2B-4-2.1	B	9-24
2B-5-1.1	C	9-27
2B-5-1.2	D	9-27
2B-5-2.1	A	9-29
2B-5-2.2	B	9-31
2B-6-1.1	C	9-19
2B-6-2.1	D	9-18
2B-6-3.1	A	9-18
2B-6-4.1	B	9-19
2B-6-5.1	C	9-19
2B-6-5.2	D	9-19

SUBELEMENT 2C

2C-1.1	A	9-3
2C-1.2	B	9-3
2C-2.1	D	9-3
2C-2.2	B	9-3
2C-2.3	B	9-3
2C-2.4	A	9-3
2C-3.1	A	9-3
2C-3.2	B	9-3
2C-3.3	D	9-3
2C-3.4	A	9-4
2C-3.5	C	9-4
2C-3.6	D	9-3
2C-4.1	C	9-3
2C-4.2	D	9-3
2C-5.1	A	9-3
2C-5.2	B	9-3
2C-6.1	C	9-5
2C-6.2	C	9-5

SUBELEMENT 2D

2D-1.1	B	8-9
2D-1.2	A	8-9
2D-2.1	D	8-9
2D-2.2	C	8-9
2D-2.3	D	8-9
2D-2.4	B	8-9
2D-3.1	A	8-3
2D-3.2	C	8-3
2D-3.3	B	8-3
2D-3.4	C	8-3
2D-4.1	B	8-11
2D-4.2	A	8-10
2D-4.3	C	8-10
2D-4.4	A	8-10
2D-4.5	B	8-10
2D-4.6	B	8-10
2D-5.1	D	8-9
2D-5.2	A	8-9
2D-6.1	D	7-21
2D-6.2	D	7-21
2D-6.3	A	7-21
2D-6.4	D	7-21
2D-6.5	A	7-21
2D-7-1.1	C	8-17
2D-7-1.2	D	8-17
2D-7-2.1	B	7-6
2D-7-2.2	C	7-6
2D-7-2.3	D	7-6
2D-7-2.4	C	7-6
2D-7-3.1	A	7-7
2D-7-3.2	A	7-6
2D-7-3.3	B	7-7
2D-7-3.4	C	7-7
2D-8-1.1	C	10-4
2D-8-1.2	B	10-4
2D-8-1.3	C	10-4
2D-8-1.4	B	10-5
2D-8-2.1	A	10-4
2D-8-2.2	A	10-4
2D-8-2.3	A	10-4
2D-8-2.4	C	10-6
2D-8-2.5	D	10-4
2D-8-2.6	B	10-5
2D-8-3.1	A	10-3
2D-8-3.2	B	10-3

SUBELEMENT 2E

2E-1-1.1	C	3-2
2E-1-2.1	B	3-2
2E-1-2.2	D	3-2
2E-1-3.1	B	3-2
2E-1-3.2	D	3-2
2E-1-4.1	B	3-13
2E-1-5.1	C	3-2
2E-1-5.2	C	3-2
2E-1-6.1	B	3-2
2E-1-7.1	B	3-2
2E-2-1.1	D	3-4
2E-2-2.1	C	3-5
2E-3-1.1	A	3-4
2E-3-1.2	D	3-4
2E-3-1.3	C	3-4
2E-3-2.1	A	3-4
2E-4.1	C	3-5
2E-5.1	A	3-5
2E-6-1.1	D	3-6
2E-6-1.2	A	3-6
2E-6-2.1	D	3-6
2E-7.1	C	3-7
2E-7.2	C	3-7
2E-7.3	B	3-7
2E-7.4	C	3-7
2E-8.1	D	3-10
2E-8.2	A	3-10
2E-9-1.1	C	3-10
2E-9-1.2	C	3-10
2E-9-2.1	B	3-10
2E-10.1	C	3-9
2E-11.1	D	3-9
2E-12-1.1	B	3-12
2E-12-2.1	A	3-12
2E-12-3.1	D	3-12
2E-12-3.2	A	3-12
2E-12-3.3	A	3-12
2E-12-4.1	B	3-12
2E-12-4.2	A	3-12
2E-12-4.3	B	3-12
2E-12-5.1	C	3-12
2E-12-5.2	B	3-12
2E-13.1	C	3-12
2E-13.2	D	3-13

SUBELEMENT 2F

2F-1.1	B	4-2
2F-1.2	C	4-2
2F-1.3	C	4-2
2F-2.1	A	4-2
2F-2.2	A	4-2
2F-2.3	B	4-2
2F-2.4	D	4-2
2F-2.5	A	4-2
2F-3.1	C	4-3
2F-4.1	C	4-4
2F-4.2	B	4-4
2F-5.1	D	4-4
2F-5.2	B	4-4
2F-5.3	A	4-4
2F-5.4	D	4-4
2F-6.1	D	4-4
2F-7.1	C	4-5
2F-7.2	A	4-5
2F-7.3	C	4-5
2F-7.4	B	4-5
2F-8.1	A	4-6

