

Pull-out

EXTRA
FEATURE

RADIO DATA

8 PAGE
SUPPLEMENT

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Practical Wireless
Dec. 1979

WE hope that you'll find this a useful source of reference data, with something in it for the beginner and the old hand, whether you're interested in the broadcast bands or the amateur bands.

USEFUL FORMULAE

Resistors in series

$$R_{TOT} = R_1 + R_2 + R_3 \dots$$

Resistors in parallel

$$\frac{1}{R_{TOT}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \dots$$

$$R_{TOT} = \frac{R_1 \times R_2}{R_1 + R_2}$$

Capacitors in series

$$\frac{1}{C_{TOT}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} \dots$$

Capacitors in parallel

$$C_{TOT} = C_1 + C_2 + C_3 \dots$$

Resonant frequency

$$f_R = \frac{1}{2\pi\sqrt{LC}} \text{ Hz (L in henrys, C in farads)}$$

If L is in μH and C in μF :

$$f_R = \frac{159}{\sqrt{LC}} \text{ kHz}$$

Inductive reactance

$$X_L = 2\pi fL \quad (\text{L in henrys})$$

Capacitive reactance

$$X_C = \frac{1}{2\pi fC} \quad (\text{C in farads})$$

Unit multipliers

giga (G)	10^9
mega (M)	10^6
kilo (k)	10^3
centi (c)	10^{-2}
milli (m)	10^{-3}
micro (μ)	10^{-6}
nano (n)	10^{-9}
pico (p)	10^{-12}

Decibel conversions

$N = 10 \log_{10}(P_2/P_1)$ decibels, for a power ratio
 $N = 20 \log_{10}(V_2/V_1)$ decibels, for a voltage ratio

and, conversely

$$P_2/P_1 = \text{antilog}(N/10)$$

$$V_2/V_1 = \text{antilog}(N/20)$$

FREQUENCY/WAVELENGTH CONVERSION

$$\text{Wavelength (metres)} = \frac{300\,000}{\text{Frequency (kilohertz)}}$$

$$\text{Frequency (kilohertz)} = \frac{300\,000}{\text{Wavelength (metres)}}$$

Medium-wave broadcast band

kHz Metres		kHz Metres		kHz Metres		kHz Metres		kHz Metres		kHz Metres	
531	565.0	711	421.9	891	336.7	1071	280.1	1251	239.8	1431	209.6
540	555.6	720	416.7	900	333.3	1080	277.8	1260	238.1	1440	208.3
549	546.4	729	411.6	909	330.0	1089	275.5	1269	236.4	1449	207.0
558	537.6	738	406.5	918	326.8	1098	273.2	1278	234.7	1458	205.8
567	529.1	747	401.6	927	323.6	1107	271.0	1287	233.1	1467	204.5
576	520.8	756	396.8	936	320.5	1116	268.8	1296	231.5	1476	203.3
585	512.8	765	392.2	945	317.5	1125	266.7	1305	229.9	1485	202.0
594	505.1	774	387.6	954	314.5	1134	264.6	1314	228.3	1494	200.8
603	497.5	783	383.1	963	311.6	1143	262.5	1323	226.8	1503	199.6
612	490.2	792	378.8	972	308.6	1152	260.4	1332	225.2	1512	198.4
621	483.1	801	374.5	981	305.8	1161	258.4	1341	223.7	1521	197.2
630	476.2	810	370.4	990	303.0	1170	256.4	1350	222.2	1530	196.1
639	469.5	819	366.3	999	300.3	1179	254.5	1359	220.8	1539	194.9
648	463.0	828	362.3	1008	297.6	1188	252.5	1368	219.3	1548	193.8
657	456.6	837	358.4	1017	295.0	1197	250.6	1377	217.9	1557	192.7
666	450.5	846	354.6	1026	292.4	1206	248.8	1386	216.5	1566	191.6
675	444.4	855	350.9	1035	289.9	1215	246.9	1395	215.1	1575	190.5
684	438.6	864	347.2	1044	287.4	1224	245.1	1404	213.7	1584	189.4
693	432.9	873	343.6	1053	284.9	1233	243.3	1413	212.3	1593	188.3
702	427.4	882	340.1	1062	282.5	1242	241.5	1422	211.0	1602	187.3

