livesey**, Glasgow. He is the auroral co-ordinator for the British Astronomical Association.

However, something did happen during the last few days of June. **Lawrence Morgan G0MATQ** in Greenock told me, "I heard a very brief aurora on June 27. Two GM stations were in direct QSO on 144MHz and their signals were 100 per cent tone-A with me. No one else heard it, perhaps I should see a doctor, hi." No need to do that Lawrence unless your medic is involved with amateur radio or astronomy, because the following evidence suggests that you were right. "My magnetometer suggested that the magnetosphere was activated on June 27 and 28 and Carl Lewis confirms that his recording fluxgate magnetometer picked up a possible magnetic storm on the 28th," writes Ron in a late news item.

Although generally very quiet, I recorded small bursts of radio noise from the sun, around 138MHz, on June 18 and 27. "These events could well be the 27 day repetitions of the activity recorded on May 31/June 1," added Ron. Once more this proves the value of logging unusual conditions, however unimportant they may seem at the time. There is little doubt that the few small bursts of solar radio noise which I recorded on July 7 and 8 were due to the sunspot drawn by Patrick Moore at 1445 on the 7th, Fig. 1. In Bristol, **Ted Waring** observed 5 sunspots on the 8th and 2 on the 13th.

Sporadic-E

During an intense Sporadic-E disturbance recently some of the signals received in the UK, from eastern-European f.m. broadcast stations, between 66 and 73MHz have exceptional strength. **Harold Brodribb** in St. Leonards-on-Sea and I both use ex-military receivers, the RL85 and R216 respectively, for f.m. broadcast stations. We logged these signals, at various times, on June 16, 19, 24, 26 and 29 and July 1, 2, 8, 10 and 11. "Amazing reception at 1825 on July 8, I counted 67 stations and 43 of these were fully closing the magic eye and the i.f. gain control was turned hard down," writes Harold. Depending on the magnitude of the opening the average number of stations received during these events is between 15 and 25; however, Harold found 59 at 1650 on July 1 and over 40 at 1615 on the 2nd and 1815 on the 10th.

The 50MHz Band

Signals from 50MHz beacons in Anglesey GB3SIX, Cyprus 5B4CY, Gibraltar ZB2VHF and Potters Bar GB3NHQ, as indicated in Fig. 2, were received by **Elaine G4LFM** and **Mike Richards G4WNC** in

Ringwood, **Norman Hyde G2AIH**, Epsom Downs, **Gordon Pheasant G4RBY** in Walsall and I. Norman copied GB3SIX by meteor trail reflection early in the mornings and ZB2VHF, by the same mode, up to about 0700 on June 16, 18, 21, 22, 23 and 25. On the other days listed, he logged ZB2VHF later in the day via sporadic-E. Around 1815 on July 13, Ted Waring copied, "ZB2VHF-INFO 4M BEACON NOW OPERATIONAL". He heard it again, with a rough tone, at 2050.

The 28MHz Band

"Over the last couple of months the 28MHz band has constantly opened giving good signals from France, Germany, etc.," writes **Douglas Maxwell G0EELP** from Hamilton on July 2. Since April 25 Douglas, using a TS130V and a converted vertical CB antenna, has worked 27 countries.

During June and July 28MHz gave us a nice selection of signals, as you can see from the Amateur Bands section this month.

Propagation Beacons

In Belfast, **Bill Kelly** reports hearing many Italian stations in QSOs via the Marconi Robot, IY4M, at 0900 on June 15. He remarks, "June was good on average, the higher bands being open most of the time, even though the skip was centred generally around Europe." Although Gordon Pheasant feels that the South American activity was not so good this time, he did log signals from LU1UG, PY2AMI and PY2GOB, on most of the days between June 15 and July 5 indicated in Fig. 3. "EA3RES, Barcelona, repeated his signal like a beacon on July 3, but only on the one day," writes **Ted Owen**, Maldon. In Storrington, Fred Pallant G3RNM heard "TEST PAOETE" on 28-310MHz at 1625 on June 29. My thanks to **Chris van den Berg**, The Hague, **Bob Hearn G0BTY** in High Wycombe, **Don Hodgkinson G0EEL** in Hanworth, Norman Hyde, Bill Kelly, Lawrence Morgan, Ted Owen, Elaine and Mike Richards and Ted Waring for their 28MHz beacon logs which, as usual, made Fig. 3 possible.

Don Hodgkinson received signals from the 144MHz beacons in Angus; GB3ANG on 144-975MHz, on June 20, 21, 22, 23, 24, 27 and 29 and Cornwall GB3CTC on 144-915MHz, France FX0THF on 144-895MHz and Wrotham GB3VHF on 144-925MHz almost daily from June 14 to July 11 inclusive. Chris van den Berg added the German beacon, DLOPR, 144-910MHz to the list.

Tropospheric

Among the stations that Douglas Maxwell worked on 144MHz during the good conditions between June 19 and 21, were 5 PAOs and GM1JAY/A on the Island of Skye. He also heard signals from DL, ON and SP, but could not raise them. Between June 15 and 29 Bill Kelly, equipped with



by Ron Ham BRS15744

Yaesu 9600 and AOR 2002 receivers, heard many stations working through the 144MHz repeaters in Ayr GB3AY, Calbeck GB3AS, Caernarfon GB3AR, Duns GB3SB, Dundalk EI7DAR, Isle of Man GB3GD, Kingston-upon-Hull GB3HS, Moel-Y-Parc GB3MP, Sligo EI7CS, Stockport GB3MN, Waterford EI2WRC and his local repeaters in Belfast GB3NI, Limavady GB3LY and West Tyrone GB3WT. Bill currently uses a colinear antenna for 144MHz and has plans to install a ground-plane.

I noted an increase in the number of repeaters audible on each channel on June 15, 21 and 27. "The big event on v.h.f. was the tropo lift into PA and DL around June 21," writes Lawrence Morgan G0MATQ. He worked 14 Dutch and 7 German stations on the 20th and LA80J on the 22nd. "The German beacon DLOPR on 144-910MHz was audible all weekend but at its best, peaking 599, on the 21st," said Lawrence. He added, "Although I am restricted to 144MHz, I heard that the 432MHz band was also good during the lift."

Simon Hamer reports that during the evening of the 21st he met a group of radio amateurs from Surrey who were working stations on 144MHz in Belgium, Denmark, Germany, Holland and Sweden.

Apart from June 23 and July 6, the atmospheric pressure between June 15 and July 14 remained where all v.h.f. operators like to see it, at 30.0 inches (1015mb) or above. The pressure readings in Fig. 4 are slightly rounded and were recorded at noon and midnight on a Short and Mason barograph installed at my QTH. As usual, tropospheric openings occurred shortly before the positive falls in pressure on June 22 and July 5.

"There have been several very good openings on 144MHz including one on July 10, perhaps the best, when the band was still open to northern Europe and Scandinavia at midnight," writes Don Hodgkinson. He added, "I have worked into GM several times, plus EI, GD, GI and PA, as well as Cornwall and the Isle of Wight in G-land." Don is still looking for QSOs on 144MHz in GJ, GW, GU, ON, LX and northern France.

Chris van den Berg heard signals through the 144MHz repeaters in Belgium—ON0AN and ON0OV; Holland—PI3AMR and PI3BMA; Norfolk—GB3NB on July 1 and the Norfolk and Belgian repeaters consistently until the 8th. "GB3WR on R0 and GB3BB on R4, were well up around 0900 on June 29," said **Phil Englehard**.

