

SECTION THREE

APPENDICES

HELPFUL DATA

METRIC CONVERSION FACTORS

Prefix	Symbol			Multiplication Factor
exa	E	10^{18}	=	1 000 000 000 000 000 000
peta	P	10^{15}	=	1 000 000 000 000 000
tera	T	10^{12}	=	1 000 000 000 000
giga	G	10^9	=	1 000 000 000
mega	M	10^6	=	1 000 000
kilo	k	10^3	=	1 000
hecto	h	10^2	=	100
deca	da	10^1	=	10
(unit)		10^0	=	1
deci	d	10^{-1}	=	0.1
centi	c	10^{-2}	=	0.01
milli	m	10^{-3}	=	0.001
micro	μ	10^{-6}	=	0.000 001
nano	n	10^{-9}	=	0.000 000 001
pico	p	10^{-12}	=	0.000 000 000 001
femto	f	10^{-15}	=	0.000 000 000 000 001
atto	a	10^{-18}	=	0.000 000 000 000 000 001

RESISTOR COLOUR CODE

Colour	Significant Figure	Decimal Multiplier	Tolerance ($\pm\%$)
Black	0	1	
Brown	1	10	
Red	2	100	
Orange	3	1,000	
Yellow	4	10,000	
Green	5	100,000	
Blue	6	1,000,000	
Violet	7	10,000,000	
Grey	8	100,000,000	
White	9	1,000,000,000	
Gold		0.1	5
Silver		0.01	10
No Colour			20

GLOSSARY OF KEY WORDS

Amateur Radio Communication – Noncommercial radio communication by or among Amateur Radio stations solely with personal aim and without pecuniary or business interest. (Pecuniary means payment of any type, whether money or other goods.)

Amateur Radio Operator – A person holding a valid license to operate an Amateur Radio Station.

Amateur Radio Service - A radio communications service of self-training, intercommunications, and technical investigation carried on by radio amateurs.

Amateur Radio Station - A station licensed in the Amateur Radio Service, including necessary equipment at a particular location, used for Amateur Radio Communications.

Antenna - A device made from wire or metal tubing. It picks up or sends out radio waves.

Antenna Switch - A switch used to connect one transmitter, receiver or transceiver to several different antennas.

Audio Frequency (AF) – The range of the frequencies that the human ear can detect. Audio Frequencies are usually listed as 20 Hz to 20,000Hz.

Autopatch - A device that allows repeater users to make telephone calls through a repeater.

Balun - Contraction for balanced to unbalanced. A device to couple a balanced load to an unbalanced source, or vice versa.

Bandwidth- The range of frequencies in the radio spectrum that a radio transmission occupies.

Battery - A device that converts chemical energy into electrical energy. It provides excess electrons to produce a current and the voltage or EMF to push those electrons through a circuit.

Beam Antenna - A directional antenna. A beam antenna must be rotated to provide coverage in different directions.

Calling Frequencies - Frequencies set aside for establishing contact. Once two stations are in contact, they should move their QSO to an unoccupied frequency.

Chassis Ground - The common connection for all parts of a circuit that connects to the negative side of the power supply.

Coaxial Cable - Coax (pronounced ko-aks). This is a type of feed line with one conductor inside the other. Insulation surrounds the inner conductor, and in turn, the insulation is surrounded by a braided shielded conductor. A plastic covering protects the shield. Sometimes the shielding conductor is solid.

Code-Practice Oscillator - A device that produces an audio tone, used for learning the code.

Code-Key- A device used as a switch to generate Morse code.

Continuous Wave (CW) - A term used by amateurs as a synonym for Morse code communication. Hams usually produce Morse code signals by interrupting the continuous-wave signal from a transmitter to form the dots and dashes.

CQ - The general call when requesting conversation with any one.

Coupling – A connection between two systems, causing one to oscillate when the other does so.

Dash - The long sound used in Morse code. Pronounce this a “dah” when verbally sounding Morse code characters.

Digipeater - A packet-radio station used to retransmit signals that are specifically addresses to be retransmitted by the station.

Digital Communication -The term used to describe Amateur Radio transmissions that are designed to be received and printed automatically. The term also describes transmissions used for the direct transfer of information from one computer to another.

Dipole Antenna – See Half-wave dipole may have lengths other than ½ wavelength.

Directivity – The ability of an antenna to focus transmitter power into a beam. Also, its ability to enhance received signals from specific directions.

