



Chapter 2: Procedures, Practices, Modes

Basic HF Operating
Digital Modes
Emergency Operation



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HF Operating Basics

HF operating practices differ from VHF:

- No repeaters. Simplex operation.
- VFO operation – no fixed channel frequencies and VFO step sizes very small – 1Hz, 10Hz, 100Hz
- Calling CQ to make contacts
- Crowded bands, QRM and heterodynes
- QRN (Noise) from weather and geomagnetics.
- Squelch is not usually employed.
- Propagation causes fading and skip zones.
- Voice and Digital modes in separate sub-bands.



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HF Operating Practices

Selecting a frequency (or band).

- Listen – a lot – first.
- Ask “Is the frequency in use?”
- Move several KHz away from existing QSO.

Operate on a band suitable for desired distance.

Join an existing Net or QSO.

Stay within the sub band for your license.

Avoid the band edges.



HF Band Plans

FCC rules divide HF bands by modes and license class.

- Amateur groups have created voluntary plans for frequency usage.
- ARRL publishes a band plan for all bands.
- FCC considers band plans part of “good practice”.
- Use them as guidelines for cooperation.



Interference Management

QRM on HF is not always intentional.

- Harmful interference is defined in FCC rules and is not always illegal or intentional, but must be fixed.
- Malicious, deliberate, or willful interference – “Jamming” – is a violation of FCC rules.

QRM is normal on crowded bands.

Avoid interference by careful operating.

Change frequencies or bands or schedules.

Don't reward jammers by talking about them.



Modes used on HF

HF modes aren't much different than VHF

- CW is used more on HF than on VHF.
- Phone operation is usually SSB.
- FM is allowed only above 29 MHz.
- AM (with carrier) still has some popularity.
- Digital signals on HF are usually sent by SSB.
 - RTTY, PSK31
 - PACTOR, AMTOR, Packet
 - SSTV, FAX



HF Receivers

HF receivers usually have features for all modes with more operator controls and menus.

- VFO(s) adjust in steps of 1, 10, 100 Hz
- Ham bands only or General Coverage
- Selectivity to reject adjacent frequencies.
- Sensitivity and strong signal rejection
- USB, LSB, CW, RTTY, AM
- Filters and DSP
- Band Scope displays



HF Transceivers

Transmitter is combined with the receiver and is capable of the same modes and filter bandwidths.
Some common features:

- Power output of 100W PEP
- Linear Amplifiers up to 1500W PEP
- Speech Processing and Compression.
- Antenna tuner.
- PTT) or VOX
- Split frequency operation



Procedures and Abbreviations

Phone procedures not much different than VHF

- Calling CQ and answering CQs
- Using Q signals: QRM, QSB, QSL, QTH, QSY, etc.
- Signal Reporting: “5-9” or “Loud and Clear”

CW operators use a lot of abbreviations and Q signals.

- QRS, QRQ, QRU, QRV, QRZ
- Prosigns: K, KN, R, AR, SK, CL,
- Abbreviations: DE, ES, WX, DX, TU, CUL, ...

RTTY and PSK op's use many CW prosigns.



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Digital Modes on HF

Digital signals are restricted to CW/Data segments of HF bands. They usually follow the band plans.

- CW at the bottom of the segment (but CW is “legal” everywhere). PSK, RTTY, PACTOR at the top.
- PSK ops usually cluster at “waterholes” like 14.070 MHz. near the data and RTTY segments
- Digital modems can reject CW signals but CW ops usually avoid data segments.
- Digital not permitted on 60 Meters.



Some HF Digital Modes

RTTY

- Narrow shift direct printing using Baudot code
- Invented for mechanical printers but most hams now use computer software.

PACTOR / WINMOR

- Use error correction to overcome noise
- Suited to sending email through gateways.

PSK31

- Slow sending rate like RTTY – 31.25 baud
- Suited for keyboard to keyboard messaging.



Other HF Digital Modes

MFSK16 – 16 tones simultaneously

MT63 – 64 tones simultaneously. Uses DSP.

WSJT, JT44, JT65 – JT stands for Joe Taylor,

- WSPR – “Whisper” – Weak Signal Propagation Reporting
- DSP encoded and decoded using time reference
- Used for meteor scatter and moonbounce
- JT8 – short messages; callsign and grid square

Hellschreiber – Images of text. Sent like Fax.



Emergency Operations

Emergency comm's take priority over all other types of Amateur comm's. You should know what you can do before you have to do it.

- All other operators on a frequency must stand by and wait when the frequency is being used for emergency communications.
- Assisting news media in emergencies is only OK when directly related to safety of human life or protection of property and only where no other communication method is available.



Amateur Radio Emergency Service

ARES – Organized by the American Radio Relay League (ARRL)

- Provides communications support for local and regional agencies – Red Cross, Salvation Army, Weather Service, etc.
- Organized by ARRL Divisions and Sections down to counties and communities.
- ARRL members appointed to leadership positions by ARRL Section Managers.
- Any licensed amateur may participate.
- Not part of government but may assist FEMA.



Radio Amateur Civil Emergency Service

RACES is part of the Amateur Service defined and governed by FCC rules in Part 97.407.

- Provide communications for civil defense purposes during civil emergencies.
- RACES operates under the direction of a Civil Defense organization.
- Sponsored by FEMA and administered by government agencies.
- RACES control operators must be licensed amateurs.
- RACES stations may participate in drills with government agencies.



Responding to Distress Calls

React to calls for help and try to obtain assistance for the station in distress.

- Acknowledge calls for help on amateur frequencies. In some cases, it may be legal to transmit on non-amateur frequencies.
- Determine the location of the emergency and the type of assistance requested.
- Relay information to proper authorities.
- Stay on frequency and in contact for further information or until help arrives.



Making a Distress Call

On voice, say “Mayday, Mayday, Mayday”. On CW, send “SOS SOS SOS” (SOS is sent as one symbol: “di di dit dah dah dah di di dit” followed by a pause.)

- Identify with your callsign.
- Give your location and assistance required.

FCC rules allow you to use “any means ... at your disposal” as long as the emergency exists.

BUT, you may be in violation of other laws.

