

THE ARRL

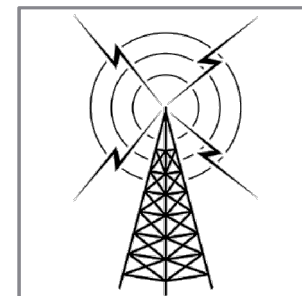
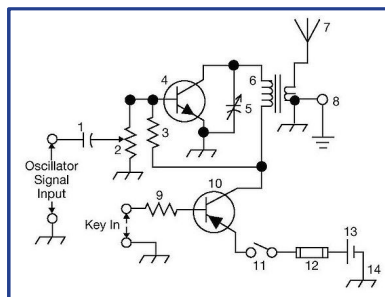
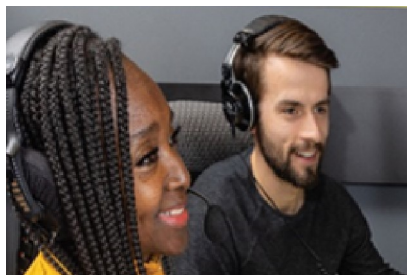
TENTH EDITION

# GENERAL CLASS

## LICENSE COURSE

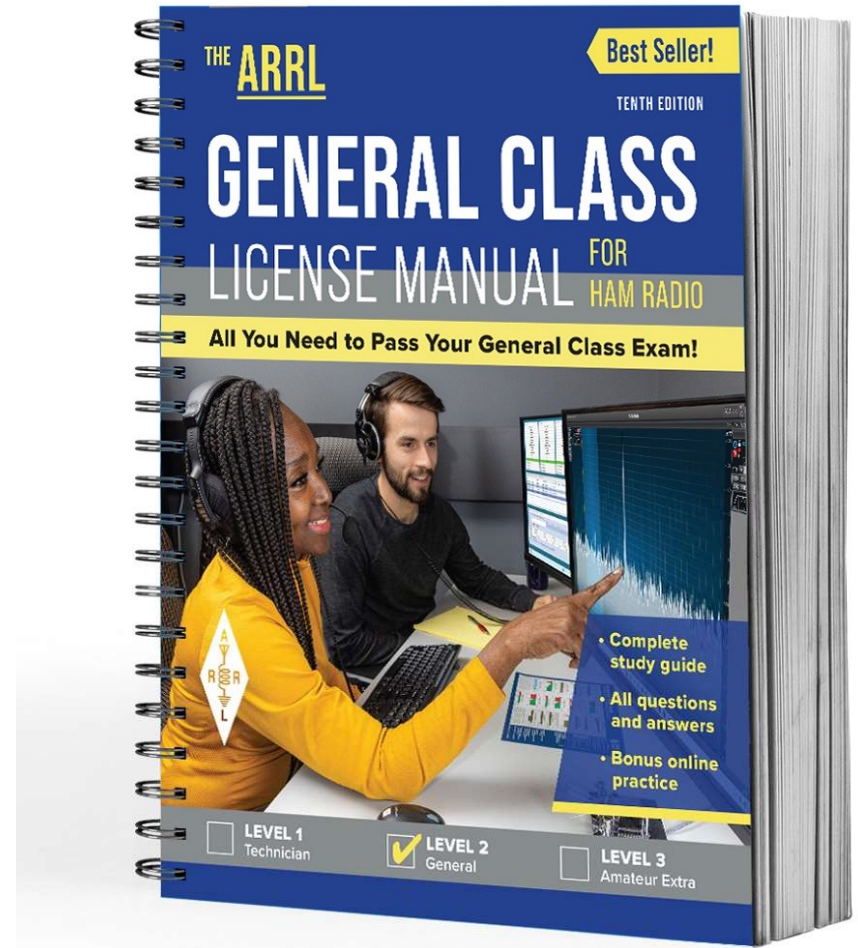
FOR  
HAM RADIO

**All You Need to Pass Your General Class Exam!**



# Resource & Reference

[www.arrl.org/shop/Licensing-Education-and-Training](http://www.arrl.org/shop/Licensing-Education-and-Training)



# Chapter 3 Part 1 of 1

ARRL General Class  
Sections 3.1, 3.2, 3.3, 3.4




Regulatory Agencies, Amateur Licensing Rules, Control Operator  
Privileges & Rules, Technical Rules & Standards