Short-wave bands

MHz	Metres	MHz	Metres	MHz	Metres	MHz	Metres	MHz	Metres	MHz	Metres
1.5	200	8.0	37.5	15	20.0	22	13.6	45	6.67	80	3.75
2.0	150	9.0	33.3	16	18.8	23	13.0	50	6.00	88	3.41
3.0	100	10.0	30.0	17	17.6	25	12.0	55	5.45	90	3.33
4.0	75.0	11.0	27.3	18	16.7	28	10.7	60	5.00	95	3.16
5.0	60.0	12.0	25.0	19	15.8	30	10.0	65	4.62	100	3.00
6.0	50.0	13.0	23.1	20	15.0	35	8.57	70	4.29	105	2.86
7.0	42.9	14.0	21.4	21	14.3	40	7.50	75	4.00	108	2.78

Long-wave broadcast band

KHz	Metres
155	1935
164	1829
173	1734
182	1648
191	1571
200	1500
209	1435
218	1376
227	1322
236	1271
245	1224
254	1181
263	1141
272	1103
281	1068

THE SINPO REPORTING CODE

Rating scale	S I N P O				
	Signal strength	Interference	Noise	Propagation disturbance	Overall readability
5	Excellent	Nil	Nil	Nil	Excellent
4	Good	Slight	Slight	Slight	Good
3	Fair	Moderate	Moderate	Moderate	Fair
2	Poor	Severe	Severe	Severe	Poor
1	Barely audible	Extreme	Extreme	Extreme	Unusable

USEFUL ADDRESSES

UK Amateur Licensing enquiries to:
Home Office,
Radio Regulatory Department,
Radio Regulatory Division,
Licensing Branch (Amateur),
Waterloo Bridge House,
Waterloo Road,
London SE1 8UA

Radio Society of Great Britain,
35 Doughty Street,
London WC1N 2AE.

European DX Council,
PO Box 4,
St Ives,
Huntingdon,
Cambs PE17 4FE.

UK AMATEUR BANDS

Footnote No.	Frequency Bands (in MHz) (See Note A)	Classes of Emission (see Note B)	Power		
			Maximum d.c. Input Power (See Notes C and D)	RF Output p.e.p. for A3A and A3J emissions only (See Note O)	
1 and 5	1.8 — 2	A1, A2, A3 A3A, A3H, A3J, F1, F2 and F3	10 watts	26 $\frac{2}{3}$ watts	
2, 10 and 12	3.5 — 3.8		150 watts	400 watts	
10 and 12	7 — 7.10				
	14 — 14.35				
	21 — 21.45				
	28 — 29.7				
1 and 3	70.025 — 70.7		50 watts	133 $\frac{1}{3}$ watts	
4, 10 and 12	144 — 145		150 watts	400 watts	
10 and 12	145 — 146				
1, 7 and 8	430 — 432		A1, A2, A3, F1, F2 and F3	—	—
1 and 11	432 — 440		A1, A2, A3, A3A, A3H, A3J, F1, F2, and F3	150 watts	400 watts
1	1215 — 1225				
1 and 11	1225 — 1290				
1	1290 — 1325				
1 and 11	2300 — 2450				
1	3400 — 3475				
1 and 11	5650 — 5850				
1 and 11	10 000 — 10 500				
9 and 11	24 000 — 24 050				
1, 9 and 11	24 050 — 24 250				
1 and 6	2350 — 2400	P1D, P2D, P2E, P3D and P3E	25 watts mean power and 2.5 kilowatts peak power		
	5700 — 5800				
	10 050 — 10 450				

