Amateur Extra License Class

1

Amateur Extra Class

Chapter 3
Rules & Regulations

2

FCC Rules

FCC Rules

- All of the FCC rules are found in:
  - The Code of Federal Regulations (CFR) Title 47
- The rules governing the Amateur Radio Service are found in:
  - CFR Title 47, Part 97.
- The following parts also contain rules affecting the Amateur Radio Service:
  - CFR Title 47, Part 2 -- Frequency allocations, radio treaty matters, and general rules & regulations
  - CFR Title 47, Part 17 – Antenna Structures

3

ITU Rules

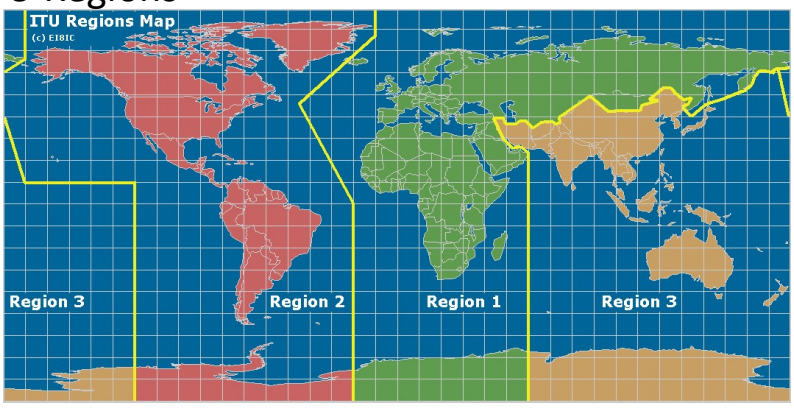
ITU Rules

- The International Telecommunications Union (ITU) is an agency of the United Nations that coordinates the use of the radio spectrum and other matters relating to radio communications between the member countries.
- The ITU has divided the world into 3 regions.
  - Different frequency allocations in each region.

4

ITU Rules & Regulations

ITU Regions



5

Operating Standards

Frequency and Emission Privileges

- Amateur Extra class licensees have access to all frequency & emission privileges granted to the Amateur Radio Service by the FCC.
  - Frequencies above 50 MHz in §97.301(a)
  - Frequencies below 30 MHz in §97.301(b)

6

Operating Standards

Frequency and Emission Privileges

- Amateur Extra class licensees have exclusive frequency privileges on certain amateur radio bands.
  - 80m: 3.500 MHz to 3.525 MHz
  - 75m: 3.600 MHz to 3.700 MHz
  - 40m: 7.000 MHz to 7.025 MHz
  - 20m: 14.000 MHz to 14.025 MHz
  - 20m: 14.150 MHz to 14.175 MHz
  - 15m: 21.000 MHz to 21.025 MHz
  - 15m: 21.200 MHz to 21.225 MHz

7

Operating Standards

Special Restrictions

- Shared MF & HF allocations.
  - 1800 kHz to 1810 kHz -- Non-amateur in Region 1.
  - 1850 kHz to 2000 kHz -- Non-amateur in Region 1.
  - 1900 kHz to 2000 kHz -- Radiolocation service in US.
  - 3950 kHz to 4000 kHz -- Broadcasting in Regions 1 & 3.
  - 60m – Entire band shared.
  - 7000 kHz to 7050 kHz – Non-amateur in some countries.
  - 7100 kHz to 7200 kHz – Non-amateur in some countries.
  - 7200 kHz to 7300 kHz -- Broadcasting in Regions 1 & 3
  - 30m – Entire band shared

8

Operating Standards

Special Restrictions – 60m

- Amateur Extra, Advanced, General class licensees only.
- CW, digital, & USB modes only with 2.8 kHz maximum bandwidth.
  - CW & digital signals must be on center frequency of channel.
- Maximum of 100 Watts ERP relative to a dipole.
- Assigned frequencies only.

Channel Center (kHz)	5332.0	5348.0	5358.5	5373.0	5405.0
VFO Frequency (kHz)	5330.5	5346.5	5357.0	5371.5	5403.5

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Operating Standards

Special Restrictions – 30m

- Maximum of 200 Watts PEP.
- CW & data only.

10

Operating Standards

Managing Your Sidebands

- All energy emitted by your transmitter must be contained within the band segment authorized.
- The frequency shown on your VFO display is **NOT** where your signal actually is.
  - All modulated signals, including CW, have sidebands.
  - **Know where your sidebands are!**

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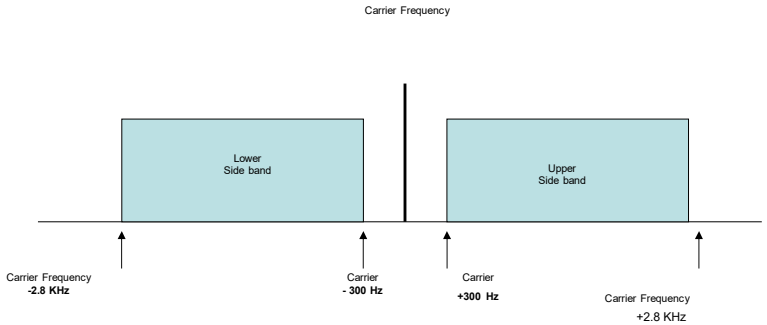
Operating Standards

Managing Your Sidebands



12

E1A01 -- When using a transceiver that displays the carrier frequency of phone signals, which of the following displayed frequencies represents the highest frequency at which a properly adjusted USB emission will be totally within the band?

A. The exact upper band edge
B. 300 Hz below the upper band edge
C. 1 kHz below the upper band edge
D. 3 kHz below the upper band edge

13

E1A02 -- When using a transceiver that displays the carrier frequency of phone signals, which of the following displayed frequencies represents the lowest frequency at which a properly adjusted LSB emission will be totally within the band?

A. The exact lower band edge
B. 300 Hz above the lower band edge
C. 1 kHz above the lower band edge
D. 3 kHz above the lower band edge

14

E1A03 -- With your transceiver displaying the carrier frequency of phone signals, you hear a DX station calling CQ on 14.349 MHz USB. Is it legal to return the call using upper sideband on the same frequency?