Director - The element in ‘front’ of the driven element in a Yagi antenna.

Dot - The short sound used in Morse code. Pronounce this as “dit” when verbally sounding Morse characters if the dot comes at the end of the character. If the dot comes at the beginning or in the middle of the character, pronounce is as “di”

Driven Element – The element of an antenna that connects directly into the feed line.

Dummy Load (Dummy Antenna) – A resistor that provides a transmitter with a proper load. The resistor gets rid of the transmitter output power without radiating a signal.

DX – Distance, foreign countries.

Earth Ground – The circuit connection to a cold-water pipe or to a ground rod driven into the earth.

Feed Line (Feeder) – The wires or cable used to connect the receiver into an antenna. Also see **Transmission Line**.

Field Day – An annual event in which amateurs set up stations in outdoor locations. Emergency power is also encouraged.

Fills – Repeats of parts of a previous transmission – usually requested because of interference.

Frequency Bands - A group of frequencies where amateur communications are authorized.

Frequency Privilege - Permission to use a certain group of frequencies

Fuse - A thin strip of metal mounted in a holder. When too much current passes through the fuse, the metal strip melts and opens the circuit.

General Coverage Receiver - A receiver used to listen to both the short wave broadcast frequencies and the amateur bands.

Ground Connection - A connection made to the earth for electrical safety.

Ground Waves - Radio waves that travel along the surface of the earth.

Half-Wave Dipole - A basic antenna used by radio amateurs. It consists of a length of wire or tubing, opened and fed at the center. The entire is $\frac{1}{2}$ wavelength long at the desired operating frequency.

Hertz (Hz)- The basic unit of frequency. An alternating-current frequency of one cycle per second.

Impedance-Matching Network - A device that matches the impedance of the antenna system to the impedance of a transmitter or receiver. Also called an antenna matching network or Transmatch.

Input Frequency- A repeater's receiving frequency.

Insulator- A material that contains a tight grip on its electrons, so that an electrical current cannot pass through it.

Inverted-V Dipole- A half-wave dipole antenna with its center elevated and the ends drooping toward the ground. Amateurs sometime call this antenna an "inverted v".

Line Of Sight- The term used to describe VHF and UHF propagation in a straight line directly from one station to another.

Lower Sideband (LSB)-The common mode of single-sideband transmission used on the 40,80 and 160-meter bands.

Malicious Interference - Intentional, deliberate obstruction of radio transmissions.

Matching Network- A device that matches one impedance level to another. For example, it may match the impedance of an antenna system to the impedance of a transmitter or receiver. Amateurs also call such devices a transmatch, impedance-matching network, match box.

Microphone - A device that converts sound waves into electrical energy.

Mobile Operation - Amateur Radio operation conducted while in motion or at temporary stops at different locations.

Multiband Antenna – An antenna that will operate well on more than one frequency band.

Multimode Transceiver - A VHF or UHF transceiver capable of SSB, CW and FM operation.

Nets - Groups of amateurs who meet on the air to pass traffic or communicate about specific subject. One station(called the net control station)usually directs the net.

Ohm's Law - a basic law of electronics. Ohm's Law gives a relationship between voltage, resistance and current ($V = I \times R$)

Ohm (Ω)- The basic unit of electrical resistance, used to describe the amount of opposition to current.

Omnidirectional -An antenna characteristic meaning it radiates equal power in all compass directions.

Open Circuit – An electrical circuit that does not have a complete path, so current cannot flow through the circuit.

Output Frequency – A repeater's transmitting frequency.

Peak Envelope Power (PEP) – The average power of a signal at its largest amplitude peak.

Phone – Voice communications.

Polarization – Describes the characteristics of a radio wave. An antenna that is parallel to the surface of the earth, such as a dipole, produces horizontal polarization. One that is perpendicular to the earth's surface, such as a quarter-wave vertical, produces vertical polarization.

Portable Operations – Amateur Radio operation conducted away from the location shown on the station license.

Propagation – the study of how radio waves travel from one place to another.

Q Signals – Three letter symbols beginning with 'Q'. Q symbols are used in the amateur CW work to save time and for better communication.

QSL Card – A postcard sent to another amateur to confirm contact.

QSO – A conversation between two amateurs.

Radio Frequency (RF) – The range of frequencies that can be radiated through space in the form of electromagnetic radiation. We usually consider RF to be those frequencies higher than the audio frequencies, or above 20 KHz.

Ragchew – A lengthy conversation (or QSO) between two radio amateurs.