Footnotes

1. This band is allocated to stations in the amateur service on a secondary basis on condition that they shall not cause interference to other services.
2. This band is shared with other services.
3. This band is available to amateurs until further notice provided that use by the Licensee of any frequency in the band shall cease immediately on the demand of a Government official.
4. The following spot aeronautical frequencies must be avoided whenever this band is used: 144.0, 144.54 MHz.
5. The type of transmission known as Radio Teleprinter (RTTY) may not be used in this band.
6. Use by the Licensee of any frequency in this band shall be only with the prior written consent of the Secretary of State.
7. This band is not available for use within the area bounded by 53°N 02°E, 55°N 02°E, 55°N 03°W and 53°N 03°W.
8. In this band the power must not exceed 10 watts e.r.p. (effective radiated power).
9. Use by the licensee for any frequency in this band shall only be with prior written consent of the Secretary of State and such consent shall indicate the power which may be used, taking into consideration the characteristics of the licensee's station.
10. Slow scan Television may be used in this band.
11. High Definition Television (A5, F5) may be used in this band.
12. Facsimile Transmission (A4, F4) may be used in this band.
13. Data transmission may be used within the frequency bands 144-145 MHz and above provided (a) the Station call sign is announced in Morse or telephony at least every 15 minutes and (b) emission is contained within the bandwidth normally used for telephony.

Notes

A. Artificial satellites may not be used by stations in the amateur service except in the bands 7-7.10 MHz, 14-14.25 MHz, 21-21.45 MHz, 28-29.7 MHz, 144-146 MHz, 435-438 MHz, 24 000-24 050 MHz.

B. The symbols used to designate the classes of emission have the meanings assigned to them in the Telecommunication Convention. They are:

Amplitude Modulation

- A1 Telegraphy by on-off keying, without the use of a modulating audio frequency.
- A2 Telegraphy by on-off keying of an amplitude-modulating audio frequency or frequencies or by on-off keying of the modulated emission.
- A3 Telephony, double sideband.
- A3A Telephony, single sideband, reduced carrier.
- A3H Telephony, single sideband, full carrier.
- A3J Telephony, single sideband, suppressed carrier.

Frequency (or phase) Modulation

- F1 Telegraphy by frequency shift keying without the use of modulating audio frequency, one of the two frequencies being emitted at any instant.
- F2 Telegraphy by on-off keying of a frequency modulating audio frequency or on-off keying of a frequency modulated emission.
- F3 Telephony.

Pulse Modulation

- P1D Telegraphy by on-off keying of a pulsed carrier without the use of a modulating audio frequency.
- P2D Telegraphy by on-off keying of a modulating audio frequency or frequencies or by on-off keying of a modulated pulsed carrier—the audio frequency or frequencies modulating the amplitude of the pulses.
- P2E Telegraphy by on-off keying of a modulating audio frequency or frequencies or by on-off keying of a modulated pulsed carrier—the audio frequency or frequencies modulating the width (or duration) of the pulses.
- P3D Telephony, amplitude modulated pulses.
- P3E Telephony, width (or duration) modulated pulses.

C. DC input is the total direct current power input to (i) the anode circuit of the valve(s) or (ii) any other device energising the aerial.

D. As an alternative, for A3A and A3J single sideband types of emission, the power shall be determined by the peak envelope power (p.e.p.) under linear operation. The radio frequency output peak envelope power under linear operation shall be limited to 2.667 times the d.c. input power appropriate to the frequency band concerned. This column gives the maximum power determined by this method which may be used.

E. Double sideband suppressed carrier emissions are permitted within the terms of this licence.

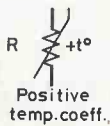
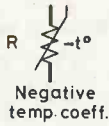
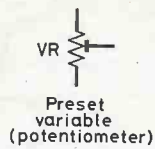
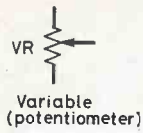
The above information is reproduced from the Home Office leaflet How to Become a Radio Amateur