A. Yes, because the DX station initiated the contact
B. Yes, because the displayed frequency is within the 20 meter band
C. No, the sideband will extend beyond the band edge
D. No, U.S. stations are not permitted to use phone emissions above 14.340 MHz

15

E1A04 -- With your transceiver displaying the carrier frequency of phone signals, you hear a DX station calling CQ on 3.601 MHz LSB. Is it legal to return the call using lower sideband on the same frequency?

A. Yes, because the DX station initiated the contact
B. Yes, because the displayed frequency is within the 75 meter phone band segment
C. No, the sideband will extend beyond the edge of the phone band segment
D. No, U.S. stations are not permitted to use phone emissions below 3.610 MHz

16

E1A05 -- What is the maximum power output permitted on the 60 meter band?

A. 50 watts PEP effective radiated power relative to an isotropic radiator
B. 50 watts PEP effective radiated power relative to a dipole
C. 100 watts PEP effective radiated power relative to the gain of a half-wave dipole
D. 100 watts PEP effective radiated power relative to an isotropic radiator

17

E1A06 -- Where must the carrier frequency of a CW signal be set to comply with FCC rules for 60 meter operation?

A. At the lowest frequency of the channel
B. At the center frequency of the channel
C. At the highest frequency of the channel
D. On any frequency where the signal's sidebands are within the channel

18

E1A07 -- Which amateur band requires transmission on specific channels rather than on a range of frequencies?

A. 12 meter band
B. 17 meter band
C. 30 meter band
D. 60 meter band

19

E1A12 -- With your transceiver displaying the carrier frequency of CW signals, you hear a DX station's CQ on 3.500 MHz. Is it legal to return the call using CW on the same frequency?

A. Yes, the DX station initiated the contact
B. Yes, the displayed frequency is within the 80 meter CW band segment
C. No, one of the sidebands of the CW signal will be out of the band
D. No, U.S. stations are not permitted to use CW emissions below 3.525 MHz

20

E1A14 -- What is the maximum bandwidth for a data emission on 60 meters?

A. 60 Hz
B. 170 Hz
C. 1.5 kHz
D. 2.8 kHz

21

Operating Standards

Automatic Message Forwarding

- Is control operator ALWAYS responsible for content of transmissions?
  - In an automatic message forwarding system, **ONLY** the originator of the message is responsible for its content.
  - Of course, if the control operator of a station in an automatic message forwarding system becomes aware of a violation, he should take steps to prevent a recurrence of the violation.

22

E1A08 -- If a station in a message forwarding system inadvertently forwards a message that is in violation of FCC rules, who is primarily accountable for the rules violation?

A. The control operator of the packet bulletin board station
B. The control operator of the originating station
C. The control operators of all the stations in the system
D. The control operators of all the stations in the system not authenticating the source from which they accept communications

23

E1A09 -- What is the first action you should take if your digital message forwarding station inadvertently forwards a communication that violates FCC rules?

A. Discontinue forwarding the communication as soon as you become aware of it
B. Notify the originating station that the communication does not comply with FCC rules
C. Notify the nearest FCC Field Engineer's office
D. Discontinue forwarding all messages

24

Operating Standards

Radio Amateur Civil Emergency Service (RACES)

25

Operating Standards

Radio Amateur Civil Emergency Service (RACES)

- A radio service comprised of amateur radio stations used for civil defense communications under the control of an emergency management agency.
  - FEMA
  - SEMA
  - Local EMA
- FCC Rules & Regulations §97.407.
- **Do not confuse with ARES!**

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Operating Standards

Radio Amateur Civil Emergency Service (RACES)

- All communications must be authorized by the EMA director of the area served.
- May communicate with non-RACES (non-amateur) stations if authorized.
- Presidential War Emergency Powers
  - Communications Act of 1934
  - Specific frequencies listed in FCC Part 214

27

Operating Standards

Radio Amateur Civil Emergency Service (RACES)

- Station must be registered with EMA organization for area served.
- Control operator must be enrolled in EMA organization for area served.
- No additional operator privileges.
  - General class licensees can only use frequencies & emissions normally authorized to Generals.
  - Technician class licensees can only use frequencies & emissions normally authorized to Technicians.

28

E1B09 -- Which amateur stations may be operated in RACES?

A. Only those club stations licensed to Amateur Extra class operators
B. Any FCC-licensed amateur station except a Technician class
C. Any FCC-licensed amateur station certified by the responsible civil defense organization for the area served
D. Any FCC-licensed amateur station participating in the Military Auxiliary Radio System (MARS)

29

E1B10 -- What frequencies are authorized to an amateur station operating under RACES rules?

A. All amateur service frequencies authorized to the control operator
B. Specific segments in the amateur service MF, HF, VHF and UHF bands
C. Specific local government channels
D. Military Auxiliary Radio System (MARS) channels

30

Operating Standards

Stations Aboard Ships or Aircraft

- Installation must be approved by master of vessel or pilot in command of aircraft.
- Installation must be separate from and independent of ship or aircraft radios.
  - Common antenna permitted.
- Installation must not constitute a hazard to life or property. If in aircraft, no operation during IFR flight unless installation complies with FAA rules.

31

Operating Standards

Stations Aboard Ships or Aircraft

- If in national waters or airspace, that nation's rules apply.
- If in international waters or airspace, rules of nation of registry of ship or aircraft apply.

32

E1A10 -- If an amateur station is installed aboard a ship or aircraft, what condition must be met before the station is operated?

A. Its operation must be approved by the master of the ship or the pilot in command of the aircraft
B. The amateur station operator must agree not to transmit when the main radio of the ship or aircraft is in use
C. The amateur station must have a power supply that is completely independent of the main ship or aircraft power supply
D. The amateur operator must have an FCC Marine or Aircraft endorsement on his or her amateur license

33

E1A11 -- What authorization or licensing is required when operating an amateur station aboard a U.S.-registered vessel in international waters?

A. Any amateur license with an FCC Marine or Aircraft endorsement
B. Any FCC-issued amateur license
C. Only General class or higher amateur licenses
D. An unrestricted Radiotelephone Operator Permit

34

E1A13 -- Who must be in physical control of the station apparatus of an amateur station aboard any vessel or craft that is documented or registered in the United States?