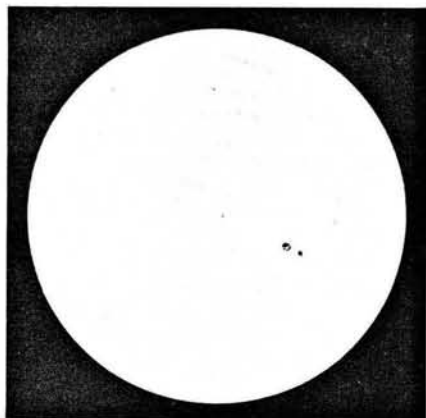


Fig. 1: The sunspot drawing from Patrick Moore

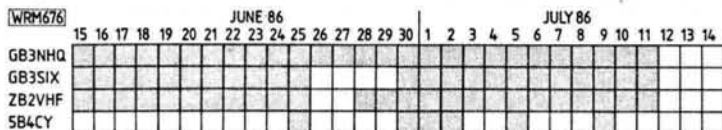


Fig. 2

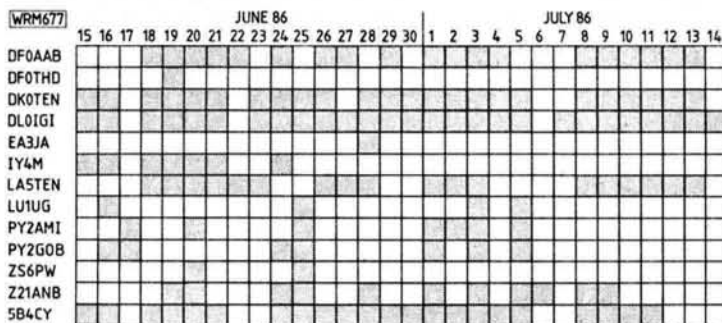


Fig. 3

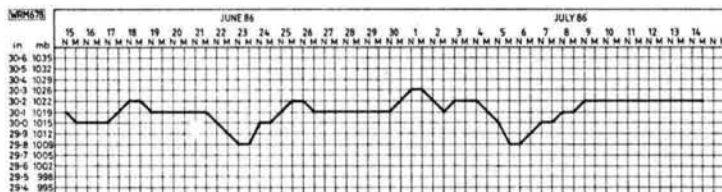


Fig. 4

Band II

Throughout the period of June 15 to July 14 the now well occupied domestic broadcast band, 88 to 104MHz, was subject to both sporadic-E and tropospheric openings. The former bringing DX signals for short periods from Italy and Spain and the latter for longer periods from many continental countries.

In Bangor, **John Holmes** added a mast-head pre-amplifier to his 6-element rotatable Yagi and writes, "On June 25, the pre-amp was fitted and things really started to happen. BBC Radios 1 from Oxford and 3 from Divis made a rather

startling appearance overpowering a lot of the more local stations". During the improved conditions on the 26th, John logged BBC Radios Cleveland, Derby, Devon and Newcastle, ILRs Beacon, Chiltern, Hereward and Wyvern and about 10 French stations between 95 and 104MHz.

On June 22, **Chris Wood** in Durham, using a DX-360 receiver and chimney mounted dipole, received Radios Cleveland, Hallam, Humberside, Tees and Penine Radio. **Stewart Russell** in Angus, using a Panasonic RX-C39DL, heard programmes from Radio Cleveland in stereo on 96.6MHz on the 21st and a German station around the same frequency.

Stewart was among those DXers who logged the Spanish stations in Band II earlier in June. Early in July, Chris counted 11 French stations in the band. I received strong French signals at the home QTH between 96 and 100MHz on June 21 and 24. While using my Plustron TVR5D, with its rod antenna, in Mitchelham Priory car park on July 1, I heard these signals again.

"The best time for v.h.f. broadcast reports is between 0500 and 0900GMT," writes Bill Kelly. He received signals from BBC Radios Cymru, Lancashire and Merseyside, ILRs City, Clyde, Piccadilly and Redrose and RTE-2 and Sunshine Radio from Dublin and transmissions from Radio Na Gaeltachta, especially for the Irish-speaking communities.

On June 20, Harold Brodribb added a Sanyo music centre to the broadcast listening section of his station thus gaining him more sensitivity and an extended frequency range. Harold logged a wide variety of French stations, sometimes in good stereo, from June 22 to 29 inclusive and on July 1, 4, 9 and 10. He also identified BRT's Programme 11, 98.6MHz on June 22 and Programmes 11 and 111, 90.4MHz, on July 9.

Broadcast listener, **Ian Smith** in Paisley, using a Grundig Satellit 1400SL receiver and a Datong AD370 active dipole, received Programmes 1 and 11 from Norway during the late afternoon of June 20 and 21; E. Germany BR3 at 1618 on the 29th; France-Inter at 1705 on July 1 and a variety of programmes from Austria, Czechoslovakia, East and West Germany and Yugoslavia, between 1858 and 2044 on the 8th. "I counted many more stations, but could not identify them," said Ian, although his impressive log includes such identas as Beograd, BR3 and 5, Hvezda, RIAS 2 and SWF-1. In Macclesfield, Phil Englehard G0DNB received the Les Platons BBC R3 and 4, BBC Radios Devon, Jersey R4 and ILR Piccadilly Radio around 2200 on June 26, BBC Radios Ulster, Divis, and RTE-2, early on the 29th and Radio 4 from Sandale and Radio Cymru, Wenvoe at 0520 on July 2.

Post reports to arrive by September 26

TELEVISION

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

A glance at Fig. 1 shows that readers made the most of the Sporadic-E openings on Band I, 48-68MHz.

Band I

David Meredith in Dudley saw pictures from Austria, East Germany and Portugal for the first time. He also sent in photographs of the Hungarian clock caption, Fig. 2, and an interviewer from Spanish TV, Fig. 3.

Neal Smythe in Penyrheol uses a JVC CX500GB and an "X" antenna for Band I. He made a good start this year with a test card from Iceland (Fig. 4), RUV Island, and pictures from Italy, Rumania and Scandinavia.

Edwina and Tony Mancini in Belper photographed signals from E. Germany, the DDR ident (Fig. 4), the Portugese RTP ident (Fig. 6) and a news caption from Poland (Fig. 7).

Arabic captions were reported by the Mancinis on June 5 and **Simon Hamer** in New Radnor on July 1. **Ian Smith** saw an Arabic caption for a few seconds around Ch. E4 at 1852 on June 5, he says this was

followed by a young lady singing in Arabic. A Portugese test card, RTP LISB1, on Ch. E3 was reported

by the Mancinis and **Harold Brodribb** in St. Leonards-on-Sea.

The following clock captions have been reported; DR—Denmark; YLE—Finland; MTV—Hungary; RUV—Iceland; NRK—Norway; TVP—Poland; RTP—Portugal; JRT—Yugoslavia. There are also regional identas; Bratislava—Czechoslovakia; Grunten and Saarland—Germany; Bagn, Bremager, Gamlem, Kongsberg, Melhus, Steigen—Norway; Aitana—Spain.

David Meredith saw the news caption Tagesschau from Germany and Sumario from Spain. The Mancinis reported Televisi Noviny from Czechoslovakia. Most people saw dt from



by Ron Ham BR515744

- 1—Harold Brodribb
- 2—Ron Ham
- 3—Simon Hamer
- 4—Tony & Edwina Mancini
- 5—David Meredith
- 6—Lawrence Morgan
- 7—Gordon Pheasant
- 8—Ian Smith
- 9—Neal Smythe
- 10—Keith Chaplin
- 11—Ian Davidson
- 12—Frank Brisley

Country	1	2	3	4	5	6	7	8	9	10	11	12
Albania			X									
Austria			X	X	X				X	X	X	
Czechoslovakia	X		X	X	X		X	X	X	X	X	
Denmark									X	X		
East Germany				X	X						X	
Finland			X	X	X			X	X	X	X	
Hungary			X	X	X			X	X	X	X	
Iceland		X	X	X	X	X		X	X	X	X	X
Italy	X	X	X	X	X	X		X	X	X	X	X
Norway	X	X	X	X	X	X		X	X	X	X	X
Poland	X	X	X	X	X			X	X	X	X	
Portugal	X			X	X			X		X	X	X
Rumania			X	X	X	X		X	X		X	X
Spain	X		X	X	X	X		X	X		X	X
Switzerland			X	X				X				
Sweden			X	X			X		X	X	X	
USSR	X	X	X	X	X	X		X	X	X	X	
West Germany		X		X	X	X		X	X			
Yugoslavia			X		X	X		X	X	X		

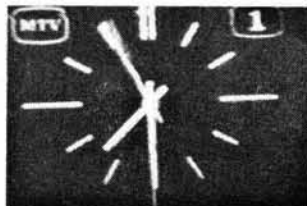


Fig. 2



Fig. 3

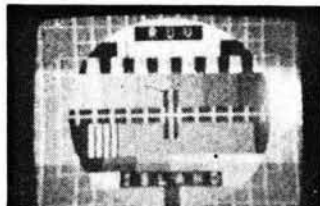


Fig. 4



Fig. 5

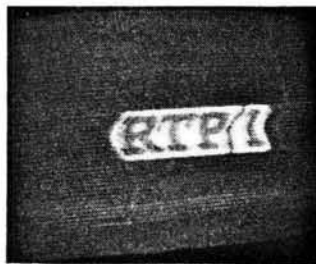


Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12



Fig. 13

Poland, BPEMR and HOBOCTN from the USSR.

