

ORIGINAL
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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

PR Docket No. 92-

In the Matter of)
)
 Revocation of License of)
)
 SANDRA V. CRANE)
 Amateur Radio Station)
 N6TFO)
)
 and)
)
 Suspension of License of)
)
 SANDRA V. CRANE)
 Amateur Extra Class)
 Radio Operator License)
)
 and)
)
 Revocation of License of)
)
 CHARLES P. PASCAL)
 Amateur Radio Station)
 WB6CIY)
)
 and)
)
 Suspension of License of)
)
 CHARLES P. PASCAL)
 Amateur Extra Class)
 Radio Operator License)

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 FCC
 FEDERAL COMMUNICATIONS COMMISSION
 OFFICE OF THE SECRETARY

To: Administrative Law Judge Joseph Chachkin

SUPPLEMENT TO CASE IN CHIEF

The Chief, Private Radio Bureau, by his attorneys, submits this supplement to the written case filed on August 31, 1992. Certain attachments to affidavits were omitted from the August 31, 1992, filing, and are furnished herewith. These omitted attachments consist of copies of the question pools used for preparing tests for the Novice Class and the Technician Class, and a

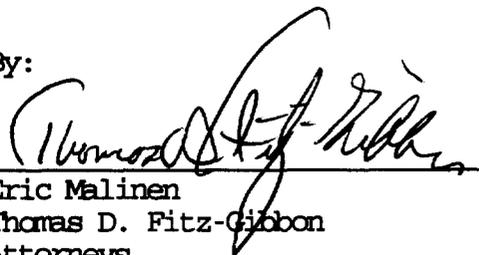
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single letter. (All of these attachments were however, actually filed elsewhere as attachments to other affidavits within the Bureau filing of August 31, 1992.) The omitted attachments were not included because the Bureau inadvertently failed for make sufficient copies, or mistakenly believed the copies had, in fact, been included. The omitted attachments are: Attachments 2 and 10 to Walter A. Ramsey's affidavit; and Attachment "46 B" to Fred Maia's supplementary affidavit.

Respectfully Submitted,

Ralph A. Haller
Chief, Private Radio Bureau

By:


Eric Malinen
Thomas D. Fitz-Gibbon
Attorneys

Dated: September 1, 1992

Certificate of Service

I, Ivy Harris, certify that on September 1, 1992, a copy of the foregoing SUPPLEMENT TO CASE IN CHIEF, filed on behalf of the Chief, Private Radio Bureau, was sent by First Class mail to:

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Joseph Chachkin
Administrative Law Judge
Federal Communications Commission
2000 L Street, N.W., Room 226
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Ivy Harris

The Radio Amateur's

ELEMENT 2

Novice Class Test Manual

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**Contains all questions & answers in the Novice Class
 VEC Question Pool**

Updated for the new Codeless Technician rules

All Volunteer Examiners (VE's) and Volunteer Examiner Coordinator (VEC) organizations are required to use these Novice Class questions verbatim in preparing their Element 2 examinations. These test questions were released into the public domain by the VEC organizations' Question Pool Committee on July 1, 1990. The purpose of this test manual is to alert the public to the content of the Element 2 question pool. Element 2 is common to both the older Novice testing program and the newer VE/VEC System since passing the Novice level is a requirement for the Technician Class.

Contents:

<u>A - Rules and Regulations</u>	<u>1</u>	<u>F - Circuit Components</u>	<u>25</u>
<u>B - Operating Procedures</u>	<u>12</u>	<u>G - Practical Circuits</u>	<u>27</u>
<u>C - Radio Wave Propagation</u>	<u>16</u>	<u>H - Signals and Emissions</u>	<u>29</u>
<u>D - Amateur Radio Practice</u>	<u>18</u>	<u>I - Antennas and Feed Lines</u>	<u>31</u>
<u>E - Electrical Principles</u>	<u>22</u>	<u>Figures/Diagrams</u>	<u>35</u>
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SUBLELEMENT 2A - Rules and Regulations (10 Questions)

One (1) question should be from the following:

1. What are the five principles that express the fundamental purpose for which the amateur service rules are designed? [2A-1.1]
 - A. Recognition of emergency communications, advancement of the radio art, improvement of communication and technical skills, increase in the number of trained radio operators and electronics experts, and the enhancement of international goodwill
 - B. Recognition of business communications, advancement of the radio art, improvement of communication and business skills, increase in the number of trained radio operators and electronics experts, and the enhancement of international goodwill
 - C. Recognition of emergency communications, preservation of the earliest radio techniques, improvement of communication and technical skills, maintain a pool of people familiar with early tube-type equipment, and the enhancement of international goodwill
 - D. Recognition of emergency communications, advancement of the radio art, improvement of communication and technical skills, increase in the number of trained radio operators and electronics experts, and the enhancement of a sense of patriotism
2. Which of the following is not one of the basic principles for which the amateur service rules are designed? [2A-1.2]
 - A. Providing emergency communications
 - B. Improvement of communication and technical skills
 - C. Advancement of the radio art
 - D. Enhancement of a sense of patriotism and nationalism
3. The amateur service rules were designed to provide a radio communications service that meets five fundamental purposes. Which of the following is not one of those principles? [2A-1.3]
 - A. Improvement of communication and technical skills
 - B. Enhancement of international goodwill
 - C. Increase the number of trained radio operators and electronics experts
 - D. Preserving the history of radio communications
4. The amateur service rules were designed to provide a radio communications service that meets five fundamental purposes. What are those principles? [2A-1.4]
 - A. Recognition of business communications, advancement of the radio art, improvement of communication and business skills, increase in the number of trained radio operators and electronics experts, and the enhancement of international goodwill
 - B. Recognition of emergency communications, advancement of the radio art, improvement of communication and technical skills, increase in the number of trained radio operators and electronics experts, and the enhancement of international goodwill
 - C. Recognition of emergency communications, preservation of the earliest radio techniques, improvement of communication and technical skills, maintain a pool of people familiar with early tube-type equipment, and the enhancement of international goodwill
 - D. Recognition of emergency communications, advancement of the radio art, improvement of communication and technical skills, increase in the number of trained radio operators and electronics experts, and the enhancement of a sense of patriotism
5. What is the definition of the amateur service? [2A-2.1]
 - A. A private radio service used for personal gain and public benefit
 - B. A public radio service used for public service communications
 - C. A radio communication service for the purpose of self-training, intercommunication and technical investigations
 - D. A private radio service intended for the furtherance of commercial radio interests
6. What name is given to the radio communication service that is designed for self-training, intercommunication, and technical investigation? [2A-2.2]
 - A. The amateur service
 - B. The Citizen's Radio Service
 - C. The Experimenter's Radio Service
 - D. The Maritime Radio Service

7. What document contains the specific rules and regulations governing the amateur service in the United States? [2A-3.1]
- Part 97 of title 47 CFR (Code of Federal Regulations)
 - The Communications Act of 1934 (as amended)
 - The Radio Amateur's Handbook
 - The minutes of the International Telecommunication Union meetings
8. Which one of the following topics is not addressed in the rules and regulations of the amateur service? [2A-3.2]
- Station operation standards
 - Technical standards
 - Providing emergency communications
 - Station construction standards
9. What is the definition of an amateur operator? [2A-4.1]
- A person who has not received any training in radio operations
 - A person holding a written authorization to be the control operator of an amateur station
 - A person who performs private radio communications for hire
 - A trainee in a commercial radio station
10. What term describes a person holding a written authorization to be the control operator of an amateur station? [2A-4.2]
- A Citizen Radio operator
 - A Personal Radio operator
 - A Radio Service operator
 - An amateur operator
-
- One (1) question should be from the following:**
-
11. What is the portion of an amateur operator/primary station license that conveys operator privileges? [2A-5.1]
- The verification section
 - Form 610
 - The operator license
 - The station license
12. What authority is derived from an operator/primary station license? [2A-5.2]
- The authority to operate any shortwave radio station
 - The authority to be the control operator of an amateur station
 - The authority to have an amateur station at a particular location
 - The authority to transmit on either amateur or Class D citizen's band frequencies
13. What authority is derived from a written authorization for an amateur station? [2A-6.1]
- The authority to use specified operating frequencies
 - The authority to operate an amateur station
 - The authority to enforce FCC Rules when violations are noted on the part of other operators
 - The authority to transmit on either amateur or Class D citizen's band frequencies
14. What part of your amateur license gives you authority to operate an amateur station? [2A-6.2]
- The operator license
 - The FCC Form 610
 - The station license
 - An amateur operator/primary station license does not specify a station location
15. What is an amateur station? [2A-7.1]
- A licensed radio station engaged in broadcasting to the public in a limited and well-defined area
 - A radio station used to further commercial radio interests
 - A private radio service used for personal gain and public service
 - A station in an amateur service consisting of the apparatus necessary for carrying on radio communications
16. Who is a control operator? [2A-8.1]
- An amateur operator designated by the licensee of a station to be responsible for the transmissions from that station to assure compliance with the FCC rules
 - A person, either licensed or not, who controls the emissions of an amateur station
 - An unlicensed person who is speaking over an amateur station's microphone while a licensed person is present
 - A government official who comes to an amateur station to take control for test purposes
17. If you designate another amateur operator to be responsible for the transmissions from your station, what is the other operator called? [2A-8.2]
- Auxiliary operator
 - Operations coordinator
 - Third party
 - Control operator