A. Only a person with an FCC Marine Radio
B. Any person holding an FCC issued amateur license or who is authorized for alien reciprocal operation
C. Only a person named in an amateur station license grant
D. Any person named in an amateur station license grant or a person holding an unrestricted Radiotelephone Operator Permit

35

Station Restrictions

Operating Restrictions

- Under certain conditions, the FCC may restrict the operation of an amateur radio station during certain times or on certain frequencies to reduce interference to other licensed services.
  - Receiver experiencing the interference must be of good engineering design.
  - Amateur station must not have spurious emissions exceeding prescribed limits.
  - FCC may impose "quiet hours". [§97.121(a)]

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Station Restrictions

Operating Restrictions

§ 97.121 Restricted operation.
(a) If the operation of an amateur station causes general interference to the reception of transmissions from stations operating in the domestic broadcast service when receivers of good engineering design, including adequate selectivity characteristics, are used to receive such transmissions, and this fact is made known to the amateur station licensee, the amateur station shall not be operated during the hours from 8 p.m. to 10:30 p.m., local time, and on Sunday for the additional period from 10:30 a.m. until 1 p.m., local time, upon the frequency or frequencies used when the interference is created.
(b) In general, such steps as may be necessary to minimize interference to stations operating in other services may be required after investigation by the FCC.

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Station Restrictions

Operating Restrictions

- Spurious Emissions
  - Signals outside of necessary bandwidth that can be reduced or eliminated without affecting information being transmitted.
    - Harmonics
    - "Spurs"
    - Splatter
  - ALL transmissions contain some spurious emissions.

38

Station Restrictions

Operating Restrictions

- Spurious emissions must be below limits set by FCC rules.
  - For frequencies below 30 MHz, spurious emissions must be at least 43 dB below mean power output of transmitter. [§97.307(d)]
  - For frequencies in the range of 30-225 MHz, spurious emissions must be at least 60 dB below mean power output of transmitter. [§97.307(e)]

39

E1B01 -- Which of the following constitutes a spurious emission?

A. An amateur station transmission made at random without the proper call sign identification

B. A signal transmitted to prevent its detection by any station other than the intended recipient

C. Any transmitted bogus signal that interferes with another licensed radio station

D. An emission outside its necessary bandwidth that can be reduced or eliminated without affecting the information transmitted

40

E1B08 -- What limitations may the FCC place on an amateur station if its signal causes interference to domestic broadcast reception, assuming that the receivers involved are of good engineering design?

A. The amateur station must cease operation
B. The amateur station must cease operation on all frequencies below 30 MHz
C. The amateur station must cease operation on all frequencies above 30 MHz
D. The amateur station must avoid transmitting during certain hours on frequencies that cause the interference

41

E1B11 -- What is the permitted mean power of any spurious emission relative to the mean power of the fundamental emission from a station transmitter or external RF amplifier installed after January 1, 2003, and transmitting on a frequency below 30 MHZ?

A. At least 43 dB below
B. At least 53 dB below
C. At least 63 dB below
D. At least 73 dB below

42

Station Restrictions

Location Restrictions

- Area of environmental, historical, or cultural significance.
  - Must file Environmental Assessment with FCC.
- Within 1 mile of FCC monitoring facility.
  - Facility manager may impose restrictions.

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Station Restrictions

Location Restrictions

- Within 1 mile of FCC monitoring facility.
  - Facility manager may impose restrictions.

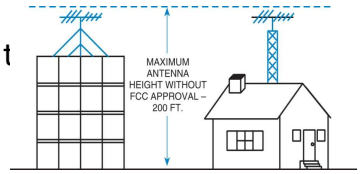
FCC Monitoring Facilities	
Allegan, MI	Kingsville, TX
Belfast, ME	Laurel, MD
Canandaigua, NY	Livermore, CA
Douglas, AZ	Powder Springs, GA
Ferndale, WA	Santa Isabel, PR
Grand Island, NE	Vero Beach, FL
Kenai, AK	Waipahu, HI

44

Station Restrictions

Antenna Restrictions

- If more than 200 ft above ground level or near a public-use airport, must notify FCC & FAA.
- Exceptions:
  - <20 ft above existing man-made structure.
    - Towers don't count.
  - <20 ft above ground.
  - Shielded by terrain or by t congested urban area.
    - Trees don't count.



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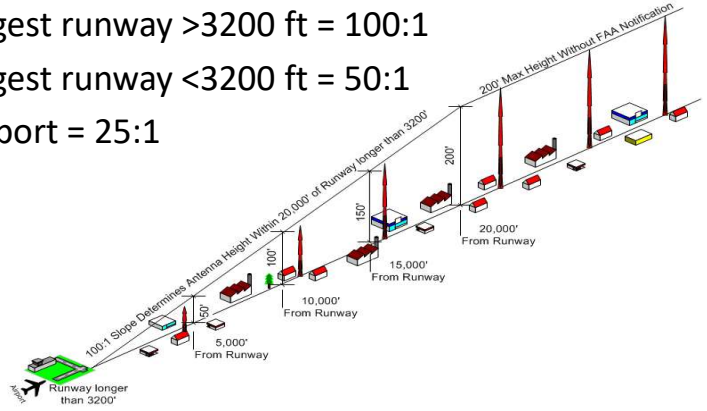
Station Restrictions

Antenna Restrictions

- Longest runway >3200 ft = 100:1
- Longest runway <3200 ft = 50:1
- Heliport = 25:1



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Station Restrictions

Antenna Restrictions

- Zoning Ordinances
  - FCC rules require minimum practical regulation to accomplish state or local government's legitimate purpose and must reasonably accommodate amateur communications. [§97.15(b)] (a.k.a. PRB-1)
- Covenants, Conditions, and Restrictions (CCR's)
  - Private agreements not covered by FCC rules.
    - Amateur Radio Parity Act of 2017 (H.R. 555).
  - Legally binding contracts.
  - Common in most sub-divisions.

47

E1B02 -- Which of the following factors might cause the physical location of an amateur station apparatus or antenna structure to be restricted?

A. The location is near an area of political conflict
B. The location is of geographical or horticultural importance
C. The location is in an ITU zone designated for coordination with one or more foreign governments
D. The location is of environmental importance or significant in American history, architecture, or culture

48

E1B03 -- Within what distance must an amateur station protect an FCC monitoring facility from harmful interference?

A. 1 mile
B. 3 miles
C. 10 miles
D. 30 miles

49

E1B04 -- What must be done before placing an amateur station within an officially designated wilderness area or wildlife preserve, or an area listed in the National Register of Historical Places?