Ian Smith in Paisley uses a Realistic Portavision, with switchable French system, and a Datong AD370 active dipole. He sent in an interesting log which included Kosice TV—Czechoslovakia, Hiradastehnika—E. Germany, Hemnes and Steigen—Norway, Aragon—Spain, Estonia—USSR, Ljubljana—Yugoslavia.

For Frank Brisley in Peterborough the most consistent pictures have been from Spain. He logged a test card and teletext from TVE-2 amongst other things on July 11 and RTP LISB1 and RTP Porto on the 14th.

Tropospheric

"Bands IV and V have been pretty active recently," wrote John Holmes from Bangor on June 30. He logged pictures from Border Television at Caldbeck, Central at Waltham, Granada at Doncaster, Tyne Tees at Bilsdale and Pontop Pike and Yorkshire at Emly Moor.

I observed co-channel interference on several u.h.f. channels during the evenings of June 21 and 26 and received test cards from Belgium RTBF-1 in Band III on June 23, 28, 29 and July 2. At 0842 on the 1st I received a German caption on Ch. E9, ARD/ZDF Beginn 9.45 Uhr, followed by their programme schedule.

I took my Plustron TVR5D out portable in East Sussex, and using its own rod antenna I logged strong, negative image pictures from France on Chs. F5 and 9.

During the afternoon of June 21, the Mancinis watched teletext from RTBF-1 on Ch. E8 (Belgium) and on days 20, 22 and 30 they watched programmes from Denmark on Chs. E5, 7, 9 and 10. TDF Canal Plus was received on June 17, 21, 22, 26 and 20 and then Radio Telefis Eirean was seen around midday on the 20th, 21st and fairly constantly during the morning of the 22nd.

Between 1400 and 1640 on the 20th they received a test card from Norway NRK

Bjerkreim on Ch. E6. Around midnight they saw the next day's programme schedule with DR in large letters at the top of the screen and the word Radioavisen underneath, this was followed by the DR Denmark test card.

At 2052 on the 21st I saw a Dutch quiz programme in full colour followed by adverts and a film called *The Greek Tycoon*, on Ch. E4.

"There was a good tropo opening on June 20/21" wrote Gordon Pheasant from Walsall. He watched Dutch TV in colour on Ch. E4 at 1945 on the 20th, then on the 21st at 0830 he saw their test card +PTT NED 1 on Chs. E4, 6 and 7, the programme Bayern Vorn in colour from the German ARD on Ch. E9 at 1958 and very strong Dutch TV on Ch. E4 in colour at 2100.

Also on the 21st Simon Hamer received pictures from Belgium—BRT-1 Nieuws on Ch. E10 and RTBF-1 Journal Tele-jt on Ch. E8; Denmark—world cup football with Danish commentary, a sub-titled German film on Chs. E5, 6, 7, 8 and 10; E. Germany—DFF on Ch. E11; Holland—NED-1 on Chs. E4, 5, 6, 7 and 39 and NED-2 on Chs. E27, 31, 45 and 54; W. Germany—a John Wayne film and logo from ARD-1 on Chs. E8, 9, 10 and 11, world cup football from ZDF on Chs. E34, 35 and 37, film awards with German commentary from ARD/WDR-3 on Chs. E48 and 49. On the 26th, Simon again logged pictures from Belgium; France—TDF Canal Plus; Ireland—RTE-1 on Chs. H and F and RTE-2 on Chs. I and J; Holland in Band III and France in the u.h.f. band. While looking for BBC-1 Scotland he found +PTT/TS1 a Swiss/Italian political programme came up with a corner Swiss ident at 2120 on Ch. E34. In addition he received Band III signals from Belgium and France again on the 29th.

At 1610 on June 17 Harold Brodribb watched from Belgium—Wavre—on Ch. E8 and a test card, marked 1100, from Luxembourg—RTL Plus—on Ch. E7 at 0900 on the 18th. He received signals

from Belgium on Ch. E8 again on June 28, 29 and July 2 and 10. When tropo conditions are right, Harold usually has a good haul of pictures from France in Bands III, IV and V. this time he logged French stations, on several channels in each Band, on June 15, 18, 26 to 29 inclusive and July 1.

During the good conditions on June 20, 21 and 23, Keith Chaplin in Barrow-on-Soar received pictures from Dutch transmitters at IJsselstein, Roermond, Smilde and Markelo on Chs. E4, 5, 6 and 7 respectively and IJsselstein and Goes on Chs. E27 and 29. He also logged captions or test cards from Belgium—BRT-1 Journaal and RTBF; Denmark—DR on Ch. E7; France—Canal Plus on Ch. E5; Germany—ARD-1 on Chs. E7, 9 and 10 and ZDF and WDR on Chs. E35 and 45. In Carmarthen, Ian Davidson received negative pictures from France on Chs. 21, 24 and 27 at 2040 on July 10.

News from India

"Our sporadic-E season started on May 3 and as I write this report I have a very clear picture of a Russian test card on Ch.2. It is an absolutely clear and sustained picture for the last 20 minutes. Yesterday I watched the world cup football between France and Russia, on Ch.3 from the USSR," wrote Major Rana Roy, from India on June 12. Rana received pictures from Dubai TV on May 3, 11 and 13 and the USSR on May 3, 9, 10, 11 and 12. At 1405 on the 3rd Rana saw an Arabic film on Dubai TV interrupted for prayers and the caption seen in Fig. 8. Soon after a YL presenter made an announcement in Arabic and then the film continued.

A Dubai presenter, Fig. 9, was seen again at 1824 on the 11th between a film about wild life on the Sulawesi Islands, dubbed in Arabic, a musical programme and a feature film called *The Amazing Cinema Era*. With a bit of fine tuning around Ch.3 at 1900, Rana found another Arabic station showing an American feature film with Arabic sub-titles and at 1910 one of

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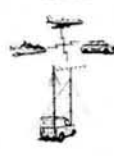
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their announcers, Fig. 10, appeared. "Both Dubai TV and this Arabic TV were in strong colour," said Rana. At 1915 he photographed yet another Arabic presenter, Fig. 11.

During the afternoon of the 13th, Rana logged a children's programme and adverts from the Arabic station on Ch.3, then, on switching to Ch.2 at 1455, he found strong colour pictures from Dubai and to his delight saw a station ident caption, Fig. 12, complete with date, time and channel number.

"The programme presenter, Fig. 13, came up at 1500 preceded by a clock showing 1400 and followed by a religious programme," said Rana. He continued, "The signals on both channels faded away at 1530."

We all worry about the safety of our antennas during spells of bad weather, but what about this lot that Rana experienced on May 26? "The wind velocity throughout the day was between 50 to 60k.p.h., but at 2030 it suddenly became calm and within a few minutes came the sand storm with wind speeds up to 110k.p.h. Instead of rain, it was sand falling from the sky and it lasted for about 6 hours. There was a power failure, the water supply stopped and many trees, telephone poles and power lines came down. This time I had ensured that I had a double strand of stay wire on my antenna and hence it was saved. In the morning we found a two feet high heap of sand against our walls and our house was full of sand which came in under the doors and windows."