SUBELEMENT 2G

2G-1-1.1	B	5-2
2G-1-1.2	C	5-2
2G-1-1.3	D	5-2
2G-1-1.4	A	5-3
2G-1-1.5	D	5-3
2G-1-2.1	B	5-3
2G-1-2.2	A	5-4
2G-1-2.3	B	5-3
2G-1-2.4	D	5-3
2G-1-2.5	D	5-3
2G-2.1	B	5-4
2G-2.2	C	5-4
2G-2.3	C	5-3
2G-3.1	D	5-4
2G-3.2	D	5-4
2G-4.1	A	5-5
2G-4.2	C	5-5
2G-5.1	A	5-5
2G-5.2	A	5-5
2G-5.3	C	5-5

SUBELEMENT 2H

2H-1-1.1	B	2-7

2H-1-1.2	C	2-7
2H-1-2.1	A	2-7
2H-1-2.2	A	2-7
2H-1-3.1	A	2-7
2H-1-4.1	D	2-7
2H-2.1	B	10-6
2H-2.2	D	10-6
2H-3.1	C	10-6
2H-3.2	B	10-6
2H-4.1	D	10-7
2H-4.2	B	10-7
2H-5.1	A	10-1
2H-5.2	C	10-1
2H-6.1	A	8-11
2H-6.2	C	8-11
2H-6.3	A	8-11
2H-7.1	C	10-3
2H-7.2	D	10-1
2H-7.3	A	10-6
2H-7.4	B	9-20
2H-7.5	B	9-20
2H-7.6	B	9-20

SUBELEMENT 2I

2I-1.1	A	7-7
2I-1.2	D	7-7
2I-1.3	C	7-7
2I-1.4	C	7-7
2I-1.5	D	7-7
2I-2.1	D	7-14
2I-2.2	D	7-14
2I-2.3	B	7-14
2I-2.4	B	7-14
2I-2.5	A	7-14
2I-3.1	B	7-21
2I-3.2	C	7-21
2I-4-1.1	D	7-19
2I-4-1.2	B	7-19
2I-4-1.3	C	7-20
2I-4-2.1	D	7-20
2I-4-2.2	A	7-20
2I-4-2.3	B	7-20
2I-4-2.4	A	7-20
2I-5.1	A	7-21
2I-5.2	B	7-21
2I-5.3	C	7-22
2I-6.1	D	7-2
2I-6.2	B	7-2
2I-6.3	B	7-2
2I-6.4	B	7-2
2I-6.5	C	7-2
2I-7.1	B	7-3
2I-7.2	C	7-3
2I-7.3	D	7-3
2I-7.4	A	7-4
2I-7.5	B	7-5
2I-8.1	C	7-4
2I-8.2	C	7-4
2I-9.1	D	7-5
2I-9.2	A	7-5
2I-9.3	A	7-5
2I-10-1.1	C	7-21
2I-11-1.1	D	7-24

8-4-91 Technician

325 questions in Tech pool.

123 reviewed = 37.8%

202 - not reviewed = 62.2%

8-4-91

Chapter 13

Element 3A Question Pool —With Answers

DON'T START HERE

This chapter contains the complete question pool for the Element 3A exam. Element 3A is part of the Technician exam. To earn a Technician license, you must also pass the Element 2 exam (Chapter 12). The Technician license does not require a code test.

Before you read the questions and answers printed in this chapter, be sure to read the text in the previous chapters. Use these questions as review exercises, when the text tells you to study them. Don't try to memorize all the questions and answers.

HOW MANY QUESTIONS?

The FCC specifies that an Element 3A exam must include 25 questions, and also specifies that a certain number of questions from each subelement must appear on the exam. The number of questions to be selected from each section is printed at the beginning of each subelement, and is summarized in Table 13-1.

Table 13-1
Technician Exam Content

Subelement	3AA	3AB	3AC	3AD	3AE	3AF	3AG	3AH	3AI
Number of Questions	5	3	3	4	2	2	1	2	3

WHO PICKS THE QUESTIONS?

The FCC allows Volunteer-Examiner teams to select the questions that will be used on amateur exams. If your test is coordinated by the ARRL/VEC, however, your test will be prepared by the VEC. The questions with multiple-choice answers and distractors (incorrect answers) printed here were released by the Volunteer Examiner Coordinator's Question Pool Committee for use until further notice. Most VECs have agreed to use these multiple-choice answers and distractors. If your test is coordinated by the ARRL/VEC or one of the other VECs using these multiple-choice answers, they will appear on your exam exactly as they are printed here. Some VECs may use the questions printed here with different answers and/or distractors; check with the VEC coordinating your test session.