A. A proposal must be submitted to the National Park Service
B. A letter of intent must be filed with the National Audubon Society
C. An Environmental Assessment must be submitted to the FCC
D. A form FSD-15 must be submitted to the Department of the Interior

50

E1B06 -- Which of the following additional rules apply if you are installing an amateur station antenna at a site at or near a public use airport?

A. You may have to notify the Federal Aviation Administration and register it with the FCC as required by Part 17 of FCC rules
B. No special rules apply if your antenna structure will be less than 300 feet in height
C. You must file an Environmental Impact Statement with the EPA before construction begins
D. You must obtain a construction permit from the airport zoning authority

51

Station Control

Control Operator

- **EVERY** amateur radio station has a control operator when it is transmitting.
- Control operator is designated by the station owner.
- Control operator is legally responsible for station operation.
- Control operator must hold amateur radio license authorized for frequency in use.

52

Station Control

There are 3 types of station control recognized in the FCC Rules:

- Local control.
- Remote control.
- Automatic control.

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Station Control

Local Control

- Control operator is physically at the station and directly manipulates the equipment.
- Most common type of control.

54

Station Control

Remote Control

- Control operator is present at a control point which is not at the station location.
- Control point connected to station via:
  - Radio (auxiliary station).
    - a.k.a. – Telecommand.
  - Wire or dedicated telephone line.
  - Dial-up telephone connection.
  - Local-area computer network (LAN).
  - Wide-area computer network (WAN, a.k.a -- Internet).

55

Station Control

Remote Control

- Provision must be made to limit transmission time to no more than 3 minutes in case the control link fails. [§97.213]
  - Time-out timer.
  - Also applies to stations operating under automatic control.

56

E1C01 -- What is a remotely controlled station?

A. A station operated away from its regular home location
B. A station controlled by someone other than the licensee
C. A station operating under automatic control
D. A station controlled indirectly through a control link

57

E1C06 -- Which of the following statements concerning remotely controlled amateur stations is true?

A. Only Extra Class operators may be the control operator of a remote station
B. A control operator need not be present at the control point
C. A control operator must be present at the control point
D. Repeater and auxiliary stations may not be remotely controlled

58

E1C07 -- What is meant by local control?

A. Controlling a station through a local auxiliary link
B. Automatically manipulating local station controls
C. Direct manipulation of the transmitter by a control operator
D. Controlling a repeater using a portable handheld transceiver

59

E1C08 -- What is the maximum permissible duration of a remotely controlled station's transmissions if its control link malfunctions?

A. 30 seconds
B. 3 minutes
C. 5 minutes
D. 10 minutes

60

Station Control

Automatic Control

- Control operator is not present at a control point.
  - Repeater Stations.
  - Auxiliary Stations.
  - Beacon Stations.
- Control operator is still legally responsible for station operation.
- No third-party traffic unless RTTY or data.

61

Station Control

Automatic Control

- Repeater Stations
  - Automatic control authorized if repeater receives and transmits on the following frequencies:

29.5 MHz to 29.7 MHz	420.0 MHz to 431.0 MHz
51.0 MHz to 54.0 MHz	433.0 MHz to 435.0 MHz
144.5 MHz to 145.5 MHz	438.0 MHz to 450.0 MHz
146.0 MHz to 148.0 MHz	902.0 MHz and above
222.15 MHz to 225.0 MHz	

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Station Control

Automatic Control

- Auxiliary Stations
  - An amateur station transmitting communications point-to-point within a system of cooperating amateur stations.
  - One-way communications are authorized.
  - Authorized same frequencies as repeater stations except no 10m or 6m operations.

63

Station Control

Automatic Control

- Beacon Stations
  - Only one signal per band at any one location.
  - 100 Watts PEP maximum power output.
  - Automatic control authorized on following frequencies:

28.200 MHz to 28.300 MHz	222.050 MHz to 222.060 MHz
50.060 MHz to 50.080 MHz	432.300 MHz to 432.400 MHz
144.275 MHz to 144.300 MHz	902.000 MHz and above

  - One-way communications are authorized.

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Station Control

Automatic Retransmission of Amateur Radio Communications

- Only the following types of stations are authorized to **automatically** retransmit signals from other amateur radio stations:
  - Repeater stations.
  - Auxiliary stations.
  - Space stations.

65

E1C02 -- What is meant by automatic control of a station?

A. The use of devices and procedures for control so that the control operator does not have to be present at a control point
B. A station operating with its output power controlled automatically
C. Remotely controlling a station's antenna pattern through a directional control link
D. The use of a control link between a control point and a locally controlled station

66

E1C03 -- How do the control operator responsibilities of a station under automatic control differ from one under local control?

A. Under local control there is no control operator
B. Under automatic control the control operator is not required to be present at the control point
C. Under automatic control there is no control operator
D. Under local control a control operator is not required to be present at a control point

67

E1C05 -- When may an automatically controlled station originate third party communications?

A. Never
B. Only when transmitting an RTTY or data emissions
C. When specifically agreed upon by the sending and receiving stations
D. When approved by the National Telecommunication and Information Administration

68

E1C09 -- Which of these ranges of frequencies is available for an automatically controlled repeater operating below 30 MHz?

A. 18.110 - 18.168 MHz
B. 24.940 - 24.990 MHz
C. 10.100 - 10.150 MHz
D. 29.500 - 29.700 MHz

69

E1C10 -- What types of amateur stations may automatically retransmit the radio signals of other amateur stations?

A. Only beacon, repeater or space stations
B. Only auxiliary, repeater or space stations
C. Only earth stations, repeater stations or model craft
D. Only auxiliary, beacon or space stations

70

Amateur Satellite Service

Definitions

- Amateur Satellite Service.
  - A radio communications service using amateur radio stations on satellites.
- Earth Station.
  - An amateur radio station on or within 50km of the Earth's surface used for space communications.
- Space Station
  - An amateur radio station located more than 50km above the Earth's surface.

71

Amateur Satellite Service

Definitions

- Telecommand.
  - A one-way transmission to initiate, modify, or terminate functions of a device at a distance.
- Telecommand station.
  - An amateur station that transmits communications to initiate, modify or terminate functions of a space station.
- Telemetry.
  - A one-way transmission of measurements at a distance from the measuring instrument.

72

Amateur Satellite Service

Telecommand

- Except for ISS, local control of a space station is not possible.
- Telecommand stations control the functions of a satellite.
  - Telecommand of space stations should be protected.
  - Encryption of commands is permitted.
    - Exception to prohibition on codes & ciphers to obscure meaning.