# Section 3.1

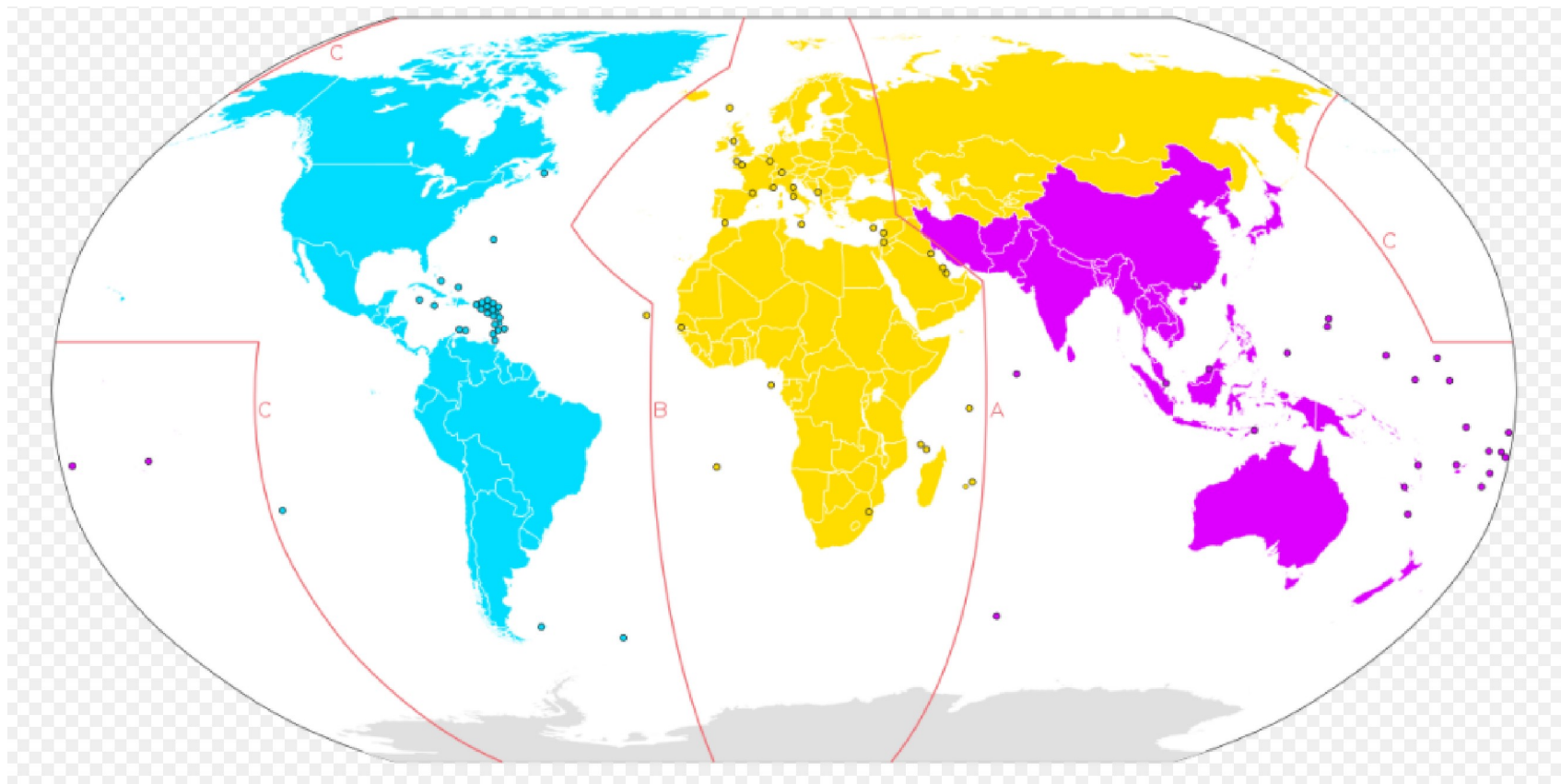
## Regulatory Agencies

- ITU: International Telecommunication Union
  - Responsible for all international radio regulations
    - Each country decides how to administer & implement regulations
    - Countries may impose additional regulations (as long as they don't conflict with ITU rules)
  - 3 administrative regions (next slide)
  - Individual regions have their greatest effect on amateurs in frequency allocations, and individual country allocations can also vary

# ITU Regions

- REGION 1 
- REGION 2 
- REGION 3 

*North & South  
America, Alaska,  
Hawaii, and most US  
territories are in  
Region 2.*



# Regulatory Agencies (cont.)

- FCC: Federal Communication Commission
  - Governed by Electronic Code of Federal Regulations Part 97
    - [www.arrl.org/part-97-amateur-radio](http://www.arrl.org/part-97-amateur-radio)
  - Charged with writing and administering rules for US amateurs
  - FCC jurisdiction includes all US states, possessions, territories, and US-flagged vessels in international waters
    - This includes some US territories in Region 3 (American Samoa, Guam, etc.). These have the same rules as amateurs in Region 2.

# FCC Volunteer Monitoring Program

- Amateur Radio Service is self-policing
- ARRL created the Amateur Auxiliary in 1982 so amateurs could assist FCC with enforcement (Official Observers) and interference issues (Local Interference Committees)
- Official Observer Program changed to Volunteer Monitoring Program (VMP) in 2018 ... Goals: *self-regulation* & *compliance*
- VMP made up of volunteer amateurs, monitoring airwaves for rules violations

## VMP (cont.)

- Training activities for *monitoring* include ...
  - Foxhunting
  - Radio direction-finding (RDF)
  - Used for quickly locating hidden transmitters
  - Volunteer monitors might use these skills to locate stations violating FCC rules, intentionally or not
- More information ...
  - [www.homingin.com](http://www.homingin.com)



# Regulatory Agencies (cont.)

- FAA: Federal Aviation Administration
  - FAA has jurisdiction over antenna structures more than 200 ft. high and within 4 miles of a public use airport or heliport
  - Must register such structures with FCC (to avoid aircraft hazards)
- Local Building Authorities
  - Local building codes may apply to towers & antennas
    - FCC Rule PRB-1: Amateur Service communications must be reasonably accommodated ... regulations must be the minimum practical and have legitimate purpose

# PRACTICE QUESTIONS

What is the maximum height above ground for an antenna structure not near a public use airport without requiring notification to the FAA and registration with the FCC?