18. List the five United States amateur operator/primary station license classes in order of increasing privileges. [2A-9.1]
- A. Novice, General, Technician, Advanced, Amateur Extra
 - B. Novice, Technician, General, Advanced, Digital
 - C. Novice, Technician, General, Amateur, Extra
 - D. Novice, Technician, General, Advanced, Amateur Extra

19. What is the license class immediately above Novice class? [2A-9.3]
- A. The Digital class license
 - B. The Technician class license
 - C. The General class license
 - D. The Experimenter's class license

One (1) question should be from the following:

20. What frequencies are available in the amateur 40-meter wavelength band for a control operator holding a Novice class operator license in ITU Region 2? [2A-10.2]
- A. 3500 to 4000 kHz
 - B. 3700 to 3750 kHz
 - C. 7100 to 7150 kHz
 - D. 7000 to 7300 kHz

21. What frequencies are available in the amateur 15-meter wavelength band for a control operator holding a Novice class operator license? [2A-10.3]
- A. 21.100 to 21.200 MHz
 - B. 21.000 to 21.450 MHz
 - C. 28.000 to 29.700 MHz
 - D. 28.100 to 28.200 MHz

22. What frequencies are available in the amateur 10-meter wavelength band for a control operator holding a Novice class operator license? [2A-10.4]
- A. 28.000 to 29.700 MHz
 - B. 28.100 to 28.300 MHz
 - C. 28.100 to 28.500 MHz
 - D. 28.300 to 28.500 MHz

23. What frequencies are available in the amateur 220-MHz band for a control operator holding a Novice class operator license in ITU Region 2? [2A-10.5]
- A. 225.0 to 230.5 MHz
 - B. 222.1 to 223.91 MHz
 - C. 224.1 to 225.1 MHz
 - D. 222.2 to 224.0 MHz

24. What frequencies are available in the amateur 1270-MHz band for a control operator holding a Novice class operator license? [2A-10.6]
- A. 1260 to 1270 MHz
 - B. 1240 to 1300 MHz
 - C. 1270 to 1295 MHz
 - D. 1240 to 1246 MHz

25. If you are operating your amateur station on 3725 kHz, in what meter band are you operating? [2A-10.7]
- A. 80 meters
 - B. 40 meters
 - C. 15 meters
 - D. 10 meters

26. If you are operating your amateur station on 7125 kHz, in what meter band are you operating? [2A-10.8]
- A. 80 meters
 - B. 40 meters
 - C. 15 meters
 - D. 10 meters

27. If you are operating your amateur station on 21150 kHz, in what meter band are you operating? [2A-10.9]
- A. 80 meters
 - B. 40 meters
 - C. 15 meters
 - D. 10 meters

28. If you are operating your amateur station on 28150 kHz, in what meter band are you operating? [2A-10.10]
- A. 80 meters
 - B. 40 meters
 - C. 15 meters
 - D. 10 meters

One (1) question should be from the following:

29. Who is eligible to obtain a US amateur operator/primary station license? [2A-11.1]
- A. Anyone except a representative of a foreign government
 - B. Only a citizen of the United States
 - C. Anyone
 - D. Anyone except an employee of the United States Government

30. Who is not eligible to obtain a US amateur operator/primary station license? [2A-11.2]
- A. Any citizen of a country other than the United States
 - B. A representative of a foreign government
 - C. No one
 - D. An employee of the United States Government

31. What FCC examination elements are required for a Novice class license? [2A-12.1]
- A. Elements 1(A) and 2(A)
 - B. Elements 1(A) and 3(A)
 - C. Elements 1(A) and 2
 - D. Elements 2 and 4
32. What is an FCC Element 1(A) examination intended to prove? [2A-12.2]
- A. The applicant's ability to send and receive texts in the international Morse code at not less than 5 words per minute
 - B. The applicant's ability to send and receive texts in the international Morse code at not less than 13 words per minute
 - C. The applicant's knowledge of Novice class theory and regulations
 - D. The applicant's ability to recognize Novice frequency assignments and operating modes
33. What is an FCC Element 2 examination? [2A-12.3]
- A. A test of the applicant's ability to send and receive Morse code at 5 words per minute
 - B. The written examination concerning the privileges of a Technician class operator license
 - C. A test of the applicant's ability to recognize Novice frequency assignments
 - D. The written examination concerning the privileges of a Novice class operator license
34. Who is eligible to obtain an FCC-issued written authorization for an amateur station? [2A-13.1]
- A. A licensed amateur operator
 - B. Any unlicensed person, except an agent of a foreign government
 - C. Any unlicensed person, except an employee of the United States Government
 - D. Any unlicensed United States Citizen
35. Why is an amateur operator required to furnish the FCC with a current mailing address served by the US Postal service? [2A-14.1]
- A. So the FCC has a record of the location of each amateur station
 - B. In order to comply with the Commission's rules and so the FCC can correspond with the licensee
 - C. So the FCC can send license-renewal notices
 - D. So the FCC can compile a list for use in a call sign directory
36. Which one of the following call signs is a valid US amateur call? [2A-15.1]
- A. UA4HAK
 - B. KBL7766
 - C. KA9OLS
 - D. BY7HY
37. Which one of the following call signs is a valid US amateur call? [2A-15.2]
- A. CE2FTF
 - B. G3GVA
 - C. UA1ZAM
 - D. AA2Z
38. Which one of the following call signs is not a valid US amateur call? [2A-15.3]
- A. KDV5653
 - B. WA1DVU
 - C. KA5BUG
 - D. NT0Z
39. What letters may be used for the first letter in a valid US amateur call sign? [2A-15.4]
- A. K, N, U and W
 - B. A, K, N and W
 - C. A, B, C and D
 - D. A, N, V and W
40. Excluding special-event call signs that may be issued by the FCC, what numbers may be used in a valid US call sign? [2A-15.5]
- A. Any double-digit number, 10 through 99
 - B. Any double-digit number, 22 through 45.
 - C. Any single digit, 1 through 9
 - D. A single digit, 0 through 9
41. Your Novice license was issued on November 1, 1988. When will it expire? [2A-16.1]
- A. On the date specified on the license
 - B. November 30, 1998
 - C. November 1, 1993
 - D. November 1, 1990
-
- One (1) question should be from the following:**
-
42. What does the term emission mean? [2A-17.1]
- A. RF signals transmitted from a radio station
 - B. Signals refracted by the E layer
 - C. Filter out the carrier of a received signal
 - D. Baud rate
43. What emission types are Novice control operators permitted to use on the 80-meter wavelength band? [2A-17.2]
- A. CW only
 - B. Data only
 - C. RTTY only
 - D. Phone only