73

E1D01 -- What is the definition of the term telemetry?

A. One-way transmission of measurements at a distance from the measuring instrument

B. Two-way radiotelephone transmissions in excess of 1000 feet

C. Two-way single channel transmissions of data

D. One-way transmission that initiates, modifies, or terminates the functions of a device at a distance

74

E1D02 -- What is the amateur satellite service?

A. A radio navigation service using satellites for the purpose of self training, intercommunication and technical studies carried out by amateurs
B. A spacecraft launching service for amateur-built satellites
C. A radio communications service using amateur radio stations on satellites
D. A radio communications service using stations on Earth satellites for public service broadcast

75

E1D03 -- What is a telecommand station in the amateur satellite service?

A. An amateur station located on the Earth's surface for communications with other Earth stations by means of Earth satellites
B. An amateur station that transmits communications to initiate, modify or terminate functions of a space station
C. An amateur station located more than 50 km above the Earth's surface
D. An amateur station that transmits telemetry consisting of measurements of upper atmosphere data from space

76

E1D04 -- What is an Earth station in the amateur satellite service?

A. An amateur station within 50 km of the Earth's surface intended for communications with amateur stations by means of objects in space
B. An amateur station that is not able to communicate using amateur satellites
C. An amateur station that transmits telemetry consisting of measurement of upper atmosphere
D. Any amateur station on the surface of the Earth

77

Amateur Satellite Service

Satellite Licensing & Frequency Privileges

- Any class amateur radio operator may be the licensee or the control operator of a space station.
  - Must be designated by the station licensee.
  - Control function must be performed on a frequency available to the class of license held by the control operator.

78

Amateur Satellite Service

Satellite Licensing & Frequency Privileges

- Any class amateur radio operator may be the control operator of an earth station.
  - Operations must be performed on a frequency available to the class of license held by the earth station operator.

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Amateur Satellite Service

Satellite Licensing & Frequency Privileges

- Satellite operations authorized on
  - Portions of 40m & 20m.
  - 17m, 15m, 12m, & 10m.
  - Portions of 2m, 70cm, & 13cm.
  - Some microwave bands also available.
- Telecommand system must provide capability of terminating operation.

80

E1D05 -- What class of licensee is authorized to be the control operator of a space station?

A. All except Technician Class
B. Only General, Advanced or Amateur Extra class
C. Any class with appropriate operator privileges
D. Only Amateur Extra Class

81

E1D06 -- Which of the following is a requirement of a space station?

A. The space station must be capable of terminating transmissions by telecommand when directed by the FCC
B. The space station must cease all transmissions after 5 years
C. The space station must be capable of changing its orbit whenever such a change is ordered by NASA
D. All of these choices are correct

82

E1D07 -- Which amateur service HF bands have frequencies authorized to space stations?

A. Only the 40 m, 20 m, 17 m, 15 m, 12 m and 10 m bands
B. Only the 40 m, 20 m, 17 m, 15 m and 10 m bands
C. Only the 40 m, 30 m, 20 m, 15 m, 12 m and 10 m bands
D. All HF bands

83

E1D08 -- Which VHF amateur service bands have frequencies available for space stations?

A. 6 meters and 2 meters
B. 6 meters, 2 meters, and 1.25 meters
C. 2 meters and 1.25 meters
D. 2 meters

84

E1D09 -- Which UHF amateur service bands have frequencies available for space stations?

A. 70 cm only
B. 70 cm and 13 cm
C. 70 cm and 33 cm
D. 33 cm and 13 cm

85

E1D10 -- Which amateur stations are eligible to be telecommand stations?

A. Any amateur station designated by NASA
B. Any amateur station so designated by the space station licensee, subject to the privileges of the class of operator license held by the control operator
C. Any amateur station so designated by the ITU
D. All of these choices are correct

86

E1D11 -- Which amateur stations are eligible to operate as Earth stations?

A. Any amateur station whose licensee has filed a pre-space notification with the FCC's International Bureau
B. Only those of General, Advanced or Amateur Extra Class operators
C. Only those of Amateur Extra Class operators
D. Any amateur station, subject to the privileges of the class of operator license held by the control operator

87

Break

88

Volunteer Examiner Program

Volunteer Examiner Coordinator (VEC)

- An organization that has signed an agreement with the FCC to coordinate amateur radio examinations.
  - Accredits Volunteer Examiners (VE's).
  - Coordinates exam sessions.
  - Maintains records of all exam sessions, including passes & failures.
  - Forwards successful applications to the FCC for processing.

89

Volunteer Examiner Program

Volunteer Examiner (VE)

- A licensed amateur radio operator accredited by a VEC to administer exams.

90

Volunteer Examiner Program

Volunteer Examiner (VE) Requirements

- Be accredited by the coordinating VEC .
- Be at least 18 years of age.
- Never had amateur radio license suspended or revoked.
- Hold an amateur radio operator license of the appropriate class for the element to be administered.

91

Volunteer Examiner Program

Volunteer Examiner (VE) Requirements

- Who can administer an exam element?

VE License Class	Element 2 (Technician)	Element 3 (General)	Element 4 (Extra)
Extra	X	X	X
Advanced	X	X	
General	X		

92

E1E03 -- What is a Volunteer Examiner Coordinator?

A. A person who has volunteered to administer amateur operator license examinations
B. A person who has volunteered to prepare amateur operator license examinations
C. An organization that has entered into an agreement with the FCC to coordinate amateur operator license examinations
D. The person who has entered into an agreement with the FCC to be the VE session manager

93

E1E04 -- Which of the following best describes the Volunteer Examiner accreditation process?

A. Each General, Advanced and Amateur Extra Class operator is automatically accredited as a VE when the license is granted
B. The amateur operator applying must pass a VE examination administered by the FCC Enforcement Bureau
C. The prospective VE obtains accreditation from the FCC
D. The procedure by which a VEC confirms that the VE applicant meets FCC requirements to serve as an examiner

94

Volunteer Examiner Program

Exam Preparation

- All of the VEC's cooperate to maintain the question pool for each exam element.
  - National Conference of Volunteer Examiner Coordinators (NCVEC)
    - Question Pool Committee (QPC).
  - Question pools are reviewed & revised on a 4-year cycle.