- A. 50 feet
- B. 100 feet
- C. 200 feet
- D. 250 feet

## Under what conditions are state and local governments permitted to regulate amateur radio antenna structures?

- A. Under no circumstances, FCC rules take priority
- B. At any time and to any extent necessary to accomplish a legitimate purpose of the state or local entity, provided that proper filings are made with the FCC
- C. Only when such structures exceed 50 feet in height and are clearly visible 1,000 feet from the structure
- D. Amateur Service communications must be reasonably accommodated, and regulations must constitute the minimum practical to accommodate a legitimate purpose of the state or local entity

When operating a US station by remote control from outside the country, what license is required of the control operator?

- A. A US operator/primary station license
- B. Only an appropriate US operator/primary license and a special remote station permit from the FCC
- C. Only a license from the foreign country, as long as the call sign includes identification of portable operation in the US
- D. A license from the foreign country and a special remote station permit from the FCC

When operating a station in South America by remote control over the internet from the US, what regulations apply?

- A. Those of both the remote station's country and the FCC
- B. Those of the remote station's country and the FCC's third-party regulations
- C. Only those of the remote station's country
- D. Only those of the FCC

The frequency allocations of which ITU region apply to radio amateurs operating in North and South America?

- A. Region 4
- B. Region 3
- C. Region 2
- D. Region 1

## What is the Volunteer Monitor Program?

- A. Amateur volunteers who are formally enlisted to monitor the airwaves for rules violations
- B. Amateur volunteers who conduct amateur licensing examinations
- C. Amateur volunteers who conduct frequency coordination for amateur VHF repeaters
- D. Amateur volunteers who use their station equipment to help civil defense organizations in times of emergency



## Which of the following are objectives of the Volunteer Monitor Program?

- A. To conduct efficient and orderly amateur licensing examinations
- B. To provide emergency and public safety communications
- C. To coordinate repeaters for efficient and orderly spectrum usage
- D. To encourage amateur radio operators to self-regulate and comply with the rules

What procedure may be used by Volunteer Monitors to localize a station whose continuous carrier is holding a repeater on in their area?

- A. Compare vertical and horizontal signal strengths on the input frequency
- B. Compare beam headings on the repeater input from their home locations with that of other Volunteer Monitors
- C. Compare signal strengths between the input and output of the repeater
- D. All these choices are correct

# Section 3.2

## Amateur Licensing Rules

- Volunteer Examiner Rules
  - Volunteer licensing program is administered by *Volunteer Examiner Coordinators* (VECs)
  - VECs have agreements with FCC to coordinate examinations
  - VE accreditation requirements
    - Be accredited by a VEC
    - Be at least 18 years of age
    - Hold a General class or higher license
    - Have never had your license suspended or revoked
    - Pass a multiple-choice, open-book exam

- *No cost!*
- *Allows you to administer exams*

# Examination Rules

- Rules listed in FCC §97.509
- Exams sessions coordinated by a VEC
- Exams administered by three (3) accredited VEs
  - VEs must hold necessary license class
    - General class may administer Technician (Element 2) exams
    - Advanced class ... General (Elem 3) and Technician (Elem 2)
    - Amateur Extra class ... Amateur Extra (Elem 4), General (Elem 3), Tech (Elem 2)

## Exam Rules (cont.)

- Those passing receive a Certificate of Successful Completion
- CSCE good for 365 days ... use the CSCE until your new license arrives from FCC (or listed in FCC database)
- You may use all General class privileges as soon as receive the CSCE. As long as you have a call sign in the FCC database, you don't need to wait for the FCC update.
  - But, add an *indicator* to your call sign!
    - Using voice, say “*slash AG*” ... CW or digital modes, add “*/AG*”

# Sample CSCE

American Radio Relay League VEC Certificate of Successful Completion of Examination		ARRL The national association for AMATEUR RADIO	NOTE TO VE TEAM: COMPLETELY CROSS OUT ALL BOXES BELOW THAT DO NOT APPLY TO THIS CANDIDATE.
Test Site (City/State): <u>Newington, CT</u> Test Date: <u>1/23/19</u>		The applicant named herein has presented valid proof for the exam element credit(s) indicated below. Element 3 credit Element 4 credit	
CREDIT for ELEMENTS PASSED VALID FOR 365 DAYS You have passed the written element(s) indicated at right. Your will be given credit for the appropriate examination element(s), for up to 365 days from the date shown at the top of this certificate.		EXAM ELEMENTS EARNED  Passed written Element 3  Passed written Element 4	
LICENSE UPGRADE NOTICE If you also hold a valid FCC-issued Amateur radio license grant, this Certificate validates temporary operation with the operating privileges of your new operator class (see Section 97.9[b] of the FCC's Rules) until you are granted the license for your new operator class, or for a period of 365 days from the test date stated above on this certificate, whichever comes first.		NEW LICENSE CLASS EARNED  TECHNICIAN GENERAL VEEP NONE	
LICENSE STATUS INQUIRIES You can find out if a new license or upgrade has been "granted" by the FCC. For on-line inquiries see the FCC Web at <a href="http://wireless.fcc.gov/uls/">http://wireless.fcc.gov/uls/</a> ("Click on Search Licenses" button), or see the ARRL Web at <a href="http://www.arrl.org/fcc/search">http://www.arrl.org/fcc/search</a> ; or by calling FCC toll free at 888-225-5322; or by calling the ARRL at 1-860-594-0300 during business hours. Allow 15 days from the test date before calling.			
THIS CERTIFICATE IS NOT A LICENSE, PERMIT, OR ANY OTHER KIND OF OPERATING AUTHORITY IN AND OF ITSELF. THE ELEMENT CREDITS AND/OR OPERATING PRIVILEGES THAT MAY BE INDICATED IN THE LICENSE UPGRADE NOTICE ARE VALID FOR 365 DAYS FROM THE TEST DATE. THE HOLDER NAMED HEREON MUST ALSO HAVE BEEN GRANTED AN AMATEUR RADIO LICENSE ISSUED BY THE FCC TO OPERATE ON THE AIR.			
Candidate's Signature <u>Amanda Grimaldi</u> Call Sign <u>N1NHL</u> (If none, write none)		VE #1 <u>Maria Somma</u> <u>AB1FM</u> Signature Call Sign	
Candidate's Name <u>Amanda Grimaldi</u>		VE #2 <u>Steve Civald</u> <u>WV1X</u> Signature Call Sign	
Address <u>225 main Street</u>		VE #3 <u>Perry Keen</u> <u>WV50</u> Signature Call Sign	
City <u>Newington</u> State <u>CT</u> ZIP <u>06111</u>		COPIES: WHITE-Candidate, YELLOW-VE Team, PINK-ARRL VEC MVE 07/2015	