**D. Lawton, "Grenehurst",
Pinewood Road, High Wycombe, Bucks HP12 4DD.**

MW BROADCAST BAND DX

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

The construction of loop antennas in readiness for the winter DX season seems to be a popular activity with many PW readers just now! Listeners who have previously been using fixed wire, ferrite rod or whip antennas on the l.w. or m.w. bands will be in for a whole new experience when DXing, because a really good loop antenna will enable a weak station to be separated from a stronger one on or close to a particular frequency.

Many interesting and varied designs are being built and tested just now and certainly the most ingenious idea this month comes from Alan Jarvis of Cardiff who has hit upon the idea of using a child's "Hula Hoop" as the basis for his design! Costing a mere 35p from a local toyshop, the Hula hoop is a little under one metre in diameter and makes an ideal former through which Alan fed several lengths of 8 core cable and wired each conductor in series with the next at the starting point, to form effectively the main coil of the loop and a single 26s.w.g. conductor was then passed inside the hoop to form a secondary coupling coil to complete the loop construction.

In view of the relatively large diameter of this "Hula Loop" antenna, the details of its performance will no doubt interest many DXers and I will report on these as soon as they are available from Alan.

DX Report

Note: All frequencies in kHz: Time in UTC = GMT)

Transatlantic DX: The winter DX season will soon be here again, for the hours of darkness are gradually increasing. Newcomers to m.w. transatlantic DXing should bear in mind that the most consistent signals received throughout the year in the UK are from CJYQ on 930, located in St. Johns, Newfoundland—which make a good pointer to band conditions! Signals from this station, which broadcasts a good deal of pop music, arrive in the UK gradually earlier as we move into the winter period. Bill Kelly has been hearing CJYQ in Belfast around 0125 recently, but during the longest nights it may well be heard as early as 2300!

Another Newfoundland station worth looking for is CKYQ, located in Grand Bank on 610—Bill has been listening to baseball games recently via this station at 0230. Graham Powell also logged it while monitoring the band with his Trio R2000

receiver in Pontypridd. Two other Canadian stations were noted in his log at 0300, namely CFRB 1010 and CHUM 1050—both in Toronto. One of the most frequently heard stations in the USA just now is WMRE located in Boston, which broadcasts memories and music from the past, hence its name "The Memory Station", look for this one on 1510 around 0115.

There are many stations in the Caribbean and in South America which can be received in the UK during the night, if you can stay awake! Signals from The Caribbean Beacon, Anguilla, are often excellent on this side of the Atlantic, Bill listened to an Evangelical programme at 0005 on 1610. Graham heard several interesting stations from South America between the hours of 0000 and 0300, including Radio Globo in Rio, Brazil, on 1220. This DX station also seems to be a very consistent signal in the UK and can often be heard as early as 0015. Radio Capital on 1040 and Radio Globo on 1100, both located in Sao Paulo, Brazil, were logged by Graham around 0100, but signals from stations in Venezuela seem to become audible rather later. Radio Mundial 1020, Radio Coro 1210 in Coro and Radio Vibracion 1470 in Caraparo were received around 0300.

Other DX: A very impressive log of European DX by anyone's standard, has been sent along by young David Jones of Walton, Liverpool. Checking the band from dusk with his ITT Golf 330 receiver and whip antenna he received successfully between 2011 and 0059 Erfurt, E. Germany 1170; AFN Stuttgart, W. Germany 1143; Zagreb, Yugoslavia 1134; La Louviere, Belgium 1125; BBC WS via Orford-



by Brian Oddy G3FEX

ness 1296; Neumunster, W. Germany 1269; BRT Beltem, Belgium 1512; Brest, France 1071; Kalundborg, Denmark 1062; Hamburg, W. Germany 972; Toulouse, France 945; Stargard, Poland 1503; Mar-nach, Luxembourg 1440; Radio Tirana, Lushnje, Albania 1458; TWR Monte Carlo, Monaco 1467; Radio Bremen, W. Germany 936; Madrid, Spain 918; RAI Milano, Italy 900; Wien-Bisamberg, Austria 1476; Langenberg, W. Germany 1593; Alger, Algeria 891; DDR Burg, E. Germany 783; RAIS Berlin, W. Germany 855; Munchen-Ismaning, W. Germany 801; DLF Braunschweig, W. Germany 756; Flevoland, Holland 747; Lille, France 1377; Bodensee, W. Germany 666 and Marseille, France 675.

Once again ILR Capital Radio has been heard in distant places, it's Dendermonde, Belgium, this time and Maurice Andries has received a QSL for his reception of their signal at 0012 on 1548. Alan Williams of Helston, Cornwall, has had a QSL from Vatican Radio which he heard on a new Philips D-7254 Cassette Radio at 2030 on 1530. Alan has been listening on 1368 to Manx Radio, Isle of Man, in the evenings at 2100. Bill Kelly sent along to me some interesting notes about the unique history of this station, which started broadcasting in June 1964, long before commercial radio became part of everyday life in Britain.

Listen out for Manx Radio at dusk and send them along a detailed report—if you would like to know more about this station, ask them for their leaflet on the station history.

Sheila Hughes of Morden has been enjoying the special programmes for DXers broadcast by BRT Belgium 1512 at 2100. She intends to write off for more details of their Club. **Wyn Mainwaring** G8AWT of Cowes, a regular listener to this programme, says the signal there has been suffering from deep fades recently, which make reception difficult.

The l.w. band has been attracting the attention of **Tony Bernascone** and **Tim Shirley** following the changes which took place last February below 200kHz. At his listening post in North Ormesby, Tony uses a diamond shaped loop antenna with 0.5m sides in conjunction with a Panasonic DL48 receiver and has established that DRF Doneback (Germany), Brasov (Rumania) and Ufa (USSR) share 153; Allouis (France) is on 162; five locations in USSR plus Nador (Morocco) use 171; Stimme Der DDR Oranienburg (E. Germany) is on 177; Europe No. 1 Saarlouis (W. Germany) is on 183 and Motala (Sweden) is on 189.

Tim has been using his new Trio R600 receiver in Bristol to check the band and



INDEPENDENT LOCAL RADIO FOR SURREY AND NORTH-EAST HAMPSHIRE
BROADCASTING ON THE TRANSMITTERS OF THE INDEPENDENT BROADCASTING AUTHORITY

MF: (AM) on 1476kHz (203 metres) from Peasmarsh, Guildford (NGR 964459), ERP 500 watts, omnidirectional.
VHF: (FM) on 96.6MHz from Sunnyside, Guildford (NGR 974486), ERP 360 watts, omnidirectional, mixed polarisation, stereo.

COUNTY SOUND
THE PRIORY
GUILDFORD
SURREY
GU1 1YX
ENGLAND

QSL

Many thanks for your reception report of 2/10/85 at 0925 GMT of our transmissions on 1476kHz (203 metres).

Richard Lawley
Richard Lawley, Chief Engineer

ILR County Sound QSL card

Freq (MHz)	Station		1	2	3	4	5	6	7	8	9	10	11
603	Invicta Sound	ILR			X			X			X	X	
630	Radio Cornwall	BBC			X					X			
630	Radio Bedfordshire	BBC				X	X	X		X			
657	Radio Cornwall	BBC					X	X					
666	Devonair Radio	ILR					X			X			
666	Radio York	BBC			X	X			X		X	X	
756	Radio Cumbria	BBC			X				X			X	
774	Radio Kent	BBC								X	X		
774	Radio Leeds	BBC			X	X						X	
774	Severn Sound	ILR						X	X				
792	Chiltern Radio	ILR						X	X	X			
801	Radio Devon	BBC			X			X		X			
828	2CR	ILR					X						
828	Radio Aire	ILR			X						X		
828	Chilton Radio	ILR			X					X			
837	Radio Leicester	BBC			X	X	X			X	X		
855	Radio Norfolk	BBC				X				X	X	X	
873	Radio Norfolk	BBC				X				X	X		
954	Radio Wyvern	ILR			X			X					
990	Radio Devon	BBC								X			
990	Beacon Radio	ILR			X					X			
990	Hallam Radio	ILR			X	X					X		
999	Radio Solent	BBC			X					X			
999	Red Rose Radio	ILR			X	X			X				
999	Radio Trent	ILR			X	X							
1026	Downtown Radio	ILR			X		X						
1026	Radio Cambridgeshire	BBC				X				X	X		
1035	Radio Sheffield	BBC				X							
1035	Radio Kent	BBC								X			
1035	Northsound Radio	ILR	X		X						X	X	
1035	West Sound	ILR			X				X				
1107	Moray Firth Radio	ILR	X		X							X	
1107	Radio Northampton	BBC				X				X	X		
1116	Radio Derby	BBC			X	X				X			
1116	Radio Guernsey	BBC		X				X					
1152	LBC	ILR			X			X	X		X		
1152	Radio Clyde	ILR			X								
1152	Metro Radio	ILR			X								
1152	BRMB	ILR						X					X
1152	Plymouth Sound	ILR			X								
1152	Piccadilly Radio	ILR			X								
1161	Radio Broadland	IBA			X			X			X		
1161	Radio Sussex	BBC					X			X			
1161	Radio Tay	ILR										X	
1161	Viking Radio	ILR				X					X		
1170	Swansea Sound	ILR			X			X					
1170	Radio Tees	ILR			X								
1170	Radio Orwell	ILR			X								
1170	Radio Victory	ILR			X			X			X		