95

Volunteer Examiner Program

Exam Preparation

- Policies of coordinating VEC determines how exams are prepared.
  - Pre-printed exams.
  - Software-generated exams.
  - Manually-generated exams.

96

Volunteer Examiner Program

Exam Preparation

- Each question pool is divided into sections.
  - Section denoted by first 3 characters of the question number.
  - Technician & General question pools each have 35 sections.
  - Amateur Extra question pool has 50 sections.
- An exam will consist of one question from each section of the question pool.

97

Volunteer Examiner Program

Exam Preparation

- Who can prepare an exam element?

VE License Class	Element 2 (Technician)	Element 3 (General)	Element 4 (Extra)
Extra	X	X	X
Advanced	X	X	
General	X		

98

Volunteer Examiner Program

Exam Session Administration

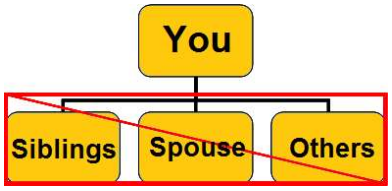
- All exam sessions must be coordinated by a VEC.
- All exam sessions must be administered by a team of at least 3 VE's who are accredited by the coordinating VEC.
- VE team determines when & where examinations will be held.

99

Volunteer Examiner Program

Exam Session Administration

§97.511(d) -- No VE may administer an examination to his or her spouse, children, grandchildren, stepchildren, parents, grandparents, stepparents, brothers, sisters, stepbrothers, stepsisters, aunts, uncles, nieces, nephews, and in-laws.



100

Volunteer Examiner Program

Exam Session Administration

- During the exam.
  - Each VE on the team is individually responsible for the proper administration & supervision of the exam session.

101

Volunteer Examiner Program

Exam Session Administration

- During the exam.
  - All 3 VE's responsible for supervising a candidate taking an exam element **MUST** be **present** & **observing** the candidate during the **entire** time that element is being taken.
    - When it is not possible for the VE's to be present at the examination site, the FCC Rules allow exams to be administered remotely as long as a real-time video link connects the administering VE's with the remote location.

102

Volunteer Examiner Program

Exam Session Administration

- During the exam.
  - Candidates **MUST** follow all instructions given to them by the VE's.
    - Any candidate failing to comply will have their examination immediately terminated.

103

Volunteer Examiner Program

Exam Session Administration

- During the exam.
  - VE team collects & immediately grades completed test papers.
  - VE team informs candidate of grade & whether they passed or failed.
    - Some VEC's allow the VE team to only report number of questions answered correctly/incorrectly to candidate.
    - Some VEC's encourage the VE team to review with the candidate any questions missed (if time permits).

104

Volunteer Examiner Program

Exam Session Administration

- During the exam.
  - Grade of 74% or better required to pass.

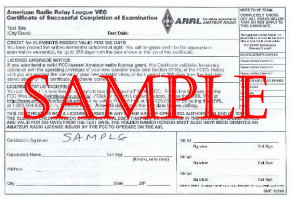
Element Nr	License Class	Nr of Questions	Minimunm Nr Right	Maximum Nr Wrong
2	Technician	35	26	9
3	General	35	26	9
4	Extra	50	37	13

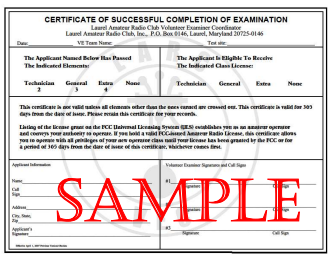
105

Volunteer Examiner Program

The CSCE

- Each VEC has their own unique design CSCE.
  - CSCE issued by any VEC accepted by all other VEC's.
  - CSCE is authorization to operate with new privileges.
  - CSCE valid for 365 days.





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Volunteer Examiner Program

Exam Session Administration

- After the exam.
  - VE team must forward all session paperwork to the VEC within 10 days of the test session.
    - Some VEC's impose a shorter time limit.
  - VEC reviews paperwork & forwards the information on successful candidates to FCC for processing.

107

Volunteer Examiner Program

Exam Session Administration

- Reimbursement
  - The coordinating VEC and the VE team members may be reimbursed by the applicants for certain out-of-pocket expenses related to preparing, processing, administering, and coordinating an examination for an amateur radio license.
  - Accomplished by means of test fees.

108

Volunteer Examiner Program

Exam Session Administration

- Test Fees
  - A VEC may choose to collect a test fee from the applicants or not.
  - **IF** a VEC collects a fee for taking an examination, then the fee paid by **ALL** applicants at **ALL** test sessions coordinated by that VEC during any calendar year **MUST BE THE SAME**.
    - Currently ARRL-VEC charges a fee of $15.
    - Currently W5YI-VEC charges a fee of $14.
    - Laurel VEC has never charged a test fee.

109

E1E01 -- What is the minimum number of qualified VEs required to administer an Element 4 amateur operator license examination?

A. 5
B. 2
C. 4
D. 3

110

E1E02 -- Where are the questions for all written US amateur license examinations listed?

A. In FCC Part 97
B. In a question pool maintained by the FCC
C. In a question pool maintained by all the VECs
D. In the appropriate FCC Report and Order

111

E1E05 -- What is the minimum passing score on amateur operator license examinations?

A. Minimum passing score of 70%
B. Minimum passing score of 74%
C. Minimum passing score of 80%
D. Minimum passing score of 77%

112

E1E06 -- Who is responsible for the proper conduct and necessary supervision during an amateur operator license examination session?

A. The VEC coordinating the session
B. The FCC
C. Each administering VE
D. The VE session manager

113

E1E07 -- What should a VE do if a candidate fails to comply with the examiner's instructions during an amateur operator license examination?

A. Warn the candidate that continued failure to comply will result in termination of the examination
B. Immediately terminate the candidate's examination
C. Allow the candidate to complete the examination, but invalidate the results
D. Immediately terminate everyone's examination and close the session

114

E1E08 -- To which of the following examinees may a VE not administer an examination?

A. Employees of the VE
B. Friends of the VE
C. Relatives of the VE as listed in the FCC rules
D. All of these choices are correct

115

E1E10 -- What must the administering VEs do after the administration of a successful examination for an amateur operator license?

A. They must collect and send the documents to the NCVEC for grading
B. They must collect and submit the documents to the coordinating VEC for grading
C. They must submit the application document to the coordinating VEC according to the coordinating VEC instructions
D. They must collect and send the documents to the FCC according to instructions

116

E1E11 -- What must the VE team do if an examinee scores a passing grade on all examination elements needed for an upgrade or new license?