BROADCASTING BANDS

Band	Frequency limits
Long (2000 — 1053m)	150 — 285kHz
Medium (571-187m)	525 — 1605kHz
120m	2300 — 2495kHz
90m	3200 — 3400kHz
75m	3900 — 4000kHz
60m	4750 — 5060kHz
49m	5950 — 6200kHz
41m	7100 — 7300kHz
31m	9500 — 9775kHz
25m	11 700 — 11 975kHz
19m	15 100 — 15 450kHz
16m	17 700 — 17 900kHz
13m	21 450 — 21 750kHz
11m	25 600 — 26 100kHz

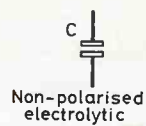
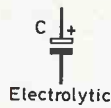
Some frequency allocations listed on this page are likely to change as a result of the 1979 World Administrative Radio Conference in Geneva

RESISTORS

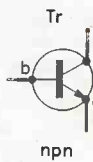
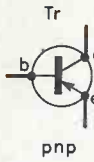


Thermistors

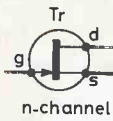
CAPACITORS



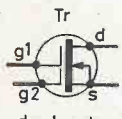
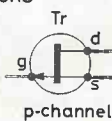
BI-POLAR TRANSISTORS



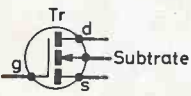
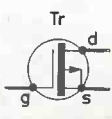
FIELD-EFFECT TRANSISTORS



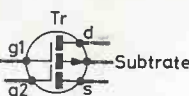
Jugfet



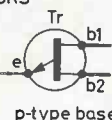
Mosfet (depletion type)



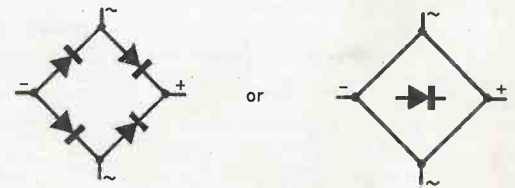
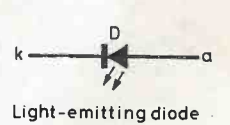
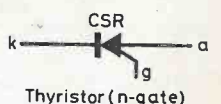
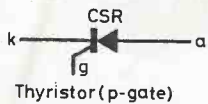
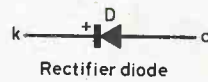
Mosfet (enhancement type)



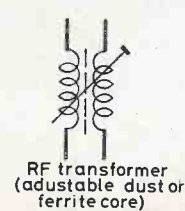
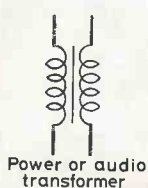
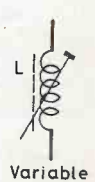
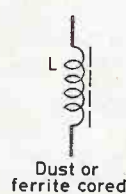
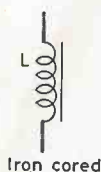
UNIUNION TRANSISTORS



SEMICONDUCTORS



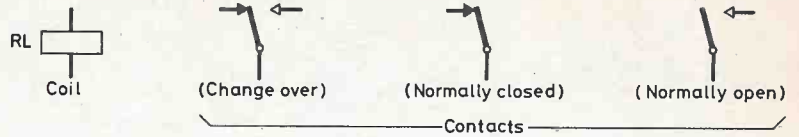
INDUCTORS



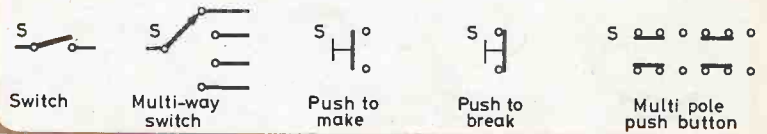
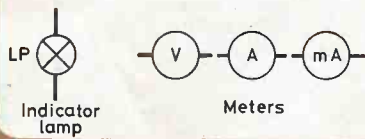
BATTERIES