heard Brasov (Roumania) 153; Maykop (USSR) 173; Kiev (Ukraine) 209; Kichinev (USSR) 236 and received their QSL & Pennant; also Burg (E. Germany) 263. On the band Tim logged Beli Kriz (Yugoslavia) 549 at 2300; Abu-Zaabel (Egypt) 558 at 0200; Murmansk (USSR) 657 at 2200; Aachen-Stolberg (W. Germany) 702 at 0100; Posnan (Poland) 738 at 2030 and Abis (Egypt) 774 at 0200.

The signals from RTE Radio 1 on 567 and 729 and from RTE Radio 2 on 612 and 1278 can be received in some areas of the UK at night via the skywave from S. Ireland. **Shane Pope** of Freshwater, I.O.W., who has been DXing for about a year now, logged them for the first time recently using a Hallicrafters SX28 receiver with a 10m wire antenna tuned by a home-made a.t.u. It is not often, however, that they are received during the daylight hours, but **Michael Hill** has been receiving RTE Radio 1 on 567 from Tullamore, S. Ireland, in Stockton-on-Tees at 1230! Another station to look for from S. Ireland, mentioned by **Brian Buckley** of Dungan-

non, N. Ireland, is Radio Na Gaeltachta which broadcasts on 540, 828 and 963 in Gaelic—of special interest if you are making language identification recordings.

News From Down Under

Writing from Southport, Australia **John Ratcliffe** says that he has been building a l.w. version of the little Reflex receiver to see if he could hear the l.w. BBC Droitwich signal on 200kHz around 4am local time on their shortest day—June 21! He found it necessary to add an antenna coil to the circuit so that he could couple in his outside wire antenna and also provide a wavetrap to eliminate 4GG—a local m.w. station which swamps the set! Tests so far indicate that a signal is present on 200kHz at 4am, but too weak to identify! Two points mentioned by John which will interest other builders—(1) NiCad cells are far less noisy than dry batteries, (2) use high impedance (2000Ω) headphones with the basic design, if not available, add an emitter-follower stage to match into low impedance headphones.

Freq (kHz)	Station		1	2	3	4	5	6	7	8	9	10	11
1242	Invicta Sound	ILR			X						X		
1251	Saxon Radio	ILR			X						X	X	
1260	GWR	ILR						X					
1260	Marcher Sound	ILR			X		X						
1260	Leicester Sound	ILR									X		
1260	Radio York	BBC										X	
1278	Pennine Radio	ILR			X	X			X				
1305	Red Dragon	ILR			X			X	X		X		
1305	Radio Hallam	ILR				X							
1323	Radio Bristol	BBC		X									
1323	Southern Sound	ILR						X			X		
1332	Hereward Radio	ILR				X			X		X	X	
1359	Essex Radio	ILR			X						X		
1359	Radio Solent	BBC						X					
1359	Red Dragon	ILR							X	X			
1359	Mercia Sound	ILR			X								
1368	Radio Lincolnshire	BBC				X						X	
1368	Radio Sussex	BBC									X		
1431	Essex Radio	ILR									X		
1431	Radio 210	ILR			X			X	X		X		
1449	Radio Cambridgeshire	BBC									X		
1458	Radio London	BBC				X		X	X				
1458	Radio WM	BBC						X					
1458	Radio Manchester	BBC			X		X						
1458	Radio Newcastle	BBC										X	X
1458	Radio Cumbria	BBC								X			
1476	County Sound	ILR			X			X			X		
1485	Radio Merseyside	BBC			X					X			
1485	Radio Humberside	BBC				X						X	
1485	Radio Sussex	BBC									X		
1503	Radio Stoke-on-Trent	BBC			X				X	X	X		
1521	Radio Mercury	ILR			X			X			X		
1530	Pennine Radio	ILR			X								
1530	Radio Wyvern	ILR						X		X	X		
1548	Capital Radio	ILR			X			X			X		
1548	Radio Bristol	BBC			X	X		X					
1548	Radio Forth	ILR	X		X					X			X
1548	Radio City	ILR			X								
1548	Radio Cleveland	BBC			X								
1557	Hereward Radio	ILR			X					X	X		
1557	Radio Lancashire	BBC			X					X			
1584	Radio Nottingham	BBC				X					X		
1584	Radio Shropshire	BBC			X								
1584	Radio Tay	ILR	X		X								X
1602	Radio Kent	BBC									X		

- 1—Stewart Russell, Forfar
- 2—Alan Williams, Helston
- 3—Brian Buckley, Dunganon
- 4—Bob Fields, Immingham
- 5—David Jones, Walton
- 6—Shane Pope, Freshwater
- 7—Francis Hearne, Bristol
- 8—Bill Kelly, Belfast
- 9—George Morley, Redhill
- 10—G. Bedwell, Weybourne
- 11—David Middlemiss

Local Radio DX

One of the joys of this branch of our hobby seems to be that the best time to listen is often during daylight hours! There has been plenty of activity again this time and many of the stations have been received over considerable distances! Writing from Bristol **Francis Hearne** used a Sharp GFA3 stereo receiver with a whip antenna to compile his impressive list for the chart.

"Radio London, Radio Bristol and Red Rose Radio were the difficult ones" says **Bob Fields** who uses a Vega 215 receiver in Immingham. **David Middlemiss** has obtained a Yaesu FRG-7 receiver with Timestep digital readout and has been putting it to good use to check out the local radio DX scene in Eyemouth, Berwick. "I

have found the BBC stations to be good verifiers in general, with the IBA being rather poor, many not replying at all!" says Brian Buckley.

Many of the *PW* readers who saw my note about the Red Dragon DX programme from Cardiff in the July issue have been trying to track down the Red Dragon in their area. **George Morley** of Redhill says "It can be received here on 1305 during daylight, but is only just intelligible, while on 1359 Chelmsford rules, OK!" **John Parry G4AKX** of Northwich, Cheshire, says "No go here I'm afraid, as on 1305 there is a pirate and on 1359 I heard ILR from Coventry". **Alan Curry** of Stockton-

on-Tees says, "I have tried to pick up Red Dragon Radio but no success—it's possibly too far away from my QTH".

The Red Dragon can be heard in Belfast on 1359. "... very nice of Red Dragon to do a DX programme", writes Bill Kelly. **Ron Pearce** of Bungay says, "I listened out ... but only got a French station on 1305 and Radio Essex on 1359". Writing from Macclesfield **Philip Rambaut** says, "After dark, several stations were heard on both frequencies, but I did manage to identify the same tune being broadcast on both frequencies at the same time—this would certainly emanate from Red Dragon".

I am preparing a chart of the areas covered by Red Dragon Radio during daylight and darkness, so your help to look for it would be appreciated and a couple of clues might enable you to track it down—it was last heard on 1305 and 1359kHz!

QSL addresses

BBC Radio Nottingham, York House, Mansfield Road, Nottingham NN1 2BE.