A. Photocopy all examination documents and forward them to the FCC for processing

B. Three VEs must certify that the examinee is qualified for the license grant and that they have complied with the administering VE requirements

C. Issue the examinee the new or upgrade license

D. All these choices are correct

117

E1E12 -- What must the VE team do with the application form if the examinee does not pass the exam?

A. Return the application document to the examinee

B. Maintain the application form with the VEC's records

C. Send the application form to the FCC and inform the FCC of the grade

D. Destroy the application form

118

E1E14 -- For which types of out-of-pocket expenses do the Part 97 rules state that VEs and VECs may be reimbursed?

A. Preparing, processing, administering and coordinating an examination for an amateur radio license
B. Teaching an amateur operator license examination preparation course
C. No expenses are authorized for reimbursement
D. Providing amateur operator license examination preparation training materials

119

Volunteer Examiner Program

Re-Administration of Examinations

- The FCC can re-administer any exam element to any licensee.
  - FCC can designate a VEC to re-administer the exam.
  - Licensee **MUST** appear or license will be cancelled or amended.
- If the FCC determines that a VE fraudulently administered or certified an exam, his/her station license can be revoked and/or operator license suspended.

120

E1E09 -- What may be the penalty for a VE who fraudulently administers or certifies an examination?

A. Revocation of the VE's amateur station license grant and the suspension of the VE's amateur operator license grant
B. A fine of up to $1000 per occurrence
C. A sentence of up to one year in prison
D. All of these choices are correct

121

E1E13 -- What are the consequences of failing to appear for re-administration of an examination when so directed by the FCC?

A. The licensee's license will be cancelled
B. The person may be fined or imprisoned
C. The licensee is disqualified from any future examination for an amateur operator license grant
D. All these choices are correct

122

Miscellaneous Rules

Auxiliary Stations

- An amateur station transmitting communications point-to-point within a system of cooperating amateur stations.
- Remote control.
- Split-site repeaters.
- Hand-held to mobile “cross-band repeater”.
- One-way communications are authorized.
- Authorized same frequencies as repeater stations except no 10m or 6m operations.
- Any class operator license except Novice.

123

E1F12 -- Who may be the control operator of an auxiliary station?

A. Any licensed amateur operator

B. Only Technician, General, Advanced or Amateur Extra Class operators

C. Only General, Advanced or Amateur Extra Class operators

D. Only Amateur Extra Class operators

124

Miscellaneous Rules

External Power Amplifiers

- Amplifiers below 144 MHz may require FCC certification before they can be marketed.
  - Must meet spurious emission standards at full power output or 1500 Watts, whichever is less.
  - Must have a maximum gain of 15 dB.
  - Must have no gain between 26 MHz and 28 MHz.

125

Miscellaneous Rules

External Power Amplifiers

- Any amateur may build or modify an amplifier for their own personal use without certification.
- Dealer may sell uncertified amplifier **ONLY** if purchased from an amateur in used condition & sold to another amateur for use in their personal station.

126

E1F03 -- Under what circumstances may a dealer sell an external RF power amplifier capable of operation below 144 MHz if it has not been granted FCC certification?

A. It was purchased in used condition from an amateur operator and is sold to another amateur operator for use at that operator's station
B. The equipment dealer assembled it from a kit
C. It was imported from a manufacturer in a country that does not require certification of RF power amplifiers
D. It was imported from a manufacturer in another country, and it was certificated by that country's government

127

E1F11 -- Which of the following best describes one of the standards that must be met by an external RF power amplifier if it is to qualify for a grant of FCC certification?

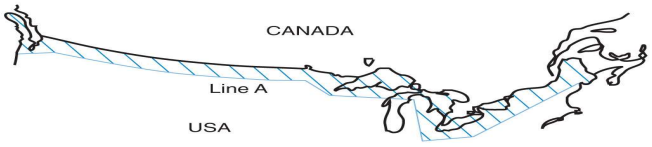
A. It must produce full legal output when driven by not more than 5 watts of mean RF input power
B. It must be capable of external RF switching between its input and output networks
C. It must exhibit a gain of 0 dB or less over its full output range
D. It must satisfy the FCC's spurious emission standards when operated at the lesser of 1500 watts, or its full output power

128

Miscellaneous Rules

Line A and National Quiet Zones

- Line A is a line roughly parallel to and approx. 50 miles south of the US-Canada border.
- Line C is a line roughly parallel to and approx. 50 miles west of the Alaska-Canada border.
- No transmissions allowed between 420 MHz and 430 MHz north of line A or east of line C.



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Miscellaneous Rules

Line A and National Quiet Zones

- National Radio Quiet Zone (NRQZ).
  - Area in portions of Maryland, Virginia, & West Virginia near the National Radio Astronomy Observatory in Green Bank, WV, & also near the Naval Research Laboratory at Sugar Grove, WV.
  - Must get permission from the National Radio Astronomy Observatory before operating an automatically-controlled beacon.

130

Station Restrictions

Line A and National Quiet Zones

- Additional restrictions in certain other geographic locations.
  - White Sands, NM
  - Aricebo, PR
  - etc.

131

E1B05 -- What is the National Radio Quiet Zone?

A. An area in Puerto Rico surrounding the Arecibo Radio Telescope

B. An area in New Mexico surrounding the White Sands Test Area

C. An area surrounding the National Radio Astronomy Observatory

D. An area in Florida surrounding Cape Canaveral

132

E1F04 -- Which of the following geographic descriptions approximately describes "Line A"?

A. A line roughly parallel to and south of the U.S.-Canadian border
B. A line roughly parallel to and west of the U.S. Atlantic coastline
C. A line roughly parallel to and north of the U.S.-Mexican border and Gulf coastline
D. A line roughly parallel to and east of the U.S. Pacific coastline

133

E1F05 -- Amateur stations may not transmit in which of the following frequency segments if they are located in the contiguous 48 states and north of Line A?

A. 440 MHz - 450 MHz
B. 53 MHz - 54 MHz
C. 222 MHz - 223 MHz
D. 420 MHz - 430 MHz

134

Miscellaneous Rules

Business and Payment

- You **CANNOT**
  - Accept payment for communications services.
    - Exception #1 – Control operator of station sending regularly-scheduled amateur radio bulletins or code practice.
      - At least 40 hours per week.
      - On at least 6 MF or HF bands.
      - Schedule published at least 30 days in advance.
    - Exception #2 – School teacher operating incidental to classroom instruction.