PAGE REFERENCES

We have listed page references along with the answers in the answer key section of this chapter. These page numbers indicate where you will find the text discussion related to each question. If you have any problems with a question, refer to the page listed for that question. You may have to study beyond the listed page numbers.

Good luck with your studies.

Withdrawn Questions

FCC Rules changes sometimes make it necessary to withdraw certain questions from the pool. Withdrawn questions are noted in the following pages.

- Pg # indicates Pg # in my notes where subject was discussed
- (#) indicates no review of material
- Q # indicates Q # on test
- HO # - refers to Handout

8-4-91

SUBELEMENT 3AA—Commission's Rules
(5 Exam Questions)

3AA-1.1 What is the *control point* of an amateur station?
A. The location at which the control operator function is performed
B. The operating position of any amateur station operating as a repeater user station
C. The physical location of any Amateur Radio transmitter, even if it is operated by radio link from some other location
D. The variable frequency oscillator (VFO) of the transmitter

3AA-1.2 What is the term for the location at which the control operator function is performed?
A. The operating desk
B. The control point
C. The station location
D. The manual control location

3AA-2.1 This question has been withdrawn.

3AA-2.2 Which operator licenses authorize privileges on 52.525 MHz?
A. Extra, Advanced only
B. Extra, Advanced, General only
C. Extra, Advanced, General, Technician only
D. Extra, Advanced, General, Technician, Novice

3AA-2.3 Which operator licenses authorize privileges on 146.52 MHz?
A. Extra, Advanced, General, Technician, Novice
B. Extra, Advanced, General, Technician only
C. Extra, Advanced, General only
D. Extra, Advanced only

3AA-2.4 Which operator licenses authorize privileges on 223.50 MHz?
A. Extra, Advanced, General, Technician, Novice
B. Extra, Advanced, General, Technician only
C. Extra, Advanced, General only
D. Extra, Advanced only

3AA-2.5 Which operator licenses authorize privileges on 446.0 MHz?
A. Extra, Advanced, General, Technician, Novice
B. Extra, Advanced, General, Technician only
C. Extra, Advanced, General only
D. Extra, Advanced only

3AA-3.1 How often do amateur service licenses generally need to be renewed?
A. Every 10 years
B. Every 5 years
C. Every 2 years
D. They are lifetime licenses

3AA-3.2 The FCC currently issues amateur licenses carrying 10-year terms. What is the "grace period" during which the FCC will renew an expired 10-year license?
A. 2 years
B. 5 years
C. 10 years
D. There is no grace period

3AA-3.3 What action would you take to modify your operator/primary station license?
A. Properly fill out FCC Form 610 and send it to the FCC in Gettysburg, PA
B. Properly fill out FCC Form 610 and send it to the nearest FCC field office
C. Write the FCC at their nearest field office
D. There is no need to modify an amateur license between renewals

3AA-4.1 On what frequencies within the 6-meter wavelength band may FM phone emissions be transmitted?
A. 50.0-54.0 MHz only
B. 50.1-54.0 MHz only
C. 51.0-54.0 MHz only
D. 52.0-54.0 MHz only

3AA-4.2 On what frequencies within the 2-meter wavelength band may FM image emissions be transmitted?
A. 144.1-148.0 MHz only
B. 146.0-148.0 MHz only
C. 144.0-148.0 MHz only
D. 146.0-147.0 MHz only

3AA-4.3 What emission type may always be used for station identification, regardless of the transmitting frequency?
A. CW
B. RTTY
C. MCW
D. Phone

3AA-5.1 If you are using a frequency within a band designated to the amateur service on a secondary basis and another station assigned to a primary service on that band causes interference, what action should you take?
A. Notify the FCC's regional Engineer in Charge of the interference
B. Increase your transmitter's power to overcome the interference
C. Attempt to contact the station and request that it stop the interference
D. Change frequencies; you may also be causing interference to the other station and that would be a violation of FCC rules

3AA-5.2 What is the basic principle of frequency sharing between two stations allocated to a primary service within a frequency band, but each in a different ITU Region or Subregion?
A. The station with a control operator holding a lesser class of license must yield the frequency to the station with a control operator holding a higher class license
B. The station with a lower power output must yield the frequency to the station with a higher power output
C. Both stations have an equal right to operate on the frequency
D. Stations in ITU Regions 1 and 3 must yield the frequency to stations in ITU Region 2