Figure 3.2 — The CSCE (Certificate of Successful Completion of Examination) is your test session receipt that serves as proof that you have completed one or more exam elements. It can be used at other test sessions for 365 days.

# Credit for Previous Licenses

- As of 2019, amateurs with expired licenses may receive credit for exam elements passed. Specifically ...
  - If you pass Element 2 (tech) exam, and provide documentation for previously-held General, Advanced, or Amateur Extra licenses, you will be credited with having passed those written exam elements

# PRACTICE QUESTIONS



## Who may receive partial credit for the elements represented by an expired Amateur Radio license?

- A. Any person who can demonstrate that they once held an FCC-issued General, Advanced, or Amateur Extra class license that was not revoked by the FCC
- B. Anyone who held an FCC-issued Amateur Radio license that has been expired for not less than 5 years and not more than 15 years
- C. Any person who previously held an amateur license issued by another country, but only if that country has a current reciprocal licensing agreement with the FCC
- D. Only persons who once held an FCC issued Novice, Technician, or Technician Plus license

What license examinations may you administer as an accredited Volunteer Examiner holding a General class operator license?

- A. General and Technician
- B. None, only Amateur Extra class licensees may be accredited
- C. Technician only
- D. Amateur Extra, General, and Technician

On which of the following band segments may you operate if you are a Technician class operator and have an unexpired Certificate of Successful Completion of Examination (CSCE) for General class privileges?

- A. Only the Technician band segments until your upgrade is posted in the FCC database
- B. Only on the Technician band segments until you have a receipt for the FCC application fee payment
- C. On any General or Technician class band segment
- D. On any General or Technician class band segment except 30 meters and 60 meters

Who must observe the administration of a Technician class license examination?

- A. At least three Volunteer Examiners of General class or higher
- B. At least two Volunteer Examiners of General class or higher
- C. At least two Volunteer Examiners of Technician class or higher
- D. At least three Volunteer Examiners of Technician class

Until an upgrade to General class is shown in the FCC database, when must a Technician licensee identify with “AG” after their call sign?

- A. Whenever they operate using General class frequency privileges
- B. Whenever they operate on any amateur frequency
- C. Whenever they operate using Technician frequency privileges
- D. A special identifier is not required if their General class license application has been filed with the FCC

## Volunteer Examiners are accredited by what organization?

- A. The Federal Communications Commission
- B. The Universal Licensing System
- C. A Volunteer Examiner Coordinator
- D. The Wireless Telecommunications Bureau

Which of the following criteria must be met for a non-U.S. citizen to be an accredited Volunteer Examiner?

- A. The person must be a resident of the U.S. for a minimum of 5 years
- B. The person must hold an FCC granted Amateur Radio license of General class or above
- C. The person's home citizenship must be in ITU region 2
- D. None of these choices is correct; a non-U.S. citizen cannot be a Volunteer Examiner

How long is a Certificate of Successful Completion of Examination (CSCE) valid for exam element credit?

- A. 30 days
- B. 180 days
- C. 365 days
- D. For as long as your current license is valid



What is the minimum age that one must be to qualify as an accredited Volunteer Examiner?

- A. 16 years
- B. 18 years
- C. 21 years
- D. There is no age limit

What action is required to obtain a new General class license after a previously held license has expired and the two-year grace period has passed?