135

Miscellaneous Rules

Business and Payment

- You **CANNOT**
  - Use amateur radio for you or your employer's business.
    - Exception – You **CAN** operate on behalf of your employer in support of an emergency preparedness or disaster readiness test or drill.
      - Not more than 1 hour per week.
      - Up to 72 hours not more than twice a year.
      - Time limits do not apply to government-sponsored tests or drills.

136

Miscellaneous Rules

Business and Payment

- You **CAN** send message to a business **IF** neither you nor your employer has a pecuniary interest in the communications.
- You can send messages to a foreign country **ONLY** if of a personal nature or incidental to purposes of amateur radio. **Therefore, no business communications of any type.**

137

E1C12 -- What types of communications may be transmitted to amateur stations in foreign countries?

A. Business-related messages for non-profit organizations

B. Messages intended for connection to users of the maritime satellite service

C. Communications incidental to the purpose of the amateur service and remarks of a personal nature

D. All of these choices are correct

138

E1F07 -- When may an amateur station send a message to a business?

A. When the total money involved does not exceed $25
B. When the control operator is employed by the FCC or another government agency
C. When transmitting international third-party communications
D. When neither the amateur nor his or her employer has a pecuniary interest in the communications

139

E1F08 -- Which of the following types of amateur station communications are prohibited?

A. Communications transmitted for hire or material compensation, except as otherwise provided in the rules
B. Communications that have a political content, except as allowed by the Fairness Doctrine
C. Communications that have a religious content
D. Communications in a language other than English

140

Miscellaneous Rules

Spread Spectrum Operation

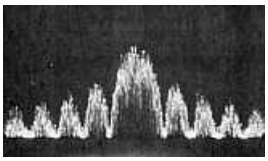
- A transmission technique that spreads the signal over a wide bandwidth.
  - a.k.a. – Bandwidth-expansion modulation.
- Spreading a little power over a wide bandwidth minimizes interference.

141

Miscellaneous Rules

Spread Spectrum Operation

- Direct Sequence modulates carrier with high-speed code sequence.
- Frequency Hopping changes frequency in step with a code sequence.



Direct Sequence
Spread Spectrum Signal

Frequency Hopping
Spread Spectrum Signal

142

Miscellaneous Rules

Spread Spectrum Operation

- Only above 222 MHz.
- Maximum power 10 Watts PEP.
- Can communicate with stations located in:
  - Any area regulated by the FCC.
  - Any nation which allows spread spectrum operation.
- Must not be used to obscure the meaning of the communications.

143

E1F01 -- On what frequencies are spread spectrum transmissions permitted?

A. Only on amateur frequencies above 50 MHz
B. Only on amateur frequencies above 222 MHz
C. Only on amateur frequencies above 420 MHz
D. Only on amateur frequencies above 144 MHz

144

E1F09 -- Which of the following conditions apply when transmitting spread spectrum emission?

A. A station transmitting SS emission must not cause harmful interference to other stations employing other authorized emissions
B. The transmitting station must be in an area regulated by the FCC or in a country that permits SS emissions
C. The transmission must not be used to obscure the meaning of any communication
D. All of these choices are correct

145

E1F10 -- What is the maximum transmitter power for an amateur station transmitting spread spectrum communications?

A. 1 W
B. 1.5 W
C. 10 W
D. 1.5 kW

146

Miscellaneous Rules

Non-US Operating Agreements

- European Conference of Postal and Telecommunications Administrations (CEPT)
  - Allows US amateurs to operate in most European countries and their overseas territories.
  - Must have in their possession:
    - Copy of FCC Public Notice DA 11-221.
    - Proof of US citizenship.
    - Evidence of FCC license grant.

147

Miscellaneous Rules

Non-US Operating Agreements

- International Amateur Radio Permit
  - Allows US amateurs to operate in some Central American & South American countries.

148

Miscellaneous Rules

Non-US Operating Agreements

- ITU Reciprocal Permit
  - An agreement between the US and a country that does not participate in either CEPT or IARP.

149

Miscellaneous Rules

Non-US Operating Agreements

- Foreign amateurs operating in the US will have Extra class privileges if they hold a full-privilege license in their home country.
  - Privileges will not exceed those available to U.S. Amateur Extra Class licensees.

150

E1C04 -- What is meant by IARP?

A. An international amateur radio permit that allows U.S. amateurs to operate in certain countries of the Americas
B. The internal amateur radio practices policy of the FCC
C. An indication of increased antenna reflected power
D. A forecast of intermittent aurora radio propagation

151

E1C11 -- Which of the following operating arrangements allows an FCC-licensed U.S. citizen to operate in many European countries, and alien amateurs from many European countries to operate in the U.S.?

A. CEPT agreement
B. IARP agreement
C. ITU reciprocal license
D. D. All of these choices are correct

152

E1C13 -- Which of the following is required in order to operate in accordance with CEPT rules in foreign countries where permitted?

A. You must identify in the official language of the country in which you are operating
B. The U.S. embassy must approve of your operation
C. You must bring a copy of FCC Public Notice DA 11-221
D. You must append "/CEPT" to your call sign

153

E1F02 -- What privileges are authorized in the U.S. to persons holding an amateur service license granted by the Government of Canada?

A. None, they must obtain a U.S. license
B. All privileges of the Extra Class license
C. The operating terms and conditions of the Canadian amateur service license, not to exceed U.S. Extra Class privileges
D. Full privileges, up to and including those of the Extra Class License, on the 80, 40, 20, 15, and 10 meter bands

154

Miscellaneous Rules

Special Temporary Authority (STA)

- Temporary permission to use modes or frequencies not normally allowed by the FCC Rules & Regulations.
- Provides ability for experimental communications for a limited period of time, normally less than 6 months.

155

E1F06 -- Under what circumstances might the FCC issue a Special Temporary Authority (STA) to an amateur station?

A. To provide for experimental amateur communications
B. To allow regular operation on Land Mobile channels
C. To provide additional spectrum for personal use
D. To provide temporary operation while awaiting normal licensing

156

Questions?

157

Amateur Extra Class

Next Week

Chapter 4
Electrical Principles

158