Random-Length Wire Antenna – An antenna having a length that is not necessarily to the wavelength of a desired signal.

Receiver – A device that converts radio signals into audio signals.

Reflector – An element in 'back' of the driven in a Yagi antenna.

Repeater – An amateur station that receives a signal and retransmits it for greater range.

RIG – The amateur's term for a transmitter, receiver or transceiver.

RST – A system of numbers used for signal reports: R is readability, S is strength, T is tone.

Selectivity – The ability of a receiver to separate two closely spaced signals.

Sensitivity – The ability of a receiver to detect weak signals.

Series Circuit – An electrical circuit where the electrons must flow through every part of the circuit. There is only one path for the current to flow.

Shack- The room where an Amateur Radio operator keeps his or her station equipment.

Simplex Operations- Term normally used in relation to VHF and UHF operations. Simplex means you are receiving and transmitting on the same frequency.

Single Sidebands (SSB)- A common mode for voice operation on the amateur high frequency bands. This is a variation of amplitude modulation.

Skip - Radio waves that are bent back to earth by the ionosphere. Skip is also called **sky-wave propagation**.

Skip Zone - An area past the maximum range of waves before the range of the waves returned from ionosphere. An area where communications between stations is not possible on a certain frequency.

Sky Waves - Radio waves that travel through the ionosphere back to earth. Sky-wave propagation is sometimes called skip.

Solid-State Devices - Circuit components that use semi-conductor materials. Semi-conductor diodes, transistors and integrated circuits are all solid-state devices.

Speech Processor - A device that increases the average power of side-band signal, making the voice easier to understand under weak signal conditions.

Spatter - The term used to describe a very wide-band width signal. Spatter is usually caused by an improperly adjusted side band transmitter.

Standing-Wave Ratio (SWR) Meter - A device used for measuring SWR. SWR is a relative measure of the impedance match between an antenna, feed line and transmitter.

SWR Meter - A device used to measure SWR. A measuring instrument that can indicate when an antenna system is working well.

Third Party Traffic - Message passed from one amateur operator to another on behalf of a third person.

Traffic - Messages passed from one amateur to another to relay system; the amateur version of a telegram.

Traffic Network - An on-the-air meeting of amateurs, for the purpose of relaying messages.

Transceiver - A radio transmitter and receiver combined in one unit.

Transformer - A device that changes ac voltage level.

Transmission Line - the wires or cable used to connect a transmitter or receiver.

Transmitter - a device that produces radio frequency signals.

Unidentified Communications Or Signals - Signal or radio communications in which the transmitting station's call sign is not transmitted.

Upper Sideband (USB)- The common signal-band operating mode on the 20,17,15,12, and 10 meter HF amateur bands. Hams also use upper side bands on all the VHF band.

Variable Frequency Oscillator (VFO)- A circuit used to control the frequency of an amateur transmitter.

Vertical Antenna – A common amateur antenna, usually made of metal tubing. The radiating element is vertical. There are usually four or more radial conductors paralleled to or on the ground.