- A. They must have a letter from the FCC showing they once held an amateur or commercial license
- B. There are no requirements other than being able to show a copy of the expired license
- C. Contact the FCC to have the license reinstated
- D. The applicant must show proof of the appropriate expired license grant and pass the current Element 2 exam

# Section 3.3

## Control Operator Privileges & Rules

- With so many new privileges, keep a reference handy (next slide)
  - When you tune bands, check to make sure you're within the proper segment before transmitting (*several questions on this*)
- Generals have FULL privileges on 160, 60, 30, 17, 12, and 10 meters
  - There are portions of 80, 40, 20, and 15 meters where Generals cannot transmit
- Repeater operation on HF is limited on 10 meters from 29.6 to 29.7 MHz
- Two HF bands have special regulations ...
  - 60 meters only permit *channelized operation* on USB, CW, and certain digital modes with power limit of 100 V ERP (effective radiated power)
  - 30 meters permit only CW, RTTY, and data signals with limit of 200 W PEP

# US Amateur Radio Bands

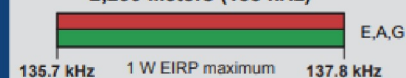
**US AMATEUR POWER LIMITS** — FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.



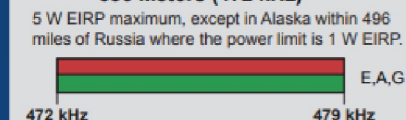
**ARRL** The national association for AMATEUR RADIO®

Amateurs wishing to operate on either 2,200 or 630 meters must first register with the Utilities Technology Council online at <https://utc.org/plc-database-amateur-notification-process/>. You need only register once for each band.

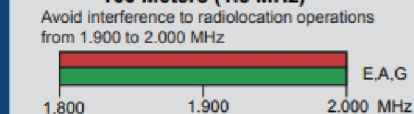
## 2,200 Meters (135 kHz)



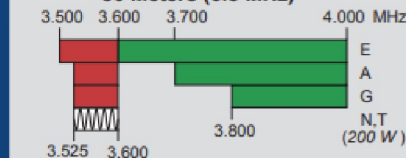
## 630 Meters (472 kHz)



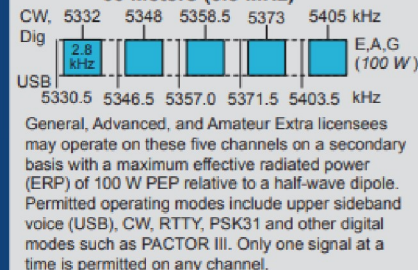
## 160 Meters (1.8 MHz)



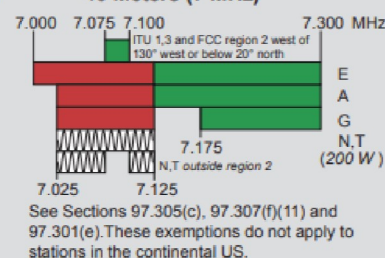
## 80 Meters (3.5 MHz)



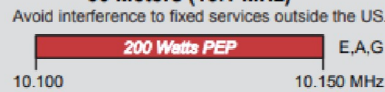
## 60 Meters (5.3 MHz)



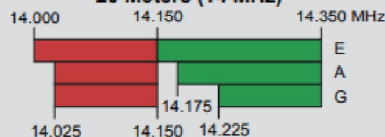
## 40 Meters (7 MHz)



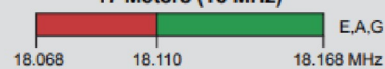
## 30 Meters (10.1 MHz)



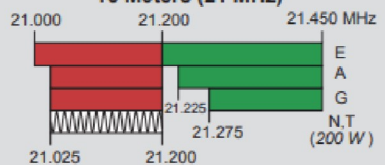
## 20 Meters (14 MHz)



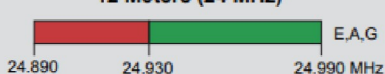
## 17 Meters (18 MHz)



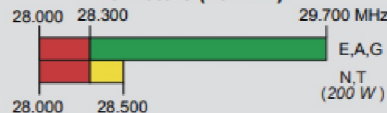
## 15 Meters (21 MHz)



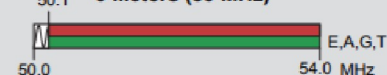
## 12 Meters (24 MHz)



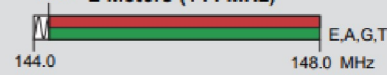
## 10 Meters (28 MHz)



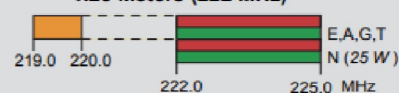
## 6 Meters (50 MHz)



## 2 Meters (144 MHz)

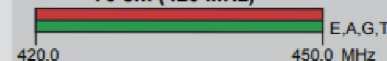


## 1.25 Meters (222 MHz)

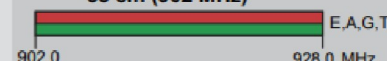


\*Geographical and power restrictions may apply to all bands above 420 MHz. See The ARRL Operating Manual for information about your area.

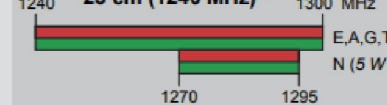
## 70 cm (420 MHz)\*



## 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](http://www.arrl.org) for detailed band plans.

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email: [newham@arrl.org](mailto:newham@arrl.org)

Exams: 860-594-0300 email: [vec@arrl.org](mailto:vec@arrl.org)

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## FREQUENCY PRIVILEGES

[www.arrl.org/graphical-frequency-allocations](http://www.arrl.org/graphical-frequency-allocations)