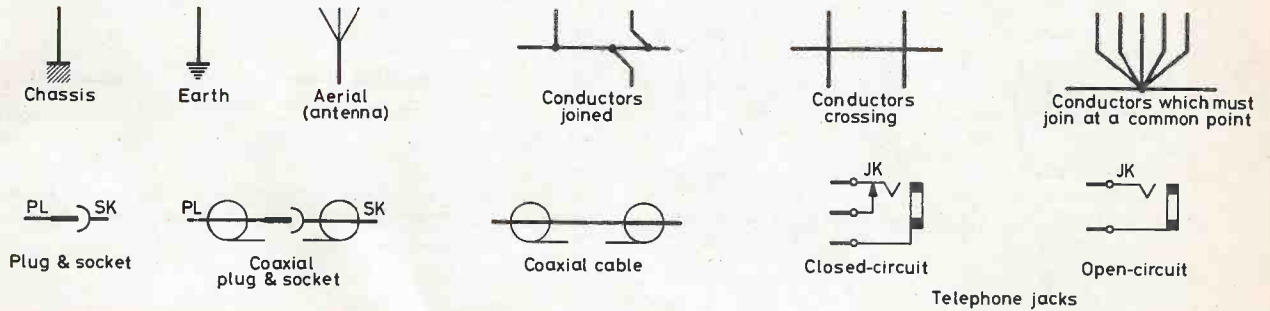
RELAYS & SWITCHES



INDICATORS



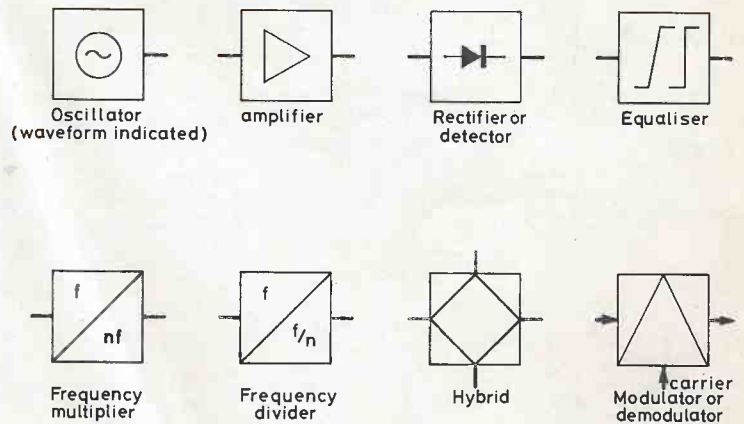
WIRING & CONNECTORS



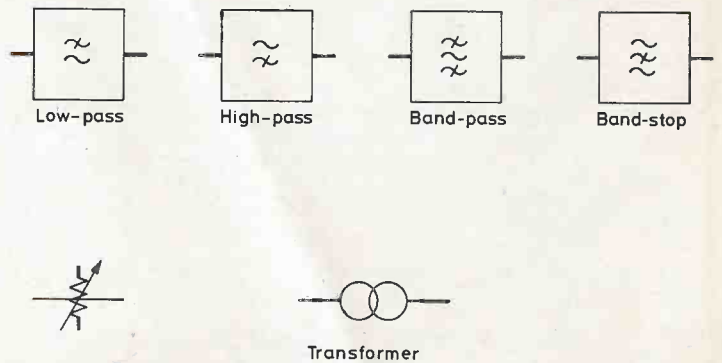
MISCELLANEOUS



BLOCK DIAGRAM SYMBOLS



FILTERS



Mechanical linkage
(between sections of a switch, variable capacitor, plug, socket, etc.)

THE MORSE CODE AND SOUND EQUIVALENTS

Alphabet

A	--	di-dah	N	--	dah-dit
B	----	dah-di-di-dit	O	----	dah-dah-dah
C	----	dah-di-dah-dit	P	----	di-dah-dah-dit
D	----	dah-di-dit	Q	----	dah-dah-di-dah
E	.	dit	R	--	di-dah-dit
F	----	di-di-dah-dit	S	---	di-di-dit
G	---	dah-dah-dit	T	-	dah
H	----	di-di-di-dit	U	---	di-di-dah
I	..	di-dit	V	----	di-di-di-dah
J	----	di-dah-dah-dah	W	---	di-dah-dah
K	---	dah-di-dah	X	----	dah-di-di-dah
L	----	di-dah-di-dit	Y	----	dah-di-dah-dah
M	--	dah-dah	Z	----	dah-dah-di-dit