44. What emission types are Novice control operators permitted to use in the 40-meter wavelength band? [2A-17.3]
- A. CW only
 - B. Data only
 - C. RTTY only
 - D. Phone only
45. What emission types are Novice control operators permitted to use in the 15-meter wavelength band? [2A-17.4]
- A. CW only
 - B. Data only
 - C. RTTY only
 - D. Phone only
46. What emission types are Novice control operators permitted to use from 7100 to 7150 kHz in ITU Region 2? [2A-17.6]
- A. CW and data
 - B. Phone
 - C. All amateur emission privileges authorized for use on those frequencies
 - D. CW only
47. What emission types are Novice control operators permitted to use on frequencies from 21.1 to 21.2 MHz? [2A-17.7]
- A. CW and data only
 - B. CW and phone only
 - C. All amateur emission privileges authorized for use on those frequencies
 - D. CW only
48. What emission types are Novice control operators permitted to use on frequencies from 28.1 to 28.3 MHz? [2A-17.8]
- A. All authorized amateur emission privileges
 - B. Data or phone only
 - C. CW, RTTY and data
 - D. CW and phone only
49. What emission types are Novice control operators permitted to use on frequencies from 28.3 to 28.5 MHz? [2A-17.9]
- A. All authorized amateur emission privileges
 - B. CW and data only
 - C. CW and single-sideband phone only
 - D. Data and phone only
50. What emission types are Novice control operators permitted to use on the amateur 220-MHz band in ITU Region 2? [2A-17.10]
- A. CW and phone only
 - B. CW and data only
 - C. Data and phone only
 - D. All amateur emission privileges authorized for use on 220 MHz
51. What emission types are Novice control operators permitted to use on the amateur 1270-MHz band? [2A-17.11]
- A. Data and phone only
 - B. CW and data only
 - C. CW and phone only
 - D. All amateur emission privileges authorized for use on 1270 MHz
52. On what frequencies in the 10-meter wavelength band may a Novice control operator use single-sideband phone? [2A-17.12]
- A. 3700 to 3750 kHz
 - B. 7100 to 7150 kHz
 - C. 21100 to 21200 kHz
 - D. 28300 to 28500 kHz
53. On what frequencies in the 1.25-meter wavelength band in ITU Region 2 may a Novice control operator use FM phone emission? [2A-17.13]
- A. 28.3 to 28.5 MHz
 - B. 144.0 to 148.0 MHz
 - C. 222.1 to 223.91 MHz
 - D. 1240 to 1270 MHz
-
- One (1) question should be from the following:**
-
54. What amount of output transmitting power may a Novice class control operator use when operating below 30 MHz? [2A-18.1]
- A. 200 watts input
 - B. 250 watts output
 - C. 1500 watts PEP output
 - D. The minimum legal power necessary to carry out the desired communications
55. What is the maximum transmitting power ever permitted to be used by an amateur station transmitting in the 80, 40 and 15-meter Novice bands? [2A-18.2]
- A. 75 watts PEP output
 - B. 100 watts PEP output
 - C. 200 watts PEP output
 - D. 1500 watts PEP output
56. What is the maximum transmitting power permitted an amateur station transmitting on 3725 kHz? [2A-18.3]
- A. 75 watts PEP output
 - B. 100 watts PEP output
 - C. 200 watts PEP output
 - D. 1500 watts PEP output

57. What is the maximum transmitting power permitted an amateur station transmitting on 7125 kHz? [2A-18.4]
- A. 75 watts PEP output
 - B. 100 watts PEP output
 - C. 200 watts PEP output
 - D. 1500 watts PEP output
58. What is the maximum transmitting power permitted an amateur station transmitting on 21.125 MHz? [2A-18.5]
- A. 75 watts PEP output
 - B. 100 watts PEP output
 - C. 200 watts PEP output
 - D. 1500 watts PEP output
59. What is the maximum transmitting power permitted an amateur station with a Novice control operator transmitting on 28.125 MHz? [2A-19.1]
- A. 75 watts PEP output
 - B. 100 watts PEP output
 - C. 200 watts PEP output
 - D. 1500 watts PEP output
60. What is the maximum transmitting power permitted an amateur station with a Novice control operator transmitting in the amateur 10-meter wavelength band? [2A-19.2]
- A. 25 watts PEP output
 - B. 200 watts PEP output
 - C. 1000 watts PEP output
 - D. 1500 watts PEP output
61. What is the maximum transmitting power permitted an amateur station with a Novice control operator transmitting in the amateur 220-MHz band? [2A-19.3]
- A. 5 watts PEP output
 - B. 10 watts PEP output
 - C. 25 watts PEP output
 - D. 200 watts PEP output
62. What is the maximum transmitting power permitted an amateur station with a Novice control operator transmitting in the amateur 1270-MHz band? [2A-19.4]
- A. 5 milliwatts PEP output
 - B. 500 milliwatts PEP output
 - C. 1 watt PEP output
 - D. 5 watts PEP output
63. What amount of transmitting power may an amateur station with a Novice control operator use in the amateur 220-MHz band? [2A-19.5]
- A. Not less than 5 watts PEP output
 - B. The minimum legal power necessary to maintain reliable communications
 - C. Not more than 50 watts PEP output
 - D. Not more than 200 watts PEP output
64. What term is used to describe narrow-band direct-printing telegraphy emissions? [2A-20.1]
- A. Teleport communications
 - B. Direct communications
 - C. RTTY communications
 - D. Third-party communications
65. What term is used to describe telemetry, telecommand and computer communications emissions? [2A-20.2]
- A. Teleport communications
 - B. Direct communications
 - C. Data communications
 - D. Third-party communications
66. On what frequencies in the 10-meter wavelength band are Novice control operators permitted to transmit RTTY? [2A-20.3]
- A. 28.1 to 28.5 MHz
 - B. 28.0 to 29.7 MHz
 - C. 28.1 to 28.2 MHz
 - D. 28.1 to 28.3 MHz
-
- One (1) question should be from the following:**
-
67. Who is held responsible for the proper operation of an amateur station? [2A-21.1]
- A. Only the control operator
 - B. Only the station licensee
 - C. Both the control operator and the station licensee
 - D. The person who owns the property where the station is located
68. You allow another amateur operator to use your amateur station. What are your responsibilities, as the station licensee? [2A-21.2]
- A. You and the other amateur operator are equally responsible for the proper operation of your station
 - B. Only the control operator is responsible for the proper operation of the station
 - C. As the station licensee, you must be at the control point of your station whenever it is operated
 - D. You must notify the FCC when another amateur will be the control operator of your station

69. What is your primary responsibility as the station licensee? [2A-21.3]
- You must permit any licensed amateur operator to operate your station at any time upon request
 - You must be present whenever the station is operated
 - You must notify the FCC in writing whenever another amateur operator will act as the control operator
 - You are responsible for the proper operation of the station for which you are licensed
70. If you are the licensee of an amateur station when are you not responsible for its proper operation? [2A-21.4]
- Only when another licensed amateur is the control operator
 - The licensee is responsible for the proper operation of the station for which he or she is licensed
 - Only after notifying the FCC in writing that another licensed amateur will assume responsibility for the proper operation of your station
 - Only when your station is in repeater operation
71. When must an amateur station have a control operator? [2A-22.1]
- A control operator is only required for training purposes
 - Whenever the station receiver is operated
 - Whenever the station is transmitting
 - A control operator is not required
72. Another amateur gives you permission to use her amateur station. What are your responsibilities, as the control operator? [2A-22.2]
- Both you and she are equally responsible for the proper operation of her station
 - Only the station licensee is responsible for the proper operation of the station, not you the control operator
 - You must be certain the station licensee has given proper FCC notice that you will be the control operator
 - You must inspect all antennas and related equipment to ensure they are working properly
73. Who may be the control operator of an amateur station? [2A-23.1]
- Any person over 21 years of age
 - Any properly licensed amateur operator that is designated by the station licensee
 - Any licensed amateur operator with an Advanced class license or higher
 - Any person over 21 years of age with a General class license or higher
74. Where must an amateur operator be when he or she is performing the duties of control operator? [2A-24.1]
- Anywhere in the same building as the transmitter
 - At the control point of the amateur station
 - At the station entrance, to control entry to the room
 - Within sight of the station monitor, to view the output spectrum of the transmitter
75. Where must you keep your amateur operator license when you are operating a station? [2A-25.1]
- Your original operator license must always be posted in plain view
 - Your original operator license must always be taped to the inside front cover of your station log
 - You must have the original or a photocopy of your operator license in your possession
 - You must have the original or a photocopy of your operator license posted at your primary station location. You need not have the original license nor a copy in your possession to operate another station
76. Where must you keep your written authorization for an amateur station? [2A-26.1]
- Your original station license must always be taped to the inside front cover of your station log
 - Your original station license must always be posted in plain view
 - You must post the original or a photocopy of your station license at the main entrance to the transmitter building
 - The original or a photocopy of the written authorization for an amateur station must be retained at the station
-
- One (1) question should be from the following:**
-
77. How often must an amateur station be identified? [2A-27.1]
- At the beginning of the contact and at least every ten minutes during a contact
 - At least once during each transmission
 - At least every ten minutes during a contact and at the end of the contact
 - Every 15 minutes during a contact and at the end of the contact