BBC Radio Stoke-on-Trent, Conway House, Hanley, Stoke-on-Trent, Staffs ST1 1JJ.

RTE Radio 1, Donnybrook, Dublin 4, S. Ireland.

SW BROADCAST BANDS

Reports as for Medium Wave DX, but please keep separate

For the Newcomer SWL

Since the early days of radio, numerous types of antenna have been evolved and many of these may well have common features, but certain characteristics will make one particular design different from another and perhaps better too. In order that these differences can be readily appreciated it is necessary to have a standard or reference antenna against which all other designs can be compared. The concept of a point source radiator, or isotropic radiator may at first seem a sensible choice, since such a radiator will, in theory, radiate equally well in all directions and receive signals with uniform efficiency. In practice however, it is virtually impossible to introduce energy into such a radiator without altering its radiation pattern. Because of this and other technical considerations, it is a purely theoretical idea with no practical counterpart whatever. A simple easily reproduced standard is what is required and the basic halfwave dipole antenna is accepted as the universal practical standard — halfwave antennas were discussed in last month's Newcomer SWL.

When comparing an antenna system with a basic reference dipole, certain measurements have to be made in order to evaluate its performance and the results of these measurements have to be recorded in the form of common terms. One term is used more than any other when discussing antenna systems and this is the decibel, spoken of as "dee bee" and written as dB. So, what then is a dB, and where did it come from?

The bel, devised by Alexander Graham Bell, was used as a means of specifying changes in sound power levels. It was rather a large unit for general use, so one tenth of a bel, called a decibel, was adopted in most practical applications.

Decibels difference = $10 \log P_2/P_1$

where P_2 is the power out and P_1 the power in.

The decibel then is associated with ratios of quantities based on a logarithmic scale. So it can be used to describe gains or losses in a system or provide a comparison of one level of power to another. This concept may at first appear to be confusing or difficult for most of us to understand, since we are used to thinking in terms of the actual value of a particular item based on a linear scale.

So using the formula you can see that when P_2 is 10 times as great as P_1 , their difference is 1 bel, since the log of 10 is 1,

this represents a change of 1 watt to 10 watts, or 100 watts to a kilowatt.

Another useful formula you can come across is

$$dB = 20 \log V_2/V_1$$

When calculating decibel differences it is usual to place a minus sign ahead of the answer in decibels if there is a loss or attenuation in the system (i.e. output less than input) or a plus sign ahead of the answer in decibels if there is a gain in the system (i.e. output greater than input).

The greatest advantage of the decibel system, is that gains or losses in a system can be simply added or subtracted to arrive at an overall figure and in terms of antenna systems this can provide a most useful means of making comparisons as we shall see in future articles!

DX Heard

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

Conditions on the 21 and 25MHz bands: The 26MHz (11m) band can best be described as dead in the UK! Writing from Johannesburg, S. Africa, **Simon Illingworth** says: "The 11m band is still dead, with not a glimmer of a signal". In view of our present position in the 11 year Solar cycle, it is going to stay that way for some time to come!

The conditions have been generally poor on the 21MHz (13m) band, too, but at least there have been some signals present! The BBC World Service can be heard on 21.470 and 21.770 for a couple of hours a day at best in Johannesburg, according to Simon. The only other signals present there are from RFI France; UAE Radio Dubai; AFRTS and Radio Bucharest—well, things are a little better than that here!

George Morley received signals from UAE Radio Dubai on 21.700 at good strength in Redhill at 0640. They beam towards Europe from 0615 until 1500 with programmes mainly in Arabic, although there are a few items in English. Other stations in his log include Radio Netherlands via their relay in Madagascar on 21.475 at 0720; Radio Japan beaming to Europe via their relay in Moyabi, Gabon, on 21.625 at 1520 and WYFR on 21.525 which broadcasts to Africa from Okeechobee, Florida, USA, from 1600.

Alan Williams received signals from UAE Radio Dubai on 21.605 when testing his new Philips Cassette/Radio Model



by Brian Oddy G3FEK

D-7254 in Helston; transmissions to Europe on this frequency commence at 1030. Alan also listened to Radio RSA from Johannesburg, S. Africa, on 21.590 at 1437. Up in Buckie, Scotland, **Julian Wood** has been hearing weak signals from Radio DW Cologne, Germany, on 21.600; this transmission is intended for Africa and may be heard in English from 1000 until 1030 when programmes change to Swahili.

The 15 and 17MHz bands: Despite the unreliable conditions just now, many interesting signals are to be found here. In the early morning, Radio Australia can sometimes be heard in the UK on the 17MHz (16m) band via the "long path". The long path is round the world via the Pacific Ocean, Central America and the Atlantic Ocean. As mainly sea path is involved, attenuation of the multiple reflections between the ionosphere and the earth along the route are lower than via the "short path", which is mainly over land. Their 17.795 signal tends to be weak and is intended for other areas, so careful listening is necessary. Using a Vega receiver, **Alan Hollingworth** picked up their signal at 0505 in Southsea for the first time and noted it in his log as SINPO 22222. George Morley has been hearing their transmission on 17.715 at 0730, but rated it as S1. Other signals noted by George in the morning include Radio Beijing, China, with songs and music in Chinese on 17.605 at 0755; Radio DW Cologne, Germany, on 17.815 with a transmission to the Middle East in Pushto/Dari at 0835 (this could be of interest to those s.w.l.s making language identification recordings); Radio Pakistan, Islamabad, beaming to Europe on 17.660 at 0900 and Radio Afghanistan, Kabul, via the USSR on 17.655, beaming to Asia at 0915.

Alan Curry of Stockton-on-Tees and **Chris Wood** of Washington, Co. Durham, have both mentioned the excellent signals from UAE Radio Dubai, which can be found on 17.775 from 0615 and on 17.865 from 1000, with News in English at 1330. Radio Cairo, Egypt, noted by Alan on 17.675, broadcasts to Asia in Arabic at 1300. Radio Algiers, logged by Chris on 17.745, has an English transmission at 2000.

Tim Shirley of Bristol is a regular listener to The Voice of the Andes, Radio HCJB which can be found on 17.790 in the evenings beaming to Europe and Africa from Quito, Ecuador, at 1900, their signal has often been very good recently at this time. Tim has also been listening to the Voice of Free China with some interesting programmes in English, including a series of lessons on learning the Chinese language! These programmes are in fact relayed to Europe by a station in Okeechobee, Florida, at 2100 on 17.845 and the signal is usually good.

Freq (MHz)	Station	Country	1	2	3	4	5	6	7	8	9	10	11
3-215	Radio Orion (RSA)	S. Africa						2307					
3-230	Radio RSA	S. Africa					0325						0315
3-270	SWABC 1	Namibia			2232		0345	2150				0055	2200
3-366	GBC Radio 2	Ghana			2218		2225	2157		2100			
3-915	BBC Kranji	Singapore			2240			2200					
3-990	BBC	Cyprus						2205					
4-682	Radio Paititi	Bolivia											0100
4-733	Radio San Juan de Cerez												0100
4-735	Xinjiang	China						2208					
4-739	Radio Manore												2100
4-740	TWR	Swaziland							0320				
4-749	Radio Santaana Yacuma												2130
4-760	ELWA Monrovia	Liberia						2215					
4-770	FRCN, Kaduna	Nigeria	2012		1955								2200
4-790	Radio Atlantida	Peru				0200							
4-795	Radio Douala	Cameroon	2010					2205	2210				
4-805	Radio Diff Do Amazonas	Brazil				2230		0135					
4-810	SABC	S. Africa	2113					2145					
4-815	Radio Diff TV Burkina	Ouagadougou	2040					2140					
4-820	Radio Botswana	Botswana			2045								
4-820	La Voz Evangelica	Honduras				0153			0157			0330	
4-830	Africa No. 1	Gabon	2012		2103			2210	2207			2230	
4-830	Radio Tachira	Venezuela				2329	0125		0149			0315	
4-832	Radio Reloj	Costa Rica							0409			0430	
4-835	RTM Bamako	Mali	2016					2215					
4-845	Nouakchott	Mauritania					2150						
4-845	Radio Nacional, Manus	Brazil					2215		0126			0220	
4-850	Radio Yaounde	Cameroon						2215					
4-850	Radio Capital, Caracas	Venezuela				0215			0458				
4-870	Radio Cotonou	Benin	2019				2205	2215					
4-890	ORTS, Dakar	Senegal	2120										
4-910	Radio Zambia	Zambia										0335	
4-915	Accra	Ghana	2048		2218							2230	
4-915	Radio Nacional, Macapa	Brazil										0410	
4-920	Moyabi	Gabon			2204								
4-920	Radio Quito	Ecuador				0353							
4-920	VLM4 Brisbane	Australia											2040
4-926	Radio Nacional, Bata	Eq. Guinea	2027										
4-940	Yakutsk	USSR										0205	
4-975	4VEH	Haiti											2345
4-980	Ecos del Torbes	Venezuela			2315	2325	2245					2310	
4-985	Radio Brazil Central	Brazil					0040					0200	
4-990	FRCN, Lagos	Nigeria	2144				2155	2145				2300	
4-990	Radio RSA	S. Africa										0330	
4-995	Radio Andina	Peru				0148							
5-004	Radio Nacional, Bata	Eq. Guinea					2145						
5-006	Radio Zaire	Zaire	2035										
5-035	Bangui Central	African Rep.		2215									
5-045	Radio Cultura do Para	Brazil					0055						
5-047	Toglekope	Togo			2255		2205	2320			2330		
5-055	Faro del Caribe	Costa Rica				0428							
5-057	Gjirokaster	Albania	2140										
5-095	Radio Sutatenza, Bogota	Colombia					2310						