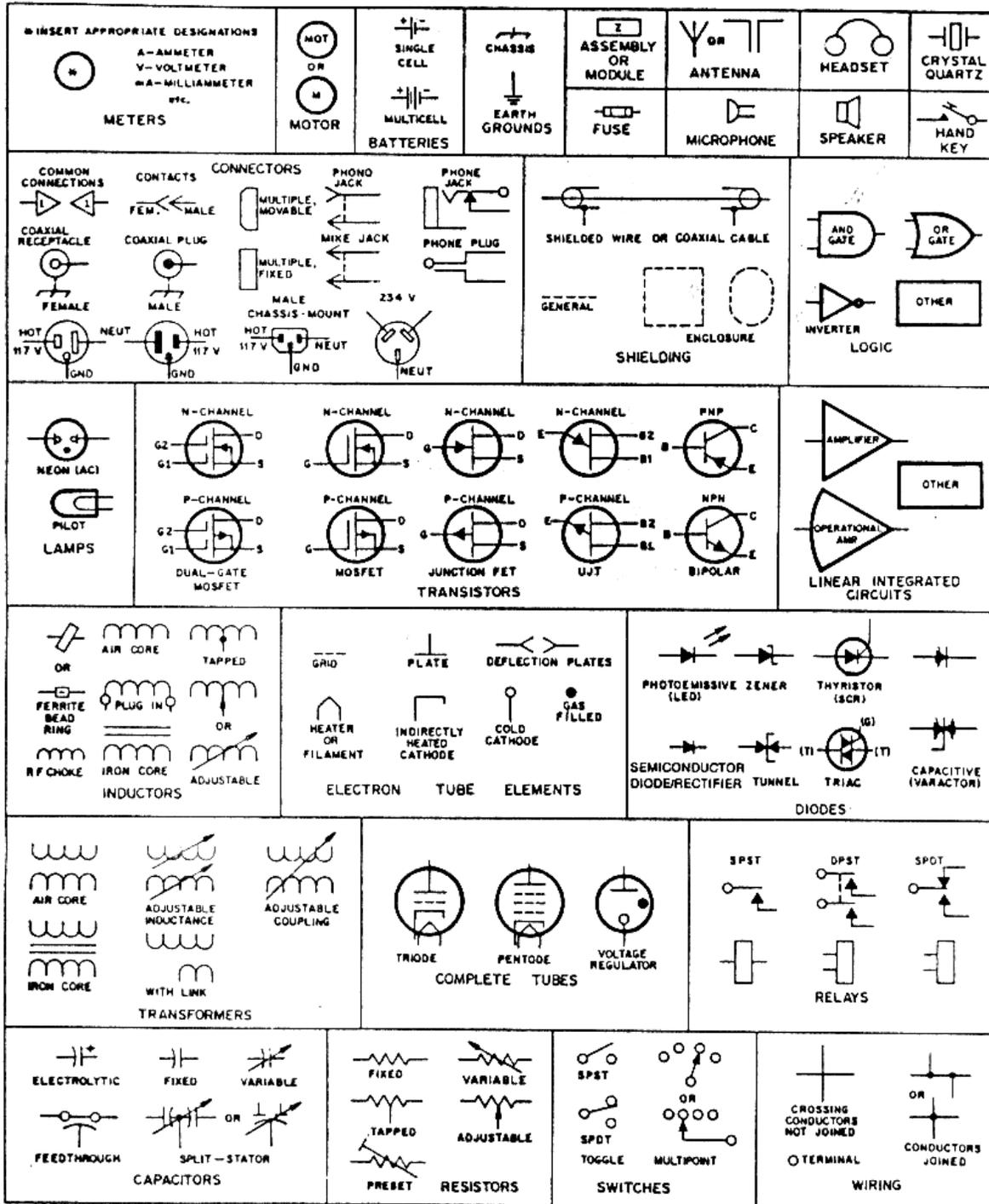
Volt (V) – The basic unit of electrical pressure or EMF.

Watt (W) – The unit of power in the metric system. The Watt describes how fast a circuit uses electrical power.

Yagi Antenna – The most popular type of amateur directional beam antenna. It has one driven element and one or more additional antennas.

Zero Beat – When two operators in a QSO are transmitting on the same frequency.

Schematic Symbols Used in Circuit Diagrams



PHONETIC ALPHABET
(International Telecommunications Union)

<u>LETTER</u>	<u>PHONETIC</u>	<u>PRONOUNCIATION</u>
A	ALPHA	AL FAH
B	BRAVO	BRAH VOH
C	CHARLIE	CHAR LEE
D	DELTA	DELL TAH
E	ECHO	ECK OH
F	FOXTROT	FOKS TROT
G	GOLF	GOLF
H	HOTEL	HOT TELL
I	INDIA	IN DEE AH
J	JULIET	JEW LEE ETT
K	KILO	KEY LOH
L	LIMA	LEE MAH
M	MIKE	MIKE
N	NOVEMBER	NOH VEM BER
O	OSCAR	OSS CAH
P	PAPA	PAH PAH
Q	QUEBEC	KEH BECK
R	ROMEO	ROW ME OH
S	SIERRA	SEE AIR RAH
T	TANGO	TANG GOH
U	UNIFORM	YOU NEE FORM
V	VICTOR	VIC TAH
W	WHISKEY	WISS KEY
X	X-RAY	ECKS RAY
Y	YANKEE	YANG KEY
Z	ZULU	ZOO LOO

Note: The **boldfaced** syllables are emphasized

This is the Standard International Phonetic Alphabet should be used at all times. It is generally used when sending your call-sign information that must be spelt out. If you want to be understood, stick to the phonetics.

Q CODES

The Q code and its proper usage must be studied and practiced. The following is a list of the most commonly used Q signals.