78. As an amateur operator, how should you correctly identify your station? [2A-27.2]
- A. With the name and location of the control operator
 - B. With the station call sign
 - C. With the call of the control operator, even when he or she is visiting another radio amateur's station
 - D. With the name and location of the station licensee, followed by the two-letter designation of the nearest FCC Field Office
79. What station identification, if any, is required at the beginning of communication? [2A-27.3]
- A. The operator originating the contact must transmit both call signs
 - B. No identification is required at the beginning of the contact
 - C. Both operators must transmit their own call signs
 - D. Both operators must transmit both call signs
80. What station identification, if any, is required at the end of a communication? [2A-27.4]
- A. Both stations must transmit their own call sign, assuming they are FCC-licensed
 - B. No identification is required at the end of the contact
 - C. The station originating the contact must always transmit both call signs
 - D. Both stations must transmit their own call sign followed by a two-letter designator for the nearest FCC field office
81. What do the FCC rules for amateur station identification generally require? [2A-27.5]
- A. Each amateur station shall give its call sign at the beginning of each communication, and every ten minutes or less during a communication
 - B. Each amateur station shall give its call sign at the end of each communication, and every ten minutes or less during a communication
 - C. Each amateur station shall give its call sign at the beginning of each communication, and every five minutes or less during a communication
 - D. Each amateur station shall give its call sign at the end of each communication, and every five minutes or less during a communication
82. What is the fewest number of times you must transmit your amateur station identification during a 25 minute QSO? [2A-27.6]
- A. 1
 - B. 2
 - C. 3
 - D. 4
83. What is the longest period of time during a QSO that an amateur station does not need to transmit its station identification? [2A-27.7]
- A. 5 minutes
 - B. 10 minutes
 - C. 15 minutes
 - D. 20 minutes
84. With which amateur stations may an FCC-licensed amateur station communicate? [2A-28.1]
- A. All amateur stations
 - B. All public noncommercial radio stations unless prohibited by the station's government
 - C. Only with US amateur stations
 - D. All amateur stations, unless prohibited by the amateur's government
85. With which non-amateur stations may an FCC-licensed amateur station communicate? [2A-28.2]
- A. No non-amateur stations
 - B. All such stations
 - C. Only those authorized by the FCC
 - D. Only those who use the International Morse code
86. When must the licensee of an amateur station in portable or mobile operation notify the FCC? [2A-29.1]
- A. One week in advance if the operation will last for more than 24 hours
 - B. FCC notification is not required for portable or mobile operation
 - C. One week in advance if the operation will last for more than a week
 - D. One month in advance of any portable or mobile operation
87. When may you operate your amateur station at a location within the United States, its territories or possessions other than the one listed on your station license? [2A-29.2]
- A. Only during times of emergency
 - B. Only after giving proper notice to the FCC
 - C. During an emergency or an FCC-approved emergency preparedness drill
 - D. Whenever you want to

88. When are communications pertaining to the business or commercial affairs of any party permitted in the amateur service? [2A-30.1]

- A. Only when the immediate safety of human life or immediate protection of property is threatened
- B. There are no rules against conducting business communications in the amateur service
- C. No business communications of any kind are ever permitted in the amateur service
- D. Business communications are permitted between the hours of 9 AM to 5 PM, only on weekdays

89. You wish to obtain an application for membership in the American Radio Relay League. When would you be permitted to send an Amateur Radio message requesting the application? [2A-30.2]

- A. At any time, since the ARRL is a not-for-profit organization
- B. Never. This would facilitate the commercial affairs of the ARRL
- C. Only during normal business hours, between 9 AM and 5 PM
- D. At any time, since there are no rules against conducting business communications in the amateur service

90. On your way home from work you decide to order pizza for dinner. When would you be permitted to use the autopatch on your radio club repeater to order the pizza? [2A-30.3]

- A. At any time, since you will not profit from the communications
- B. Only during normal business hours, between 9 AM and 5 PM
- C. At any time, since there are no rules against conducting business communications in the amateur service
- D. Never. This would facilitate the commercial affairs of a business

One (1) question should be from the following:

91. When may an FCC-licensed amateur operator communicate with an amateur operator in a foreign country? [2A-31.1]

- A. Only when the foreign operator uses English as his primary language
- B. All the time, except on 28.600 to 29.700 MHz
- C. Only when a third party agreement exists between the US and the foreign country
- D. At any time unless prohibited by either the US or the foreign government

92. When may an amateur station be used to transmit messages for hire? [2A-32.1]

- A. Under no circumstances may an amateur station be hired to transmit messages
- B. Modest payment from a non-profit charitable organization is permissible
- C. No money may change hands, but a radio amateur may be compensated for services rendered with gifts of equipment or services rendered as a returned favor
- D. All payments received in return for transmitting messages by amateur radio must be reported to the IRS

93. When may the control operator be paid to transmit messages from an amateur station? [2A-32.2]

- A. The control operator may be paid if he or she works for a public service agency such as the Red Cross
- B. The control operator may not be paid under any circumstances
- C. The control operator may be paid if he or she reports all income earned from operating an amateur station to the IRS as receipt of tax-deductible contributions
- D. The control operator may accept compensation if he or she works for a club station during the period in which the station is transmitting telegraphy practice or information bulletins if certain exacting conditions are met

94. When is an amateur operator permitted to broadcast information intended for the general public? [2A-33.1]

- A. Amateur operators are not permitted to broadcast information intended for the general public
- B. Only when the operator is being paid to transmit the information
- C. Only when such transmissions last less than 1 hour in any 24-hour period
- D. Only when such transmissions last longer than 15 minutes

95. What is third-party communications? [2A-34.1]

- A. A message passed from the control operator of an amateur station to another control operator on behalf of another person
- B. Public service communications handled on behalf of a minor political party
- C. Only messages that are formally handled through amateur radio channels
- D. A report of highway conditions transmitted over a local repeater

96. Who is a third party in amateur communications? [2A-34.2]

- A. The amateur station that breaks into a two-way contact between two other amateur stations
- B. Any person for whom a message is passed through amateur communication channels other than the control operators of the two stations handling the message
- C. A shortwave listener monitoring a two-way amateur communication
- D. The control operator present when an unlicensed person communicates over an amateur station

97. When is an amateur operator permitted to transmit a message to a foreign country for a third party? [2A-34.3]

- A. Anytime
- B. Never
- C. Anytime, unless there is a third-party communications agreement between the US and the foreign government
- D. When there is a third-party communications agreement between the US and the foreign government, or when the third party is eligible to be the control operator of the station

98. Is an amateur station permitted to transmit music? [2A-35.1]

- A. The transmission of music is not permitted in the amateur service
- B. When the music played produces no dissonances or spurious emissions
- C. When it is used to jam an illegal transmission
- D. Only above 1280 MHz

99. Is the use of codes or ciphers where the intent is to obscure the meaning permitted during a two-way communication in the amateur service? [2A-36.1]

- A. Codes and ciphers are permitted during ARRL-sponsored contests
- B. Codes and ciphers are permitted during nationally declared emergencies
- C. The transmission of codes and ciphers where the intent is to obscure the meaning is not permitted in the amateur service
- D. Codes and ciphers are permitted above 1280 MHz

100. When is an operator in the amateur service permitted to use abbreviations that are intended to obscure the meaning of the message? [2A-36.2]

- A. Only during ARRL-sponsored contests
- B. Only on frequencies above 222.5 MHz
- C. Only during a declared communications emergency
- D. Abbreviations that are intended to obscure the meaning of the message may never be used in the amateur service

One (1) question should be from the following:

101. Under what circumstances, if any, may the control operator cause false or deceptive signals or communications to be transmitted? [2A-37.1]

- A. Under no circumstances
- B. When operating a beacon transmitter in a "fox hunt" exercise
- C. When playing a harmless "practical joke" without causing interference to other stations that are not involved
- D. When you need to obscure the meaning of transmitted information to ensure secrecy

102. If an amateur operator transmits the word "MAYDAY" when no actual emergency has occurred, what is this called? [2A-37.2]

- A. A traditional greeting in May
- B. An Emergency Action System test transmission
- C. False or deceptive signals
- D. "MAYDAY" has no significance in an emergency situation

103. When may an amateur station transmit unidentified communications? [2A-38.1]

- A. A transmission need not be identified if it is restricted to brief tests not intended for reception by other parties
- B. A transmission need not be identified when conducted on a clear frequency or "dead band" where interference will not occur
- C. An amateur operator may never transmit unidentified communications
- D. A transmission need not be identified unless two-way communications or third-party communications handling are involved