An interesting 16m station to look for at 1730 was mentioned by **Darren Taplin** of Tunbridge Wells. Radio Surinam in Paramaribo on 17-755 is a good example of the confusion which relay stations can cause on the bands for the unwary newcomer, see June 1986 *PW*, page 66. Their transmission in Dutch, with some items in English, is in fact coming from a Radio Brasilia transmitter located many hundreds of kilometres to the south of Paramaribo—in Brazil!

Apparently the BBC World Service signal from Ascension island on 17-790 is so strong in Johannesburg during the day that the S meter of Simon Illingworth's receiver is hard on the end stop! He says their 17-885 signal from Cyprus is very good, too. The signal from RCI Montreal, Canada, on 17-820, however, is non-existent in the evening there. This is certainly not the case in the UK and George Morley referred to their broadcast in English on 17-875 at 2000 as good in his log and Alan Williams mentioned that their transmission in French and English from

Practical Wireless, October 1986

1430 on 17-820 is often a very good signal.

The 15MHz (19m) band is the hub of DXing activity for many s.w.l.s. **John Parry G4AKX** of Northwich, Cheshire, has been enjoying some morning listening tuning to the BBC's Ascension Island, S. Atlantic, relay station, 15-105 at 0730 and to the broadcast in Afrikaans to Europe from Radio RSA in Johannesburg, S. Africa, at 0830 on 15-220.

Some of the other early morning 19m signals to look out for include Radio Australia, which can be received via the "long path". Alan Hollingworth found their signal to be SINPO 32323 at 0530 on 15-320. Radio Japan, which is relayed to Europe via Moyabi, Gabon, from 0700 on 15-230, was noted by Allan Curry as SINPO 54444. KYOI, the "Super Rock" station in Saipan, N. Mariana Islands, on 15-190, has been heard by **Neil Dove** at 0920 with SINPO 35443 up in Lockerby, Scotland.

Bob Fields has been monitoring this band on his Vega 215 receiver during the day in Immingham and sent along an

- 1—**Fred Pallant, Storrington**
- 2—**Philip Rambaut, Macclesfield**
- 3—**George Morley, Redhill**
- 4—**Graham Powell, Pontypridd**
- 5—**Neil Dove, Lockerby**
- 6—**Simon Hamer, New Radnor**
- 7—**John Sheridan, Mapperley**
- 8—**John Parry, Northwich**
- 9—**Maurice Andries, Dendermonde**
- 10—**Bill Kelly, Belfast**
- 11—**Tim Shirley, Bristol**

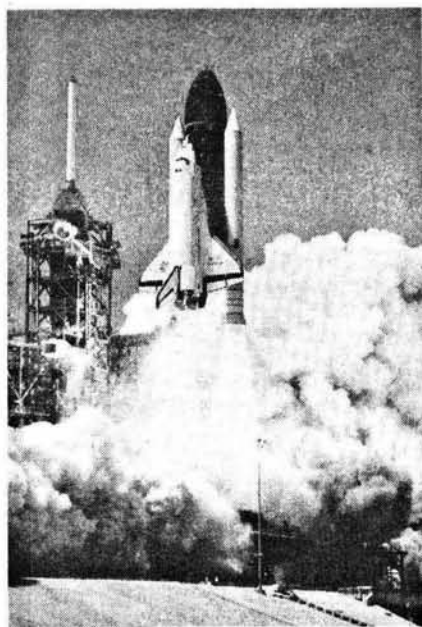
interesting list which included Radio Finland, Helsinki, on 15-265 from 0830; VOIRI Tehran, Iran, 15-084 with a programme for Europe in Farsi at 1430; Radio HCJB Quito, Ecuador, beaming to Europe and Africa at 1900 on 15-270; AFRTS via Bethany, USA, on 15-345 at 2000 and WRNO New Orleans, USA, on 15-420 at 2000.

Ron Pearce has been checking out the 19m performance of his one valve home-made receiver in Bungay and was delighted to hear UAE Radio Dubai coming in well on 15-320 with a broadcast to Europe at 1600! Later, he picked up REE Madrid, Spain, on 15-375 with a programme of pop music at 1909 and listened to the News from VOFC Taipei, Taiwan, on 15-440, via their relay in Florida, USA, at 2109. At 2135 he tuned into Quito, Ecuador, direct and listened to the s.w.l. *DX Party Line* programme from HCJB! Ron has been listening to the News from Canada on his little set, too, via RCI in Montreal on 15-325 at 2158.

Some idea of the band occupancy by Radio Moscow in the early afternoon can be ascertained from a log sent along by **Albert Fisher G4VBH** of Heston. Between 1430 and 1515 he noted Radio Moscow on 15-350; 15-440; 15-455; 15-465 shared with Monte-Carlo; 15-475; 15-490; 15-520; 15-535; 15-570 shared with SRI Berne, Switzerland, and 15-585 also shared with SRI. Other stations heard were Radio DW Cologne, Germany, 15-135; AFRTS on 15-425; The Voice of Israel, 15-485; Radio Kuwait on 15-495 and 15-505 in Arabic; very weak signals from Radio Netherlands Flevo, Netherlands, on 15-560; Radio Pakistan on 15-595, broadcasting to the Middle East in Urdu. VOA use a good many frequencies on this band, too! **Peter Vlietink** of London has received a QSL for his reception of their signals on his Vega 206 receiver using the built-in whip antenna.

During the late afternoon and early evening signals from other areas can be heard, such as RAE Buenos Aires, Argentina, which directs its transmission to Europe at 1800 on 15-345. **Sheila Hughes** of Morden, Surrey, has been listening to their programme of News, Music and more News, but finds the signal is very much in the noise by 1825 on her Vega receiver. A relay in Taipei, Taiwan, on 15-090 was heard broadcasting programmes from WYFR in Oakland, California, in Russian by **Philip Rambaut** of Macclesfield, Cheshire, at 1600. His interesting log included two stations with programmes intended for Africa, namely, WHRI from South Bend, USA, on 15-105, with a programme in English from 1500 and Africa No. 1 in Gabon, on 15-200 at 1607. **Fred Pallant G3RNM** of Storrington is a regular listener to Africa No. 1, Gabon, on 15-475 between 2000 and 2105 and says the signals are often like a local station!

