



HAM RADIO

What's it all about?



ELECTROMAGNETIC SPECTRUM

LF – Low Frequency – 30 kHz to 300 kHz

One Ham Band soon

MF – Medium Frequency – 300 kHz to 3 MHz.

Two Ham Bands (160 m + one soon).

HF – High Frequency – 3 MHz to 30 MHz.

Nine Ham Bands – 80 to 10 m.

VHF – Very High Frequency – 30 MHz to 300 MHz.

Three Ham Bands – 6, 2, 1-1/4 m.

UHF – Ultra High Frequency – 300 MHz to 3 GHz.

Four Ham Bands

Above UHF to Light and beyond – As far as Ham Radio, this is mostly still for advanced experimenting.



What ham bands do we use:

MF – 160 Meters – 1.8 MHz

HF

VHF

UHF



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VHF

UHF



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50-54, 144-148 and 222-225 MHz

UHF



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420 MHz (highest most use) to 2300 MHz



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← On the chart shows Novice/Tech HF Privileges

US Amateur Radio Bands

US AMATEUR POWER LIMITS

FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

Effective Date
March 5, 2012

Published by:
ARRL AMATEUR RADIO®
www.arrl.org
225 Main Street, Newington, CT USA 06111-1494

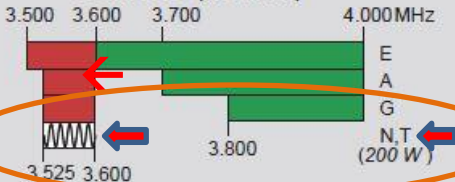


160 Meters (1.8 MHz)

Avoid interference to radiolocation operations from 1.900 to 2.000 MHz



80 Meters (3.5 MHz)

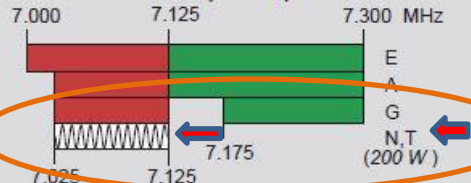


60 Meters (5.3 MHz)



General, Advanced, and Amateur Extra licensees may operate on these five channels on a secondary basis with a maximum effective radiated output of 100 W PEP. Permitted operating modes include upper sideband voice (USB), CW, RTTY, PSK31 and other digital modes such as PACTOR III as defined by the FCC Report and Order of November 18, 2011. USB is limited to 2.8 kHz centered on 5332, 5348, 5358.5, 5373 and 5405 kHz. CW and digital emissions must be centered 1.5 kHz above the channel frequencies indicated above. Only one signal at a time is permitted on any channel.

40 Meters (7 MHz)



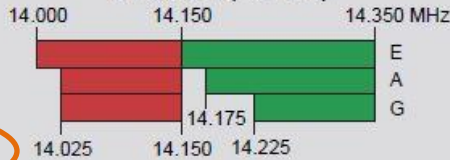
Phone and Image modes are permitted between 7.075 and 7.100 MHz for FCC licensed stations in ITU Regions 1 and 3 and by FCC licensed stations in ITU Region 2 West of 130 degrees West longitude or South of 20 degrees North latitude. See Sections 97.305(c) and 97.307(f)(11). Novice and Technician licensees outside ITU Region 2 may use CW only between 7.025 and 7.075 MHz and between 7.100 and 7.125 MHz. 7.200 to 7.300 MHz is not available outside ITU Region 2. See Section 97.301(e). These exemptions do not apply to stations in the continental US.

30 Meters (10.1 MHz)

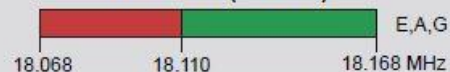
Avoid interference to fixed services outside the US.



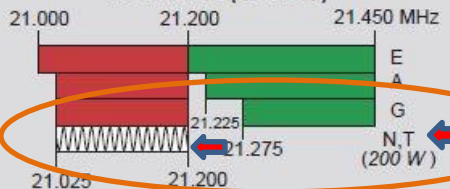
20 Meters (14 MHz)



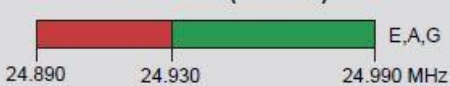
17 Meters (18 MHz)



15 Meters (21 MHz)



12 Meters (24 MHz)



10 Meters (28 MHz)



6 Meters (50 MHz)



2 Meters (144 MHz)



1.25 Meters (222 MHz)



*Geographical and power restrictions may apply to all bands above 420 MHz. See *The ARRL Operating Manual* for information about your area.

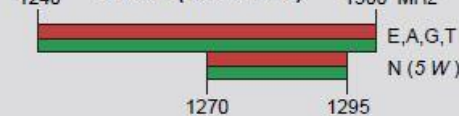
70 cm (420 MHz)*



33 cm (902 MHz)*



23 cm (1240 MHz)*



All licensees except Novices are authorized all modes on the following frequencies:

2300-2310 MHz	10.0-10.5 GHz *	122.25-123.0 GHz
2390-2450 MHz	24.0-24.25 GHz	134-141 GHz
3300-3500 MHz	47.0-47.2 GHz	241-250 GHz
5650-5925 MHz	76.0-81.0 GHz	All above 275 GHz

* No pulse emissions

KEY

Note:
CW operation is permitted throughout all amateur bands.

MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz. Test transmissions are authorized above 51 MHz, except for 219-220 MHz

- = RTTY and data
- = phone and image
- = CW only
- = SSB phone
- = USB phone, CW, RTTY, and data
- = Fixed digital message forwarding systems only

- E = Amateur Extra
- A = Advanced
- G = General
- T = Technician
- N = Novice

See *ARRLWeb* at www.arrl.org for detailed band plans.

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HAM RADIO Terms we use:

SSB

FM

CW

DIGITAL MODES



HAM RADIO Terms we use:

**SSB – Single Sideband – Voice mode used
on all bands (except 30 Meters)**

FM

CW

DIGITAL MODES



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**FM – Frequency Modulation – Voice Mode
used for repeaters and simplex**

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CW – Morse Code

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**DIGITAL MODES – RTTY, PSK31, JT65, JT9, FT8,
PACKET and many more**



SSB – Single Sideband voice mode

Upper sideband 20 Meters and up + 60 M

Lower sideband 40, 80 and 160 M

USB-D – Upper sideband/DIGITAL on many rigs takes computer audio into a different input in the rig bypassing the microphone preamp and thus eliminating distortion



FM – Frequency Modulation

Voice Mode

Used on 10 Meters (high end of band)

Used on simplex frequencies or split

Used on repeaters –10M, 6M, 2M, and up



CW – used on every band

CW stands for Continuous Wave which is keyed on and off to send Morse code.

It can be sent by hand – straight key

It can be sent using electronic keyers

It can be computer generated



DIGITAL MODES: (Keyboard modes)

RTTY – RADIO TELETYPE – Typing where the radio sends the message by shifting frequencies. Upper case and numbers.

PSK31 – Phase Shift Keying where the typing has upper and lower case and more characters than just letters & numbers



Joe Taylor, Steven Franke and Bill Sommerville developed new DIGITAL modes designed for weak signal work:

JT65 and JT9 – 1 minute long TX then

1 minute to receive reply

Used on MF, HF, 6 Meters

and (JT65 only) for EME

FT8 Like JT modes but only 15 seconds

for each transmission – 4x as fast but

a bit less sensitive – used on MF, HF

and 6 Meters.



Ham Terminology:



Simplex – Transmit and receive on the SAME Frequency

**Split – Transmit and receive on different frequencies
(Offset defines the split used for repeaters)**

Doubling – 2 stations talking at the same time on the same frequency and neither is understood.

**Report – “59” on HF voice; “Full Quieting” on repeater
Your signal only goes to the repeater, not the other ham**

Rig – Your transceiver (e.g. Icom 7100, Yaesu ...)



Ragchew – Just chatting with someone

Working DX – Can be any station anywhere. Usually considered a station outside your own country.

Can be another county or state for awards purposes.

Contesting – A set time period 2 hours, 8 hours, 24 hours or more where the goal is to contact as many stations in as many areas as possible.

Points are given for each contact and

Multipliers are collected by area, country, etc.

Total score is usually Points x Multipliers.

Each contest has a given report expected which usually relates to the multipliers for that contest.



“Q” SIGNALS



QRZ? – Who is calling me?

QRM – Man made interference (Line Noise)

or stations near or on your frequency

QRN – Natural interference (static crashes, etc.)

QRG – Your Frequency

QRT – I am shutting down

QRX – Standby

QSY – Change Frequency

QTH – Location

QSO – Contact (Talking to someone on the air)

QSL – Confirm contact



Calling CQ:

[First ask, “Is this frequency clear”; QRL? on CW]

3 groups of 3 CQs

Then “This is – (your call sign)” 3 times

Then “Standing by” (or Listening)

Don’t call CQ on repeaters, just give your call sign and comment that you are on that frequency. Someone might have multiple radios on.



Parts of your station:

**Rig – Your transceiver, handheld radio, mobile radio, etc.
(including your microphone, key, and keyer, etc)**

Power Amplifier – takes 10/100W to up to 1500 watts

Power supply or battery charger

SWR/power /watt meter

Antenna tuner – manual or automatic

**Antenna – The MOST important part of the station
(speaker/Audio Amp; go cart tires/Dragster)**



LOGGING:

Keep track of your QSOs (contacts)

Log a contest so you can send it in

Award tracking

There are specific logging programs

General logging: Logger 32, DXLabs, Ham Radio Deluxe

Contest logging: N1MM+, Win-Test, Squirrel



Other Modes:

APRS – Location tracking

EME – Moonbounce

SSTV – Slow Scan TV

HAM TV – Fast Scan Television

Satellite Communication

Talk to the Space Station (ISS)

Store and forward messages

FM repeaters

Linear Transponders (SSB/CW)



SSTV PICTURE COPIED FROM THE ISS



QSL CARD FOR QSO ON NEXT ORBIT

W5KWQ
The Second Generation of Ham Radio in Space
From the ISS on a Kenwood D700 via NA1SS & RS0ISS

Richard Garriott
8207 Two Coves
Austin Texas 78730
rgarriott@britanniamanor.com

Owen Garriott
WSLFL
STS 9 / Spacelab 1
November 28-December 8, 1983

QSO With:
W6BXQ

Richard Garriott
W5KWQ
Soyuz TMA 13 / ISS / TMA 12
October 12-24, 2008

These were both on 2 Meter FM



ACTIVITIES:

Radio Clubs – Club activities

Teaching classes and VE Testing

Public Service – Boat Parade, Marathons, Bike Races, etc.

ARES/RACES – Neighborhood Watch, Emergency Communications