104. What is the meaning of the term unidentified radio communications or signals? [2A-38.2]
- Radio communications in which the transmitting station's call sign is transmitted in modes other than CW and voice
 - Radio communications approaching a receiving station from an unknown direction
 - Radio communications in which the operator fails to transmit his or her name and QTH
 - Radio communications in which the station identification is not transmitted
105. What is the term used to describe a transmission from an amateur station that does not transmit the required station identification? [2A-38.3]
- Unidentified communications or signals
 - Reluctance modulation
 - NON emission
 - Tactical communication
106. When may an amateur operator willfully or maliciously interfere with a radio communication or signal? [2A-39.1]
- You may jam another person's transmissions if that person is not operating in a legal manner
 - You may interfere with another station's signals if that station begins transmitting on a frequency already occupied by your station
 - You may never willfully or maliciously interfere with another station's transmissions
 - You may expect, and cause, deliberate interference because it is unavoidable during crowded band conditions
107. What is the meaning of the term malicious interference? [2A-39.2]
- Accidental interference
 - Intentional interference
 - Mild interference
 - Occasional interference
108. What is the term used to describe an amateur radio transmission that is intended to disrupt other communications in progress? [2A-39.3]
- Interrupted CW
 - Malicious interference
 - Transponded signals
 - Unidentified transmissions
109. As an amateur operator, you receive an Official Notice of Violation from the FCC. How promptly must you respond? [2A-40.1]
- Within 90 days
 - Within 30 days
 - As specified in the Notice
 - The next day
110. If you were to receive a voice distress signal from a station on a frequency outside your operator privileges, what restrictions would apply to assisting the station in distress? [2A-40.2]
- You would not be allowed to assist the station because the frequency of its signals were outside your operator privileges
 - You would be allowed to assist the station only if your signals were restricted to the nearest frequency band of your privileges
 - You would be allowed to assist the station on a frequency outside of your operator privileges only if you used international Morse code
 - You would be allowed to assist the station on a frequency outside of your operator privileges using any means of radio communications at your disposal
111. If you were in a situation where normal communication systems were disrupted due to a disaster, what restrictions would apply to essential communications you might provide in connection with the immediate safety of human life? [2A-40.3]
- You would not be allowed to communicate at all except to the FCC Engineer in Charge of the area concerned
 - You would be restricted to communications using only the emissions and frequencies authorized to your operator privileges
 - You would be allowed to communicate on frequencies outside your operator privileges only if you used international Morse code
 - You would be allowed to use any means of radio communication at your disposal

SUBELEMENT 2B - Operating Procedures (2 Questions)

One (1) question should be from the following:

112. What is the most important factor to consider when selecting a transmitting frequency within your authorized subband? [2B-1-1.1]
- A. The frequency should not be in use by other amateurs
 - B. You should be able to hear other stations on the frequency to ensure that someone will be able to hear you
 - C. Your antenna should be resonant at the selected frequency
 - D. You should ensure that the SWR on the antenna feed line is high enough at the selected frequency
113. You wish to contact an amateur station more than 1500 miles away on a summer afternoon. Which band is most likely to provide a successful contact? [2B-1-1.2]
- A. The 80- or 40-meter wavelength bands
 - B. The 40- or 15-meter wavelength bands
 - C. The 15- or 10-meter wavelength bands
 - D. The 1-1/4 meter or 23-centimeter wavelength bands
114. How can on-the-air transmitter tune-up be kept as short as possible? [2B-1-1.3]
- A. By using a random wire antenna
 - B. By tuning up on 40 meters first, then switching to the desired band
 - C. By tuning the transmitter into a dummy load
 - D. By using twin lead instead of coaxial-cable feed lines
115. You are having a QSO with your uncle in Pittsburgh when you hear an emergency call for help on the frequency you are using. What should you do? [2B-1-2.1]
- A. Inform the station that the frequency is in use
 - B. Direct the station to the nearest emergency net frequency
 - C. Call your local Civil Preparedness Office and inform them of the emergency
 - D. Immediately stand by to copy the emergency communication
116. What is the format of a standard Morse code CQ call? [2B-2-1.1]
- A. Transmit the procedural signal "CQ" three times, followed by the procedural signal "DE", followed by your call three times
 - B. Transmit the procedural signal "CQ" three times, followed by the procedural signal "DE", followed by your call one time
 - C. Transmit the procedural signal "CQ" ten times, followed by the procedural signal "DE", followed by your call one time
 - D. Transmit the procedural signal "CQ" continuously until someone answers your call
117. How should you answer a Morse code CQ call? [2B-2-1.2]
- A. Send your call sign four times
 - B. Send the other station's call sign twice, followed by the procedural signal "DE", followed by your call sign twice
 - C. Send the other station's call sign once, followed by the procedural signal "DE", followed by your call sign four times
 - D. Send your call sign followed by your name, station location and a signal report
118. At what telegraphy speed should a "CQ" message be transmitted? [2B-2-2.1]
- A. Only speeds below five WPM
 - B. The highest speed your keyer will operate
 - C. Any speed at which you can reliably receive
 - D. The highest speed at which you can control the keyer
119. What is the meaning of the Morse code character AR? [2B-2-3.1]
- A. Only the called station transmit
 - B. All received correctly
 - C. End of transmission
 - D. Best regards
120. What is the meaning of the Morse code character SK? [2B-2-3.2]
- A. Received some correctly
 - B. Best regards
 - C. Wait
 - D. End of contact
121. What is the meaning of the Morse code character BT? [2B-2-3.3]
- A. Double dash "="
 - B. Fraction bar "/"
 - C. End of contact
 - D. Back to you

122. What is the meaning of the Morse code character DN? [2B-2-3.4]
- A. Double dash "="
 - B. Fraction bar "/"
 - C. Done now (end of contact)
 - D. Called station only transmit
123. What is the meaning of the Morse code character KN? [2B-2-3.5]
- A. Fraction bar "/"
 - B. End of contact
 - C. Called station only transmit
 - D. Key now (go ahead to transmit)
124. What is the procedural signal "CQ" used for? [2B-2-4.1]
- A. To notify another station that you will call on the quarter hour
 - B. To indicate that you are testing a new antenna and are not listening for another station to answer
 - C. To indicate that only the called station should transmit
 - D. A general call when you are trying to make a contact
125. What is the procedural signal "DE" used for? [2B-2-4.2]
- A. To mean "from" or "this is," as in "W9NGT de N9BTT"
 - B. To indicate directional emissions from your antenna
 - C. To indicate "received all correctly"
 - D. To mean "calling any station"
126. What is the procedural signal "K" used for? [2B-2-4.3]
- A. To mean "any station transmit"
 - B. To mean "all received correctly"
 - C. To mean "end of message"
 - D. To mean "called station only transmit"
127. What does the R in the RST signal report mean? [2B-2-5.1]
- A. The recovery of the signal
 - B. The resonance of the CW tone
 - C. The rate of signal flutter
 - D. The readability of the signal
128. What does the S in the RST signal report mean? [2B-2-5.2]
- A. The scintillation of a signal
 - B. The strength of the signal
 - C. The signal quality
 - D. The speed of the CW transmission
129. What does the I in the RST signal report mean? [2B-2-5.3]
- A. The tone of the signal
 - B. The closeness of the signal to "telephone" quality
 - C. The timing of the signal dot to dash ratio
 - D. The tempo of the signal
130. What is one meaning of the Q signal "QRS"? [2B-2-6.1]
- A. Interference from static
 - B. Send more slowly
 - C. Send RST report
 - D. Radio station location is
131. What is one meaning of the Q signal "QRT"? [2B-2-6.2]
- A. The correct time is
 - B. Send RST report
 - C. Stop sending
 - D. Send more slowly
132. What is one meaning of the Q signal "QTH"? [2B-2-6.3]
- A. Time here is
 - B. My name is
 - C. Stop sending
 - D. My location is ...
133. What is one meaning of the Q signal "QRZ," when it is followed with a question mark? [2B-2-6.4]
- A. Who is calling me?
 - B. What is your radio zone?
 - C. What time zone are you in?
 - D. Is this frequency in use?
134. What is one meaning of the Q signal "QSL," when it is followed with a question mark? [2B-2-6.5]
- A. Shall I send you my log?
 - B. Can you acknowledge receipt (of my message)?
 - C. Shall I send more slowly?
 - D. Who is calling me?
135. What is the format of a standard radiotelephone CQ call? [2B-3-1.1]
- A. Transmit the phrase "CQ" at least ten times, followed by "this is," followed by your call sign at least two times
 - B. Transmit the phrase "CQ" at least five times, followed by "this is," followed by your call sign once
 - C. Transmit the phrase "CQ" three times, followed by "this is," followed by your call sign three times
 - D. Transmit the phrase "CQ" at least ten times, followed by "this is," followed by your call sign once