QRM	Interference caused by man – Your transmission is being interfered with <u>#</u> . (1-Nil; 2-Slightly; 3-Moderately; 4-Severely; 5-Extremely)
QRN	I am troubled by static <u>#</u> . (1-Nil; 2-Slightly; 3-Moderately; 4-Severely; 5-Extremely)
QRP	Decrease transmitting power
QRT	Stop sending or transmitting
QRX	Temporary stop transmitting or stand by (Please wait)
QSB	Your signal is fading
QSL	I acknowledge receipt (of your message or transmission)
QSO	I can communicate with _____ direct
QSY	Change to transmission on another frequency (or on _____ kHz)
QTH	My location is _____
QTR	The time is _____

Note: The Q signal can be turned into a question by following it with a question mark (in Morse code) or by asking it as a question when using voice transmission.

READABILITY, SIGNALS STRENGTH AND TONAL QUALITY (R-S-T)

The R-S-T Code must be fully understood. This code means in which operators can accurately tell the condition of their equipment by means of Readability, Signals Strength and Tonal Quality. However, tonal quality is primarily used when using Morse Code and refers to the purity of the signal.

READABILITY

1. Unreadable
2. Barely readable; occasional words
3. Readable with considerable difficulty
4. Readable with practically no difficulty
5. Perfectly readable

SIGNAL STRENGTH

1. Faint signals; barely perceptible
2. Very weak signals
3. Weak signals
4. Readable with practically no difficulty
5. Fairly good signals
6. Good signals
7. Moderately strong signals
8. Strong signals
9. Extremely strong signals

TONE

1. Sixty cycles or less, very rough and broad
2. Very rough ac, very harsh and broad
3. Rough ac tone, rectified by not filtered
4. Rough note, some trace of filtering
5. Filtered rectified ac, but strongly ripple-modulated
6. Filtered tone, definite trace of ripple modulation
7. Near perfect tone, trace of ripple modulation
8. Near perfect tone, slight trace of ripple modulation
9. Perfect tone, no trace of ripple or modulation of any kind

ALLOCATION OF AMATEUR RADIO PREFIXES

WESTERN HEMISPHERE

Anguilla	VP2E	Guatemala	TG
Antigua & Barbuda	V2	Guyana	8R
Argentina	LU	Haiti	HH
Aruba	P4	Honduras	HR
Bahamas	C6	Jamaica	6Y
Barbados	8P	Martinique	FM
Belize	V3	Mexico	XE, XF
Bermuda	VP9	Montserrat	VP2M
Bolivia		Nicaragua	YN
Bonaire		Panama	HP
Brazil	PP – PY	Paraguay	ZP
British Virgin Islands		Peru	OA
Canada	VE	Puerto Rico	KP4, WP4, NP4
Cayman Islands	ZF	St. Lucia	J6
Chile		St. Martin	FS
Colombia	HK	St. Kitts & Nevis	V4
Costa Rica	TI	St. Vincent & Grenadines	J3
Cuba	CM, CO	Suriname	PZ
Curacao		Trinidad & Tobago	9Y
Dominica	J7	Turks & Caicos Islands	VP5
Dominican Republic	HI	United Nation	4U
Ecuador	HC	United States of America	AA – AL
El Salvador	YS	US Virgin Islands	KP2, WP2, NP2
French Guyana	FY	Uruguay	CX
Grenada	J3	Venezuela	YV
Guadeloupe	FG		

RESOURCES

- American Radio Relay League www.arrl.org
- Ham Radio www.hamrad.com
- Ham Radio Online www.hamradio-online.com
- International Amateur Radio Union www.iaru.org
- www.ham.org www.ham.org
- National Radio Club Inc. DX Audio Service www.nrcdxas.org
- Amateur Radio & DX Reference Guide www.ac6v.com
- The DX Zone Guide to the Amateur Radio World www.dxzone.com
- Amateur Radio Resources <http://hamster.ivey.uwo.ca/~amsoft/amsoft0.htm>
- ArtSci Publications www.artscipub.com
- Amateur Radio Newslines www.arnewslines.org
- Amateur Radio Trader www.amradiotrader.com
- Amateur Radio World www.mindspring.com/~jjwein/arworld/arwindex.html
- CQ – Radio Amateur’s Journal www.cq-amateur-radio.com
- Electronic Experimenter’s Journal www.dxdestop.com/eej/eejhome.htm/
- Ham Radio Online Magazine www.hamradio-online.com
- World Radio Magazine www.wr6wr.com