Numerals

1	-----	di-dah-dah-dah-dah	6	-----	dah-di-di-di-dit
2	-----	di-di-dah-dah-dah	7	-----	dah-dah-di-di-dit
3	-----	di-di-di-dah-dah	8	-----	dah-dah-dah-di-dit
4	-----	di-di-di-di-dah	9	-----	dah-dah-dah-dah-dit
5	-----	di-di-di-di-dit	0	-----	dah-dah-dah-dah-dah

Accented Letters

ä	----	di-dah-di-dah	ö	----	dah-dah-dah-dit
ch	----	dah-dah-dah-dah	ü	----	di-di-dah-dah
ñ	-----	dah-dah-di-dah-dah			

Abbreviated Numerals

1	--	di-dah	6	-----	Dah-di-di-di-dit
2	---	di-di-dah	7	-----	dah-di-di-dit
3	----	di-di-di-dah	8	---	dah-di-dit
4	-----	di-di-di-di-dah	9	--	dah-dit
5	-----	di-di-di-di-dit	0	-	dah

Punctuation

Full stop (.)	-----	di-dah-di-dah-di-dah
Comma (,)	-----	dah-dah-di-di-dah-dah
Colon (:)	-----	dah-dah-dah-di-di-dit
Question mark (?)	-----	di-di-dah-dah-di-dit
Brackets ([])	-----	dah-di-dah-dah-di-dah
Fraction bar or solidus	-----	dah-di-di-dah-dit
Apostrophe (')	-----	di-dah-dah-dah-dah-dit
Hyphen or dash (-)	-----	dah-di-di-di-di-dah
Double hyphen (=)	-----	dah-di-di-di-dah
Quotation marks ("")	-----	di-dah-di-di-dah-dit
Underline (sent before and after the words)	-----	di-di-dah-dah-di-dah
Error	-----	di-di-di-di-di-di-dit

Spacing and Length of Signals

1. A dash is equal to three dots.
2. The space between the signals which form a letter is equal to one dot.
3. The space between two letters is equal to three dots.
4. The space between two words is equal to five dots.

THE RST CODE

Readability

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

Signal Strength

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

Tone

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

A letter is sometimes added to the "T" report to give further information:

- | | | | |
|---|-------|---|--|
| C | Chirp | K | Key clicks |
| D | Drift | X | Very stable note, sounding like a crystal-controlled transmitter |

PROCEDURE SIGNALS AND ABBREVIATIONS FOR CW COMMUNICATIONS

AA	All after . . . (used after a question mark or RPT to request a repetition)
<u>AB</u>	All before . . . (see AA)
<u>AR</u>	End of transmission
<u>AS</u>	Wait
BK	Signal used to interrupt a transmission in progress
BN	All between . . . and . . . (see AA)
<u>BT</u>	Long break (=); used to separate different parts of the same transmission
CFM	Confirm (<i>or</i> I confirm)
CL	I am closing my station
<u>CQ</u>	General call to all stations
<u>CT</u>	Starting signal (Also known as <u>KA</u>)
DE	"from . . ." (used to precede the callsign of the calling station)
<u>K</u>	Invitation to transmit
<u>KN</u>	Invitation to a specific station to transmit
NIL	I have nothing to send to you
NR	Number
NW	Now
OK	We agree (<i>or</i> it is correct)
PSE	Please
R	Received
RPT	Repeat (<i>or</i> I repeat)
TFC	Traffic
<u>TU</u>	Thank you
<u>VA</u>	End of work (Also known as <u>SK</u>)
WA	Word after . . . (see AA)
WB	Word before . . . (see AA)
WX	Weather report

A bar over the letters in the above list indicates that they are sent as one character.