136. How should you answer a radiotelephone CQ call? [2B-3-1.2]
- Transmit the other station's call sign at least ten times, followed by "this is," followed by your call sign at least twice
 - Transmit the other station's call sign at least five times phonetically, followed by "this is," followed by your call sign at least once
 - Transmit the other station's call sign at least three times, followed by "this is," followed by your call sign at least five times phonetically
 - Transmit the other station's call sign once, followed by "this is," followed by your call sign given phonetically
137. How is the call sign "KA3BGQ" stated in Standard International Phonetics? [2B-3-2.1]
- Kilo Alfa Three Bravo Golf Quebec
 - King America Three Bravo Golf Quebec
 - Kilowatt Alfa Three Bravo George Queen
 - Kilo America Three Baker Golf Quebec
138. How is the call sign "WE5TZD" stated phonetically? [2B-3-2.2]
- Whiskey Echo Foxtrot Tango Zulu Delta
 - Washington England Five Tokyo Zanzibar Denmark
 - Whiskey Echo Five Tango Zulu Delta
 - Whiskey Easy Five Tear Zebra Dog
139. How is the call sign "KC4HRM" stated phonetically? [2B-3-2.3]
- Kilo Charlie Four Hotel Romeo Mike
 - Kilowatt Charlie Four Hotel Roger Mexico
 - Kentucky Canada Four Honolulu Radio Mexico
 - King Charlie Foxtrot Hotel Roger Mary
140. How is the call sign "AF6PSQ" stated phonetically? [2B-3-2.4]
- America Florida Six Portugal Spain Quebec
 - Adam Frank Six Peter Sugar Queen
 - Alfa Fox Sierra Papa Santiago Queen
 - Alfa Foxtrot Six Papa Sierra Quebec
141. How is the call sign "NB8LXG" stated phonetically? [2B-3-2.5]
- November Bravo Eight Lima Xray Golf
 - Nancy Baker Eight Love Xray George
 - Norway Boston Eight London Xray Germany
 - November Bravo Eight London Xray Germany
142. How is the call sign "KJ1UOI" stated phonetically? [2B-3-2.6]
- King John One Uncle Oboe Ida
 - Kilowatt George India Uncle Oscar India
 - Kilo Juliette One Uniform Oscar India
 - Kentucky Juliette One United Ontario Indiana
143. How is the call sign "WV2BPZ" stated phonetically? [2B-3-2.7]
- Whiskey Victor Two Bravo Papa Zulu
 - Willie Victor Two Baker Papa Zebra
 - Whiskey Victor Tango Bravo Papa Zulu
 - Willie Virginia Two Boston Peter Zanzibar
144. How is the call sign "NY3CTJ" stated phonetically? [2B-3-2.8]
- Norway Yokohama Three California Tokyo Japan
 - Nancy Yankee Three Cat Texas Jackrabbit
 - Norway Yesterday Three Charlie Texas Juliette
 - November Yankee Three Charlie Tango Juliette
145. How is the call sign "KG7DRV" stated phonetically? [2B-3-2.9]
- Kilo Golf Seven Denver Radio Venezuela
 - Kilo Golf Seven Delta Romeo Victor
 - King John Seven Dog Radio Victor
 - Kilowatt George Seven Delta Romeo Video
146. How is the call sign "WX9HKS" stated phonetically? [2B-3-2.10]
- Whiskey Xray Nine Hotel Kilo Sierra
 - Willie Xray November Hotel King Sierra
 - Washington Xray Nine Honolulu Kentucky Santiago
 - Whiskey Xray Nine Henry King Sugar
147. How is the call sign "AE0LQY" stated phonetically? [2B-3-2.11]
- Able Easy Zero Lima Quebec Yankee
 - Arizona Equador Zero London Queen Yesterday
 - Alfa Echo Zero Lima Quebec Yankee
 - Able Easy Zero Love Queen Yoke
-
- One (1) question should be from the following:**
-
148. What is the format of a standard RTTY CQ call? [2B-4-1.1]
- Transmit the phrase "CQ" three times, followed by "DE", followed by your call sign two times
 - Transmit the phrase "CQ" three to six times, followed by "DE", followed by your call sign three times
 - Transmit the phrase "CQ" ten times, followed by the procedural signal "DE", followed by your call one time
 - Transmit the phrase "CQ" continuously until someone answers your call

149. You receive an RTTY CQ call at 45 bauds. At what speed should you respond? [2B-4-2.1]
- 22-1/2 bauds
 - 45 bauds
 - 90 bauds
 - Any speed, since radioteletype systems adjust to any signal rate
150. What does the term connected mean in a packet-radio link? [2B-5-1.1]
- A telephone link has been established between two amateurs
 - An amateur radio message has reached the station for local delivery
 - The transmitting station is sending data specifically addressed to the receiving station, and the receiving station is acknowledging that the data has been received correctly
 - The transmitting station and a receiving station are using a certain digipeater, so no other contacts can take place until they are finished
151. What does the term monitoring mean on a frequency used for packet radio? [2B-5-1.2]
- The FCC is copying all messages to determine their content
 - A member of the Amateur Auxiliary to the FCC's Field Operations Bureau is copying all messages to determine their content
 - The receiving station's video monitor is displaying all messages intended for that station, and is acknowledging correct receipt of the data
 - The receiving station is displaying information that may not be addressed to that station, and is not acknowledging correct receipt of the data
152. What is a digipeater? [2B-5-2.1]
- A packet-radio station used to retransmit data that is specifically addressed to be retransmitted by that station
 - An amateur radio repeater designed to retransmit all audio signals in a digital form
 - An amateur radio repeater designed using only digital electronics components
 - A packet-radio station that retransmits any signals it receives
153. What is the meaning of the term network in packet radio? [2B-5-2.2]
- A system of telephone lines interconnecting packet-radio stations to transfer data
 - A method of interconnecting packet-radio stations so that data can be transferred over long distances
 - The interlaced wiring on a terminal-node-controller board
 - The terminal-node-controller function that automatically rejects another caller when the station is connected
154. What is a good way to establish contact on a repeater? [2B-6-1.1]
- Give the call sign of the station you want to contact three times
 - Call the other operator by name and then give your call sign three times
 - Call the desired station and then identify your own station
 - Say, "Breaker, breaker," and then give your call sign
155. What is the main purpose of a repeater? [2B-6-2.1]
- To provide a station that makes local information available 24 hours a day
 - To provide a means of linking amateur stations with the telephone system
 - To retransmit NOAA weather information during severe storm warnings
 - Repeaters extend the operating range of portable and mobile stations
156. What does it mean to say that a repeater has an input and an output frequency? [2B-6-3.1]
- The repeater receives on one frequency and transmits on another
 - All repeaters offer a choice of operating frequency, in case one is busy
 - One frequency is used to control repeater functions and the other frequency is the one used to retransmit received signals
 - Repeaters require an access code to be transmitted on one frequency while your voice is transmitted on the other
157. When should simplex operation be used instead of using a repeater? [2B-6-4.1]
- Whenever greater communications reliability is needed
 - Whenever a contact is possible without using a repeater
 - Whenever you need someone to make an emergency telephone call
 - Whenever you are traveling and need some local information

158. What is an autopatch? [2B-6-5.1]
- A. A repeater feature that automatically selects the strongest signal to be repeated
 - B. An automatic system of connecting a mobile station to the next repeater as it moves out of range of the first
 - C. A device that allows repeater users to make telephone calls from their portable or mobile stations
 - D. A system that automatically locks other stations out of the repeater when there is a QSO in progress
159. What is the purpose of a repeater time-out timer? [2B-6-5.2]
- A. It allows the repeater to have a rest period after heavy use
 - B. It logs repeater transmit time to determine when the repeater mean time between failure rating is exceeded
 - C. It limits repeater transmission time to no more than ten minutes
 - D. It limits repeater transmission time to no more than three minutes

SUBELEMENT 2C - Radio-Wave Propagation (1 Question)