# Control Operator Privileges & Rules (cont.)

- In some bands, amateurs share access with other services
  - Called *secondary amateur allocations* (*primary services* have priority); the amateur station must clear the frequency
  - Hams are not allowed to contact the primary service
    - Example: Hams share part of the 13-cm spectrum with Wi-Fi channels, but amateurs may not communicate with unlicensed Wi-Fi stations
- Amateurs are required to take special steps to mitigate interference in the following circumstances ...
  - Operating within one mile of an FCC Monitoring Station
  - Transmitting spread spectrum (SS) emissions
  - Using a band where the Amateur Service is secondary

# Beacons

- Used for observation of propagation and reception and related activities
- Useful on HF, VHF, and UHF bands
- Beacon rules contained in §97.203 ... most important ones ...
  - No more than one signal in the same band from a single location
  - Limited to 100 W PEP output
- Only HF band where automatically controlled beacons can operate: 28.2 to 28.3 MHz
- Avoid transmitting on international beacon frequencies operated by Northern California DX Foundation ([www.ncdxf.org](http://www.ncdxf.org))

# Summary of Amateur HF Bands (Table 3.2)

WAVELENGTH (meters)	FREQUENCY (MHz)
160	1.800 – 2.00
80 and 75	3.500 – 3.600 and 3.600 – 4.000
60	5.3305, 5.3465, 5.3570, and 5.4035 (USB carrier frequency)
40	7.000 – 7.300
30	10.100 – 10.150
20	14.000 – 14.350
17	18.068 – 18.168
15	21.000 – 21.450
12	24.890 – 24.990
10	28.000 – 29.700

*NOTE: On 60 meters, CW, and digital emissions must be centered 1.5 kHz above the carrier frequencies indicated above. Only one signal at a time is permitted on any channel.*

# PRACTICE QUESTIONS



On which HF and/or MF amateur bands are there portions where General class licensees cannot transmit?

- A. 60 meters, 30 meters, 17 meters, and 12 meters
- B. 160 meters, 60 meters, 15 meters, and 12 meters
- C. 80 meters, 40 meters, 20 meters, and 15 meters
- D. 80 meters, 20 meters, 15 meters, and 10 meters

On which of the following bands is phone operation prohibited?

- A. 160 meters
- B. 30 meters
- C. 17 meters
- D. 12 meters

On which of the following bands is image transmission prohibited?

- A. 160 meters
- B. 30 meters
- C. 20 meters
- D. 12 meters

Which of the following amateur bands is restricted to communication only on specific channels, rather than frequency ranges?

- A. 11 meters
- B. 12 meters
- C. 30 meters
- D. 60 meters

On which of the following frequencies are General class licensees prohibited from operating as control operator?

- A. 7.125 MHz to 7.175 MHz
- B. 28.000 MHz to 28.025 MHz
- C. 21.275 MHz to 21.300 MHz
- D. All of the above

Which of the following applies when the FCC rules designate the amateur service as a secondary user on a band?

- A. Amateur stations must record the call sign of the primary service station before operating on a frequency assigned to that station
- B. Amateur stations may use the band only during emergencies
- C. Amateur stations must not cause harmful interference to primary users and must accept interference from primary users
- D. Amateur stations may only operate during specific hours of the day, while primary users are permitted 24-hour use of the band

On which amateur frequencies in the 10-meter band may stations with a General class control operator transmit CW emissions?

- A. 28.000 MHz to 28.025 MHz only
- B. 28.000 MHz to 28.300 MHz only
- C. 28.025 MHz to 28.300 MHz only
- D. The entire band

Which HF bands have segments exclusively allocated to Amateur Extra licensees?

- A. All HF bands
- B. 80 meters, 40 meters, 20 meters, and 15 meters
- C. All HF bands except 160 meters and 10 meters
- D. 60 meters, 30 meters, 17 meters, and 12 meters



Which of the following frequencies is within the General class portion of the 15-meter band?

- A. 14250 kHz
- B. 18155 kHz
- C. 21300 kHz
- D. 24900 kHz

What portion of the 10-meter band is available for repeater use?

- A. The entire band
- B. The portion between 28.1 MHz and 28.2 MHz
- C. The portion between 28.3 MHz and 28.5 MHz
- D. The portion above 29.5 MHz

When General class licensees are not permitted to use the entire voice portion of a band, which portion of the voice segment is available to them?

- A. The lower frequency portion
- B. The upper frequency portion
- C. The lower frequency portion on frequencies below 7.3 MHz, and the upper portion on frequencies above 14.150 MHz
- D. The upper frequency portion on frequencies below 7.3 MHz, and the lower portion on frequencies above 14.150 MHz

With which of the following conditions must beacon stations comply?

- A. No more than one beacon station may transmit in the same band from the same station location
- B. The frequency must be coordinated with the National Beacon Organization
- C. The frequency must be posted on the internet or published in a national periodical
- D. All these choices are correct

Which of the following is a purpose of a beacon station as identified in the FCC rules?

- A. Observation of propagation and reception
- B. Automatic identification of repeaters
- C. Transmission of bulletins of general interest to amateur radio licensees
- D. All these choices are correct

On what HF frequencies are automatically controlled beacons permitted?

- A. On any frequency if power is less than 1 watt
- B. On any frequency if transmissions are in Morse code
- C. 21.08 MHz to 21.09 MHz
- D. 28.20 MHz to 28.30 MHz

What is the power limit for beacon stations?

- A. 10 watts PEP output
- B. 20 watts PEP output
- C. 100 watts PEP output
- D. 200 watts PEP output

Which of the following conditions require a licensed amateur radio operator to take specific steps to avoid harmful interference to other users or facilities?