The 13MHz band: Although Radio Moscow uses many frequencies on the 13MHz (22m) band, some other countries are active here, too. One example is Radio



QSL card from VOA

Prague, it uses this band to provide a service in Czech to Asia, logged by Darren Taplin at 1400 on 13-715 and broadcasts to Africa on 13-605 at 1600 in Arabic, English and French. The Voice of Israel beams transmissions to Europe on 13-725 in many languages between the hours of 0300 and 2200. A programme in Russian and Yiddish was noted by Philip Rambaut at 1640 and other languages include English, French, Spanish, Farsi, Georgian, Hebrew and Hungarian, this may be an ideal spot to make language identification recordings!

The 11, 9, 7 and 6MHz bands: Reception conditions have been fairly reliable on these bands and there are plenty of interesting stations to be found here both during the day and at night! Many of the stations suffer from some form of interfer-

ence, however, which is either due to co-channel problems or swamp from a station on an adjacent channel due to the overcrowded situation. Worse still is the deliberate illegal jamming which still continues from mainly Eastern bloc countries.

In the early morning, Radio Australia broadcasts to the Pacific area on the 11MHz (25m) band, with programmes in English, and these can sometimes be received in the UK, too! **Graham Powell** has been hearing these signals in Pontypridd at 0515 on 11-910. While monitoring the band during the early evening with his Trio R2000 receiver, he picked up a transmission from FEBA in the Seychelles on 11-805, which was directed to the UK at 1900 for test purposes.

Graham has also been monitoring the 9MHz (31m) band during the early mornings and listened to the signal from Radio HCJB in Quito, Ecuador, at 0715 on 9-845—Sheila Hughes is a regular listener to their *Happiness Is* programme, broadcast on this frequency. Another regular spot on the dial to which Sheila tunes her Vega B212 in the mornings at 0800 is 9-880, to hear News and the *Mailbag* programme broadcast by BRT Brussels, Belgium. Using a Sharp GFA3 receiver in Bristol, **Francis Hearne** listens to programmes in English from Radio Bucharest, Rumania, on 9-690 at 2100 and has heard Radio Japan on 9-675 at 2300. **David**

Jones uses an ITT Golf 330 with whip antenna in Walton, Liverpool, to pick up Radio Polonia, Warsaw, on 9-540 at 1606; UAE Radio Dubai on 9-550 at 1628 and the Voice of Israel on 9-435 at 2200. He logged Radio Vilnius Lithuania, USSR, on 9-685 at 2200, but the signal was fading badly.

When DXing on the 7MHz (41m) band, **Carl Ratcliffe** uses either a Vega 206 or a Trio 9R59D receiver and his log includes TWR Monte-Carlo, Monaco, on 7-105 at 0700; Radio Kiev Ukraine, USSR, on 7-330 at 1800 and the Voice of Israel, Jerusalem, on 7-410 from 2300. **Maurice Andries** of Dendermonde, Belgium, has been hearing a programme from Radio Earth Int. USA, broadcast via Radio Milano, Italy, on 7-295 at 0800. On the 6MHz (49m) band **Michael Hill** of Stockton-on-Tees, Cleveland, heard IBRA Radio, which broadcasts via Radio Mediterran, Malta, on 6-110 from 2015 and has now received their QSL. It's not often mentioned by s.w.i.s., but this station welcomes reports.

The 5, 4, 3 and 2MHz bands: Once again there has been plenty of activity on these bands as can be seen from the chart, which gets larger each month.

Station Addresses

All India Radio, Director of External Services, P.O. Box 500, New Delhi 110001, India.

Radio Algiers, Radio TV Algerienne, 21 Boulevard des Martyrs, Alger, Algeria.

Radio Damascus, Director of Public Relations, Place des Ommayyades, Syrian Arab Republic.

Post reports to arrive by September 26



Paper pennant from RAE Argentina

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... available from book stockists

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relationship, whilst on the production side working conditions were probably the best in the industry by the mid-30s. At last we can read the full story of an outstanding personality, thanks to Joan Long's absorbing portrait of her father.

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"Value for money" was the principle that guided Frank Murphy to success in advertising and then radio

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Later he again attempted to re-enter the radio business in Canada, but without success. Although dogged by failure in later life, he can never be robbed of the respect and admiration



that he earned from customers, dealers and workers alike during his days with Murphy Radio.

Joan Long's book has derived its title from a phrase much used by her father when commending a piece of work well done. One feels that he would have said that this book is truly "A First Class Job".

C.E.M.

Practical Wireless, October 1986

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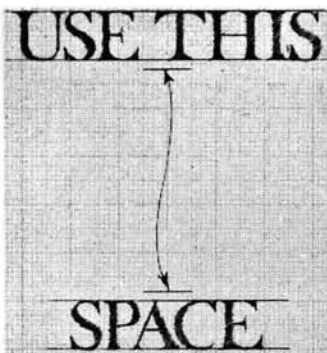
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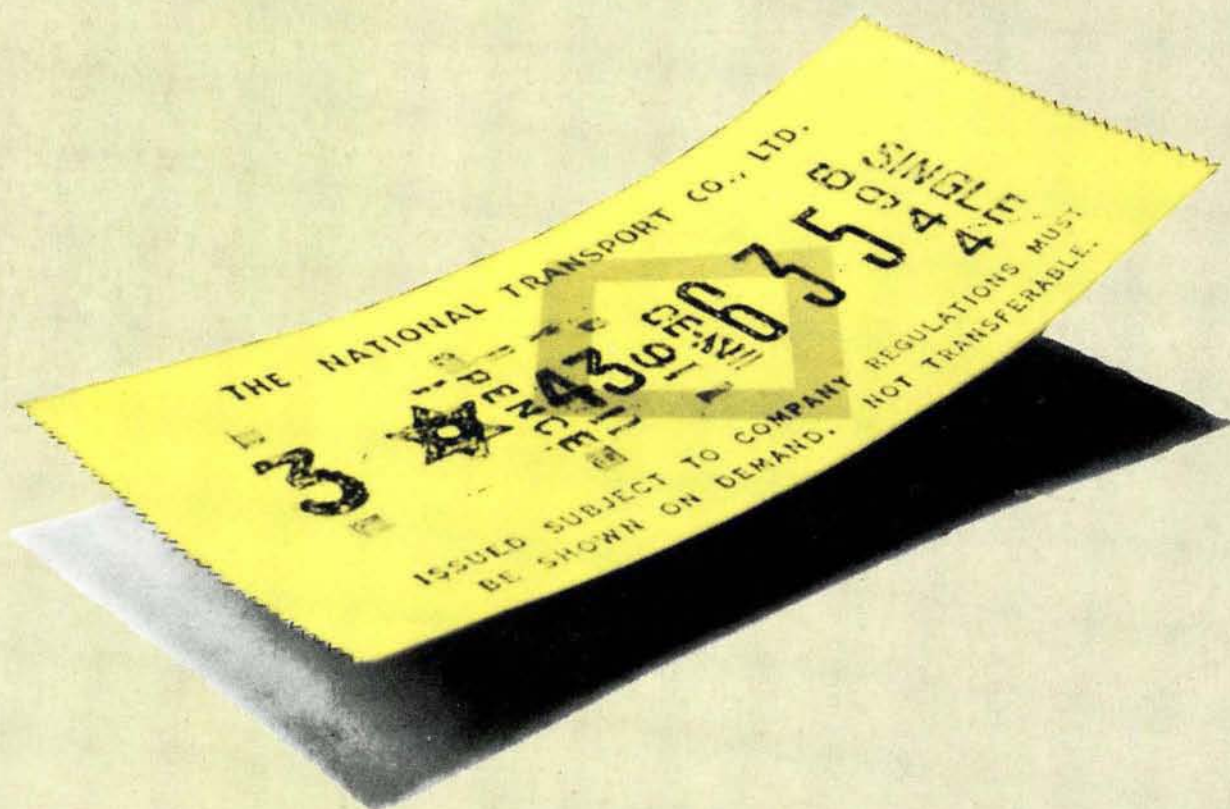
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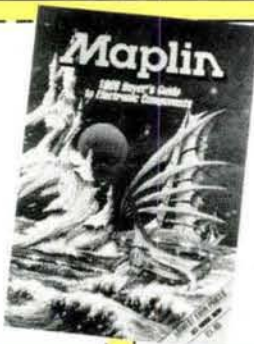
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