One (1) question should be from the following:

160. What type of radio-wave propagation occurs when the signal travels in a straight line from the transmitting antenna to the receiving antenna? [2C-1.1]
- A. Line-of-sight propagation
 - B. Straight-line propagation
 - C. Knife-edge diffraction
 - D. Tunnel propagation
161. What path do radio waves usually follow from a transmitting antenna to a receiving antenna at VHF and higher frequencies? [2C-1.2]
- A. A bent path through the ionosphere
 - B. A straight line
 - C. A great circle path over either the north or south pole
 - D. A circular path going either east or west from the transmitter
162. What type of propagation involves radio signals that travel along the surface of the Earth? [2C-2.1]
- A. Sky-wave propagation
 - B. Knife-edge diffraction
 - C. E-layer propagation
 - D. Ground-wave propagation
163. What is the meaning of the term ground-wave propagation? [2C-2.2]
- A. Signals that travel along seismic fault lines
 - B. Signals that travel along the surface of the earth
 - C. Signals that are radiated from a ground-plane antenna
 - D. Signals that are radiated from a ground station to a satellite
164. Two amateur stations a few miles apart and separated by a low hill blocking their line-of-sight path are communicating on 3.725 MHz. What type of propagation is probably being used? [2C-2.3]
- A. Tropospheric ducting
 - B. Ground wave
 - C. Meteor scatter
 - D. Sporadic E
165. When compared to sky-wave propagation, what is the usual effective range of ground-wave propagation? [2C-2.4]
- A. Much smaller
 - B. Much greater
 - C. The same
 - D. Dependent on the weather
166. What type of propagation uses radio signals refracted back to earth by the ionosphere? [2C-3.1]
- A. Sky wave
 - B. Earth-moon-earth
 - C. Ground wave
 - D. Tropospheric
167. What is the meaning of the term sky-wave propagation? [2C-3.2]
- A. Signals reflected from the moon
 - B. Signals refracted by the ionosphere
 - C. Signals refracted by water-dense cloud formations
 - D. Signals retransmitted by a repeater
168. What does the term skip mean? [2C-3.3]
- A. Signals are reflected from the moon
 - B. Signals are refracted by water-dense cloud formations
 - C. Signals are retransmitted by repeaters
 - D. Signals are refracted by the ionosphere

169. What is the area of weak signals between the ranges of ground waves and the first hop called? [2C-3.4]
- A. The skip zone
 - B. The hysteresis zone
 - C. The monitor zone
 - D. The transequatorial zone
170. What is the meaning of the term skip zone? [2C-3.5]
- A. An area covered by skip propagation
 - B. The area where a satellite comes close to the earth, and skips off the ionosphere
 - C. An area that is too far for ground-wave propagation, but too close for skip propagation
 - D. The area in the atmosphere that causes skip propagation
171. What type of radio wave propagation makes it possible for amateur stations to communicate long distances? [2C-3.6]
- A. Direct-inductive propagation
 - B. Knife-edge diffraction
 - C. Ground-wave propagation
 - D. Sky-wave propagation
172. How long is an average sunspot cycle? [2C-4.1]
- A. 2 years
 - B. 5 years
 - C. 11 years
 - D. 17 years
173. What is the term used to describe the long-term variation in the number of visible sunspots? [2C-4.2]
- A. The 11-year cycle
 - B. The Solar magnetic flux cycle
 - C. The hysteresis count
 - D. The sunspot cycle
174. What effect does the number of sunspots have on the maximum usable frequency (MUF)? [2C-5.1]
- A. The more sunspots there are, the higher the MUF will be
 - B. The more sunspots there are, the lower the MUF will be
 - C. The MUF is equal to the square of the number of sunspots
 - D. The number of sunspots effects the lowest usable frequency (LUF) but not the MUF
175. What effect does the number of sunspots have on the ionization level in the atmosphere? [2C-5.2]
- A. The more sunspots there are, the lower the ionization level will be
 - B. The more sunspots there are, the higher the ionization level will be
 - C. The ionization level of the ionosphere is equal to the square root of the number of sunspots
 - D. The ionization level of the ionosphere is equal to the square of the number of sunspots
176. Why can a VHF or UHF radio signal that is transmitted toward a mountain often be received at some distant point in a different direction? [2C-6.1]
- A. You can never tell what direction a radio wave is traveling in
 - B. These radio signals are easily bent by the ionosphere
 - C. These radio signals are easily reflected by objects in their path
 - D. These radio signals are sometimes scattered in the ectosphere
177. Why can the direction that a VHF or UHF radio signal is traveling be changed if there is a tall building in the way? [2C-6.2]
- A. You can never tell what direction a radio wave is traveling in
 - B. These radio signals are easily bent by the ionosphere
 - C. These radio signals are easily reflected by objects in their path
 - D. These radio signals are sometimes scattered in the ectosphere

SUBELEMENT 2D - Amateur Radio Practice (4 Questions)

One (1) question should be from the following:

178. How can you prevent the use of your amateur station by unauthorized persons? [2D-1.1]
- A. Install a carrier-operated relay in the main power line
 - B. Install a key-operated "ON/OFF" switch in the main power line
 - C. Post a "Danger - High Voltage" sign in the station
 - D. Install AC line fuses in the main power line
179. What is the purpose of a key-operated "ON/OFF" switch in the main power line? [2D-1.2]
- A. To prevent the use of your station by unauthorized persons
 - B. To provide an easy method for the FCC to put your station off the air
 - C. To prevent the power company from inadvertently turning off your electricity during an emergency
 - D. As a safety feature, to kill all power to the station in the event of an emergency
180. Why should all antenna and rotator cables be grounded when an amateur station is not in use? [2D-2.1]
- A. To lock the antenna system in one position
 - B. To avoid radio frequency interference
 - C. To save electricity
 - D. To protect the station and building from damage due to a nearby lightning strike
181. How can an antenna system be protected from damage caused by a nearby lightning strike? [2D-2.2]
- A. Install a balun at the antenna feed point
 - B. Install an RF choke in the feed line
 - C. Ground all antennas when they are not in use
 - D. Install a line fuse in the antenna wire
182. How can amateur station equipment be protected from damage caused by voltage induced in the power lines by a nearby lightning strike? [2D-2.3]
- A. Use heavy insulation on the wiring
 - B. Keep the equipment on constantly
 - C. Disconnect the ground system
 - D. Disconnect all equipment after use, either by unplugging or by using a main disconnect switch

183. For proper protection from lightning strikes, what equipment should be grounded in an amateur station? [2D-2.4]

- A. The power supply primary
- B. All station equipment
- C. The feed line center conductors
- D. The AC power mains

184. What is a convenient indoor grounding point for an amateur station? [2D-3.1]

- A. A metallic cold water pipe
- B. PVC plumbing
- C. A window screen
- D. A natural gas pipe

185. To protect against electrical shock hazards, what should you connect the chassis of each piece of your equipment to? [2D-3.2]

- A. Insulated shock mounts
- B. The antenna
- C. A good ground connection
- D. A circuit breaker

186. What type of material should a driven ground rod be made of? [2D-3.3]

- A. Ceramic or other good insulator
- B. Copper or copper-clad steel
- C. Iron or steel
- D. Fiberglass

187. What is the shortest ground rod you should consider installing for your amateur station RF ground? [2D-3.4]

- A. 4 foot
- B. 6 foot
- C. 8 foot
- D. 10 foot

One (1) question should be from the following:

188. What precautions should you take when working with 1270-MHz waveguide? [2D-4.1]

- A. Make sure that the RF leakage filters are installed at both ends of the waveguide
- B. Never look into the open end of a waveguide when RF is applied
- C. Minimize the standing wave ratio before you test the waveguide
- D. Never have both ends of the waveguide open at the same time when RF is applied