- A. When operating within one mile of an FCC Monitoring Station
- B. When using a band where the Amateur Service is secondary
- C. When a station is transmitting spread spectrum emissions
- D. All these choices are correct



In what part of the 2.4 GHz band may an amateur station communicate with non-licensed Wi-Fi stations?

- A. Anywhere in the band
- B. Channels 1 through 4
- C. Channels 42 through 45
- D. No part

Why should an amateur operator normally avoid transmitting on 14.100, 18.110, 21.150, 24.930 and 28.200 MHz?

- A. A system of propagation beacon stations operates on those frequencies
- B. A system of automatic digital stations operates on those frequencies
- C. These frequencies are set aside for emergency operations
- D. These frequencies are set aside for bulletins from the FCC

On what band do amateurs share channels with the unlicensed Wi-Fi service?

- A. 432 MHz
- B. 902 MHz
- C. 2.4 GHz
- D. 10.7 GHz

# Third-Party Traffic

- Definition: Sending messages on behalf of someone else who is not an amateur
- Foreign governments have an interest in limiting this because it bypasses normal Internet, telephone, and postal systems
- FCC recognizes the value ... wants people trained to provide effective emergency communications
- Handling 3<sup>rd</sup> party messages is called *passing traffic*
- 3<sup>rd</sup> party traffic must be exchanged between amateur stations operating under FCC rules ...
  - Non-commercial & either be personal and unimportant OR relating to emergencies or disaster relief

## Third-Party Traffic (cont.)

- 3<sup>rd</sup> Party is the person or entity on whose behalf the message is being sent (may be an organization)
- 3<sup>rd</sup> Party does not need to be present
- 3<sup>rd</sup> party traffic CANNOT be exchanged on behalf of an amateur whose license has been suspended or revoked
- Question arises ... *May third-party messages be transmitted via remote control?*
  - **YES:** Under the same circumstances in which third party messages are permitted by FCC rules!

MORE INFO: [www.arrl.org/third-party-operating-agreements](http://www.arrl.org/third-party-operating-agreements)

# PRACTICE QUESTIONS

Which of the following would disqualify a third party from participating in sending a message via an amateur station?

- A. The third party's amateur license has been revoked and not reinstated
- B. The third party is not a US citizen
- C. The third party is speaking in a language other than English
- D. All these choices are correct

What are the restrictions on messages sent to a third party in a country with which there is a Third-Party Agreement?

- A. They must relate to emergencies or disaster relief
- B. They must be for other licensed amateurs
- C. They must relate to amateur radio, or remarks of a personal character, or messages relating to emergencies or disaster relief
- D. The message must be limited to no longer than 1 minute in duration and the name of the third party must be recorded in the station log



## When may third-party messages be transmitted via remote control?

- A. Under any circumstances in which third party messages are permitted by FCC rules
- B. Under no circumstances except for emergencies
- C. Only when the message is intended for licensed radio amateurs
- D. Only when the message is intended for third parties in areas where licensing is controlled by the FCC

# Prohibited & Restricted Communications

- One-way transmissions not permitted, except for *code practice*
- Can't retransmit a broadcast, except for weather or propagation predictions from US government stations (as long as it's occasional)
- It's permitted for US amateurs to communicate with amateur stations in countries outside the areas administered by the FCC unless the country has notified the ITU that it objects
- Codes intended to obscure meanings of messages are prohibited

## Prohibited & Restricted Communications (cont.)

- On terrestrial cross-band repeaters that receive signals on one frequency band and retransmit them on another frequency band, such transmissions are permitted if the control operator of the repeater transmitter that operates on the HF band has a General class license or higher

# PRACTICE QUESTIONS

Which of the following transmissions is permitted for all amateur stations?

- A. Unidentified transmissions of less than 10 seconds duration for test purposes only
- B. Automatic retransmission of other amateur signals by any amateur station
- C. Occasional retransmission of weather and propagation forecast information from US government stations
- D. Encrypted messages, if not intended to facilitate a criminal act

Which of the following one-way transmissions are permitted?

- A. Unidentified test transmissions of less than 10 seconds in duration
- B. Transmissions to assist with learning the International Morse code
- C. Regular transmissions offering equipment for sale, if intended for amateur radio use
- D. All these choices are correct

What are the restrictions on the use of abbreviations or procedural signals in the amateur service?

- A. Only “Q” signals are permitted
- B. They may be used if they do not obscure the meaning of a message
- C. They are not permitted
- D. They are limited to those expressly listed in Part 97 of the FCC rules

## When is it permissible to communicate with amateur stations in countries outside the areas administered by the Federal Communications Commission?

- A. Only when the foreign country has a formal third-party agreement filed with the FCC
- B. When the contact is with amateurs in any country except those whose administrations have notified the ITU that they object to such communications
- C. Only when the contact is with amateurs licensed by a country which is a member of the United Nations, or by a territory possessed by such a country
- D. Only when the contact is with amateurs licensed by a country which is a member of the International Amateur Radio Union, or by a territory possessed by such a country



When may a 10-meter repeater retransmit the 2-meter signal from a station that has a Technician class control operator?