144MHz BAND CHANNELS

Frequency (MHz)	Channel Number	Notes
Repeater input channels		
145.000	R0	
145.025	R1	
145.050	R2	
145.075	R3	
145.100	R4	
145.125	R5	
145.150	R6	
145.175	R7	

Simplex channels

145.200	S8	(1)
145.225	S9	
145.250	S10	
145.275	S11	
145.300	S12	(2)
145.325	S13	
145.350	S14	
145.375	S15	
145.400	S16	
145.425	S17	
145.450	S18	
145.475	S19	
145.500	S20	(3)
145.525	S21	
145.550	S22	
145.575	S23	

Repeater output channels

145.600	R0	
145.625	R1	
145.650	R2	
145.675	R3	
145.700	R4	
145.725	R5	
145.750	R6	
145.775	R7	

432MHz BAND CHANNELS

Frequency (MHz)	Channel Number	Notes
Repeater output channels		
433.000	RB0	
433.025	RB1	
433.050	RB2	
433.075	RB3	
433.100	RB4	
433.125	RB5	
433.150	RB6	
433.175	RB7	
433.200	RB/SU8	(4)
433.225	RB9	
433.250	RB10	
433.275	RB11	
433.300	SU12	(2)
433.325	RB13	
433.350	RB14	

Simplex channels

433.375	SU15	
433.400	SU16	
433.425	SU17	
433.450	SU18	
433.475	SU19	
433.500	SU10	(5)

Repeater input channels

434.600	RB0	
434.625	RB1	
434.650	RB2	
434.675	RB3	
434.700	RB4	
434.725	RB5	
434.750	RB6	
434.775	RB7	
(434.800)	RB8)	
434.825	RB9	
434.850	RB10	
434.875	RB11	
(434.900)	RB12)	
434.925	RB13	
434.950	RB14	

ITU PHONETIC SPELLING ALPHABET

Letter	Word
A	Alpha
B	Bravo
C	Charlie
D	Delta
E	Echo
F	Foxtrot
G	Golf
H	Hotel
I	India
J	Juliet
K	Kilo
L	Lima
M	Mike
N	November
O	Oscar
P	Papa
Q	Quebec
R	Romeo
S	Sierra
T	Tango
U	Uniform
V	Victor
W	Whiskey
X	X-Ray
Y	Yankee
Z	Zulu

Notes

1. Used by Raynet
2. RTTY local working (f.m.—v.f.t.)
3. Mobile calling channel
4. Simplex, used by Raynet
5. Fixed/mobile calling channel

INFORMAL AMATEUR CW ABBREVIATIONS

ABT	About	FB	Fine business	LID	Poor operator	TKS	Thanks
ADR	Address	FER	For	LSN	Listen	TMW	Tomorrow
AGN	Again	FONE	Telephony	MNI	Many	TNX	Thanks
ANI	Any	FREQ	Frequency	MSG	Message	TRX	Transceiver
ANT	Antenna	GA	Good afternoon	ND	Nothing doing	TX	Transmitter
BCNU	Be seeing you	GB	Goodbye	OM	Old man	U	You
BD	Bad	GD	Good day	OP	Operator	UR	Your
BLV	Believe	GE	Good evening	OT	Old-timer	VY	Very
BUG	Semi-automatic key	GLD	Glad	PWR	Power	WID	With
CK	Check	GM	Good morning	RCVR	Receiver	WKD	Worked
CLD	Called	GN	Good night	RPRT	Report	WKG	Working
CNT	Cannot	GND	Ground (earth)	RX	Receiver	WL	Will
CONDX	Conditions	GUD	Good	SA	Say	WUD	Would
CRD	Card	HI	Laughter	SED	Said	XYL	Wife
CUD	Could	HPE	Hope	SGS	Signals	YL	Young lady
CUAGN	See you again	HR	Here	SKED	Schedule	73	Best regards
CUL	See you later	HRD	Heard	SN	Soon	88	Love and kisses
DX	Long distance	HV	Have	SRI	Sorry		
ELBUG	Electronic bug key	HVY	Heavy	STN	Station		
ENUF	Enough	HW	How	SUM	Some		
ES	And	II	Repetition	SWL	Short wave listener		
		INPT	Input				