189. What precautions should you take when you mount a UHF antenna in a permanent location? [2D-4.2]
- Make sure that no one can be near the antenna when you are transmitting
 - Make sure that the RF field screens are in place
 - Make sure that the antenna is near the ground to maximize directional effect
 - Make sure you connect an RF leakage filter at the antenna feed point
190. What precautions should you take before removing the shielding on a UHF power amplifier? [2D-4.3]
- Make sure all RF screens are in place at the antenna
 - Make sure the feed line is properly grounded
 - Make sure the amplifier cannot be accidentally energized
 - Make sure that the RF leakage filters are connected
191. Why should you use only good-quality, well-constructed coaxial cable and connectors for a UHF antenna system? [2D-4.4]
- To minimize RF leakage
 - To reduce parasitic oscillations
 - To maximize the directional characteristics of your antenna
 - To maximize the standing wave ratio of the antenna system
192. Why should you be careful to position the antenna of your 220-MHz hand-held transceiver away from your head when you are transmitting? [2D-4.5]
- To take advantage of the directional effect
 - To minimize RF exposure
 - To use your body to reflect the signal, improving the directional characteristics of the antenna
 - To minimize static discharges
193. Which of the following types of radiation produce health risks most like the risks produced by radio frequency radiation? [2D-4.6]
- Microwave oven radiation and ultraviolet radiation
 - Microwave oven radiation and radiation from an electric space heater
 - Radiation from Uranium or Radium and ultraviolet radiation
 - Sunlight and radiation from an electric space heater
194. Why is there a switch that turns off the power to a high-voltage power supply if the cabinet is opened? [2D-5.1]
- To prevent RF from escaping from the supply
 - To prevent RF from entering the supply through the open cabinet
 - To provide a way to turn the power supply on and off
 - To reduce the danger of electrical shock
195. What purpose does a safety interlock on an amateur transmitter serve? [2D-5.2]
- It reduces the danger that the operator will come in contact with dangerous high voltages when the cabinet is opened while the power is on
 - It prevents the transmitter from being turned on accidentally
 - It prevents RF energy from leaking out of the transmitter cabinet
 - It provides a way for the station licensee to ensure that only authorized operators can turn the transmitter on
196. What type of safety equipment should you wear when you are working at the top of an antenna tower? [2D-6.1]
- A grounding chain
 - A reflective vest
 - Loose clothing
 - A carefully inspected safety belt
197. Why should you wear a safety belt when you are working at the top of an antenna tower? [2D-6.2]
- To provide a way to safely hold your tools so they don't fall and injure someone on the ground
 - To maintain a balanced load on the tower while you are working
 - To provide a way to safely bring tools up and down the tower
 - To prevent an accidental fall
198. For safety purposes, how high should you locate all portions of your horizontal wire antenna? [2D-6.3]
- High enough so that a person cannot touch them from the ground
 - Higher than chest level
 - Above knee level
 - Above electrical lines

199. What type of safety equipment should you wear when you are on the ground assisting someone who is working on an antenna tower? [2D-6.4]
- A. A reflective vest
 - B. A safety belt
 - C. A grounding chain
 - D. A hard hat

200. Why should you wear a hard hat when you are on the ground assisting someone who is working on an antenna tower? [2D-6.5]
- A. To avoid injury from tools dropped from the tower
 - B. To provide an RF shield during antenna testing
 - C. To avoid injury if the tower should accidentally collapse
 - D. To avoid injury from walking into tower guy wires

One (1) question should be from the following:

201. What accessory is used to measure standing wave ratio? [2D-7-1.1]
- A. An ohm meter
 - B. An ammeter
 - C. An SWR meter
 - D. A current bridge
202. What instrument is used to indicate the relative impedance match between a transmitter and antenna? [2D-7-1.2]
- A. An ammeter
 - B. An ohmmeter
 - C. A voltmeter
 - D. An SWR meter
203. What does an SWR-meter reading of 1:1 indicate? [2D-7-2.1]
- A. An antenna designed for use on another frequency band is probably connected
 - B. An optimum impedance match has been attained
 - C. No power is being transferred to the antenna
 - D. An SWR meter never indicates 1:1 unless it is defective
204. What does an SWR-meter reading of less than 1.5:1 indicate? [2D-7-2.2]
- A. An unacceptably low reading
 - B. An unacceptably high reading
 - C. An acceptable impedance match
 - D. An antenna gain of 1.5

205. What does an SWR-meter reading of 4:1 indicate? [2D-7-2.3]
- A. An unacceptably low reading
 - B. An acceptable impedance match
 - C. An antenna gain of 4
 - D. An impedance mismatch, which is not acceptable; it indicates problems with the antenna system

206. What does an SWR-meter reading of 5:1 indicate? [2D-7-2.4]
- A. The antenna will make a 10-watt signal as strong as a 50-watt signal
 - B. Maximum power is being delivered to the antenna
 - C. An unacceptable mismatch is indicated
 - D. A very desirable impedance match has been attained

207. What kind of SWR-meter reading may indicate poor electrical contact between parts of an antenna system? [2D-7-3.1]
- A. An erratic reading
 - B. An unusually low reading
 - C. No reading at all
 - D. A negative reading

208. What does an unusually high SWR-meter reading indicate? [2D-7-3.2]
- A. That the antenna is not the correct length, or that there is an open or shorted connection somewhere in the feed line
 - B. That the signals arriving at the antenna are unusually strong, indicating good radio conditions
 - C. That the transmitter is producing more power than normal, probably indicating that the final amplifier tubes or transistors are about to go bad
 - D. That there is an unusually large amount of solar white-noise radiation, indicating very poor radio conditions

209. The SWR-meter reading at the low-frequency end of an amateur band is 2.5:1, and the SWR-meter reading at the high-frequency end of the same band is 5:1. What does this indicate about your antenna? [2D-7-3.3]
- A. The antenna is broadbanded
 - B. The antenna is too long for operation on this band
 - C. The antenna is too short for operation on this band
 - D. The antenna has been optimized for operation on this band

210. The SWR-meter reading at the low-frequency end of an amateur band is 5:1, and the SWR-meter reading at the high-frequency end of the same band is 2.5:1. What does this indicate about your antenna? [2D-7-3.4]

- A. The antenna is broadbanded
- B. The antenna is too long for operation on this band
- C. The antenna is too short for operation on this band
- D. The antenna has been optimized for operation on this band

One (1) question should be from the following:

211. What is meant by receiver overload? [2D-8-1.1]

- A. Interference caused by transmitter harmonics
- B. Interference caused by overcrowded band conditions
- C. Interference caused by strong signals from a nearby transmitter
- D. Interference caused by turning the receiver volume too high

212. What is a likely indication that radio-frequency interference to a receiver is caused by front-end overload? [2D-8-1.2]

- A. A low pass filter at the transmitter reduces interference sharply
- B. The interference is independent of frequency
- C. A high pass filter at the receiver reduces interference little or not at all
- D. Grounding the receiver makes the problem worse

213. Your neighbor reports interference to his television whenever you are transmitting from your amateur station. This interference occurs regardless of your transmitter frequency. What is likely to be the cause of the interference? [2D-8-1.3]

- A. Inadequate transmitter harmonic suppression
- B. Receiver VR tube discharge
- C. Receiver overload
- D. Incorrect antenna length

214. What type of filter should be installed on a TV receiver as the first step in preventing RF overload from an amateur HF station transmission? [2D-8-1.4]

- A. Low pass
- B. High pass
- C. Band pass
- D. Notch

215. What is meant by harmonic radiation? [2D-8-2.1]

- A. Transmission of signals at whole number multiples of the fundamental (desired) frequency
- B. Transmission of signals that include a superimposed 60-Hz hum
- C. Transmission of signals caused by sympathetic vibrations from a nearby transmitter
- D. Transmission of signals to produce a stimulated emission in the air to enhance skip propagation

216. Why is harmonic radiation from an amateur station undesirable? [2D-8-2.2]

- A. It will cause interference to other stations and may result in out-of-band signal radiation
- B. It uses large amounts of electric power
- C. It will cause sympathetic vibrations in nearby transmitters
- D. It will produce stimulated emission in the air above the transmitter, thus causing aurora

217. What type of interference may radiate from a multi-band antenna connected to an improperly tuned transmitter? [2D-8-2.3]

- A. Harmonic radiation
- B. Auroral distortion
- C. Parasitic excitation
- D. Intermodulation

218. What is the purpose of shielding in a transmitter? [2D-8-2.4]

- A. It gives the low pass filter structural stability
- B. It enhances the microphonic tendencies of radiotelephone transmitters
- C. It prevents unwanted RF radiation
- D. It helps maintain a sufficiently high operating temperature in circuit components

219. Your neighbor reports interference on one or two channels of her television when you are transmitting from your amateur station. This interference only occurs when you are operating on 15 meters. What is likely to be the cause of the interference? [2D-8-2.5]

- A. Excessive low-pass filtering on the transmitter
- B. Sporadic E de-ionization near your neighbor's TV antenna
- C. TV Receiver front-end overload
- D. Harmonic radiation from your transmitter