- A. Under no circumstances
- B. Only if the station on 10-meters is operating under a Special Temporary Authorization allowing such retransmission
- C. Only during an FCC-declared general state of communications emergency
- D. Only if the 10-meter repeater control operator holds at least a General class license

# Section 3.4

## Technical Rules and Standards

- Good Amateur Practices ...
  - Not all procedures are covered in the exam or by FCC Part 97 rules
  - Amateurs themselves set day-to-day operating standards, although the FCC reserves the right to rule on what is and isn't *good engineering and good amateur practice*
  - Many sources available cover these practices, including ...
    - ARRL Handbook
    - ARRL Antenna Book
    - Club websites

# Output Power

- General, Advanced, and Amateur Extra limited to max transmitter output of 1500 W PEP (*peak envelope power*) on HF bands
- Two Q-signals for indicating power level ...
  - QRP: *Reduce power* or *I am using low power* (usually 5W or less)
  - QRO: *Increase power* or *I am using high power*
- Two max power restrictions on HF ...
  - 200 W PEP on 30 meters (10.1 MHz)
  - 100 W PEP with respect to half-wave dipole on 60 meters (5 MHz) with max bandwidth of 2.8 kHz

## Output Power (cont.)

- Novice and Technician licensees operating on HF are limited to 200 W PEP output
- General, Advanced, and Extra licensees may use full 1500 W PEP output in the former Novice segments on 80, 40, and 15 meters
- Since spread spectrum creates a noise-like signal that can affect other users, the output power limit for amateurs for SS signals is 10 watts
- FCC requires amateurs to use the minimum power necessary to carry out the desired communication

# PRACTICE QUESTIONS

Who or what determines “good engineering and good amateur practice,” as applied to the operation of an amateur station in all respects not covered by the Part 97 rules?

- A. The FCC
- B. The control operator
- C. The IEEE
- D. The ITU

What is the maximum transmitting power an amateur station may use on 10.140 MHz?

- A. 200 watts PEP output
- B. 1000 watts PEP output
- C. 1500 watts PEP output
- D. 2000 watts PEP output

What is the maximum transmitting power an amateur station may use on the 12-meter band?

- A. 50 watts PEP output
- B. 200 watts PEP output
- C. 1500 watts PEP output
- D. An effective radiated power equivalent to 100 watts from a half-wave dipole



What is the maximum bandwidth permitted by FCC rules for Amateur Radio stations transmitting on USB frequencies in the 60-meter band?

- A. 2.8 kHz
- B. 5.6 kHz
- C. 1.8 kHz
- D. 3 kHz

What is the limit for transmitter power on the 28 MHz band for a General Class control operator?

- A. 100 watts PEP output
- B. 1000 watts PEP output
- C. 1500 watts PEP output
- D. 2000 watts PEP output

What is the limit for transmitter power on the 1.8 MHz band?

- A. 200 watts PEP output
- B. 1000 watts PEP output
- C. 1200 watts PEP output
- D. 1500 watts PEP output

What is the maximum power limit on the 60-meter band?

- A. 1500 watts PEP
- B. 10 watts RMS
- C. ERP of 100 watts PEP with respect to a dipole
- D. ERP of 100 watts PEP with respect to an isotropic antenna

What measurement is specified by FCC rules that regulate maximum power?

- A. RMS output from the transmitter
- B. RMS input to the antenna
- C. PEP input to the antenna
- D. PEP output from the transmitter

What is the maximum PEP output allowed for spread spectrum transmissions?

- A. 100 milliwatts
- B. 10 watts
- C. 100 watts
- D. 1500 watts

## What is QRP operation?

- A. Remote piloted model control
- B. Low-power transmit operation
- C. Transmission using Quick Response Protocol
- D. Traffic relay procedure net operation

# Digital Transmissions

- FCC rules for digital transmissions are primarily concerned with the bandwidth of the transmitted signal
  - Bandwidth is tied to the *symbol rate* ... signal events per second
  - Covered in §97.305(c) and §97.307(f) ... see Table 3.4 (next slide)
- As the size of the amateur bands increases with frequency, faster (wider) signals are allowed
  - At 33 cm (902 MHz) and above, there is no limit except for the band edges themselves



# Max Symbol Rates & Bandwidth (Table 3.4)

BAND	SYMBOL RATE (baud)	BANDWIDTH (kHz)
160 thru 12 m	300	1
10 m	1200	1
6 m, 2 m	19.6k	2
1.25 m, 70 cm	56k	100
33 cm and above	No limit	No limit

There are new protocols being introduced all the time. The FCC recognized the need for amateurs to receive and understand signals must be balanced with the benefits of innovation. This is why the FCC requires the technical characteristics of the protocol be publicly documented before using it on the air.

# PRACTICE QUESTIONS

What must be done before using a new digital protocol on the air?

- A. Type-certify equipment to FCC standards
- B. Obtain an experimental license from the FCC
- C. Publicly document the technical characteristics of the protocol
- D. Submit a rule-making proposal to the FCC describing the codes and methods of the technique

What is the maximum symbol rate permitted for RTTY or data emission transmitted at frequencies below 28 MHz?

- A. 56 kilobaud
- B. 19.6 kilobaud
- C. 1200 baud
- D. 300 baud

What is the maximum symbol rate permitted for RTTY or data emission transmissions on the 10-meter band?

- A. 56 kilobaud
- B. 19.6 kilobaud
- C. 1200 baud
- D. 300 baud

END OF CHAPTER 3 PART 1 OF 1

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