3AA-6-1.1 FCC Rules specify the maximum transmitter power that you may use with your amateur station. At what point in your station is the transmitter power measured?
A. By measuring the final amplifier supply voltage inside the transmitter or amplifier
B. By measuring the final amplifier supply current inside the transmitter or amplifier
C. At the antenna terminals of the transmitter or amplifier
D. On the antenna itself, after the feed line

8-4-91

3AA-6-1.2 What is the term used to define the average power supplied to the antenna transmission line during one RF cycle at the crest of the modulation envelope?
A. Peak transmitter power
B. Peak output power
C. Average radio-frequency power
D. Peak envelope power

3AA-6-2.1 Notwithstanding the numerical limitations in the FCC Rules, how much transmitting power shall be used by an amateur station?
A. There is no regulation other than the numerical limits
B. The minimum power level required to achieve S9 signal reports
C. The minimum power necessary to carry out the desired communication
D. The maximum power available, as long as it is under the allowable limit

3AA-6-3.1 What is the maximum transmitting power permitted an amateur station on 146.52 MHz?
A. 200 watts PEP output
B. 500 watts ERP
C. 1000 watts DC input
D. 1500 watts PEP output

3AA-6-4.1 What is the maximum transmitting power permitted an amateur station in beacon operation?
A. 10 watts PEP output
B. 100 watts PEP output
C. 500 watts PEP output
D. 1500 watts PEP output

3AA-7-1.1 What is the maximum sending speed permitted for a RTTY transmission between 28 and 50 MHz?
A. 56 kilobauds
B. 19.6 kilobauds
C. 1200 bauds
D. 300 bauds

3AA-7-1.2 What is the maximum sending speed permitted for a RTTY transmission between 50 and 220 MHz?
A. 56 kilobauds
B. 19.6 kilobauds
C. 1200 bauds
D. 300 bauds

3AA-7-1.3 What is the maximum sending speed permitted for a RTTY transmission above 220 MHz?
A. 300 bauds
B. 1200 bauds
C. 19.6 kilobauds
D. 56 kilobauds

3AA-7-2.1 What is the maximum frequency shift permitted for RTTY when transmitted below 50 MHz?
A. 100 Hz
B. 500 Hz
C. 1000 Hz
D. 5000 Hz

3AA-7-2.2 What is the maximum frequency shift permitted for RTTY when transmitted above 50 MHz?
A. 100 Hz or the sending speed, in bauds, whichever is greater
B. 500 Hz or the sending speed, in bauds, whichever is greater
C. The FCC rules do not specify a maximum frequency shift above 50 MHz
D. 5000 Hz or the sending speed, in bauds, whichever is greater

3AA-7-3.1 What is the authorized bandwidth of a RTTY, data or multiplexed emission using a specified digital code within the frequency range of 50 to 220 MHz?
A. 20 kHz
B. 50 kHz
C. The total bandwidth shall not exceed that of a single-sideband emission
D. The total bandwidth shall not exceed 10 times that of a CW emission

3AA-7-3.2 What is the authorized bandwidth of a RTTY, data or multiplexed emission using an unspecified digital code within the frequency range of 220 to 450 MHz?
A. 50 kHz
B. 150 kHz
C. 200 kHz
D. 100 kHz

3AA-7-3.3 What is the maximum authorized bandwidth of a RTTY, data or multiplexed emission using an unspecified digital code within the 420 to 450 MHz amateur band?
A. 50 kHz
B. 200 kHz
C. 300 kHz
D. 100 kHz

3AA-8-1.1 How must a control operator who has a Novice license and a Certificate of Successful Completion of Examination for Technician privileges identify the station when transmitting on 146.34 MHz?
A. The new Technician may not operate on 146.34 until his or her new license arrives
B. The licensee gives his or her call sign, followed by any suitable word that denotes the slant mark and the identifier "KT"
C. No special form of identification is needed
D. The license gives his or her call sign and states the location of the VE examination where he or she obtained the certificate of successful completion

3AA-8-2.1 Which language(s) must be used when making the station identification by telephony?
A. The language being used for the contact may be used if it is not English, providing the US has a third-party communications agreement with that country
B. English must be used for identification
C. Any language may be used, if the country which uses that language is a member of the International Telecommunication Union
D. The language being used for the contact must be used for identification purposes

3AA-8-3.1 What does the FCC recommend to aid correct station identification when using phone?
A. A speech compressor
B. Q signals
C. A recognized phonetic alphabet
D. Unique words of the operator's choice

3AA-9-1.1 What is the term used to describe an amateur station transmitting communications for the purpose of observation of propagation and reception or other related experimental activities?
A. Beacon operation
B. Repeater operation
C. Auxiliary operation
D. Radio control operation

8-4-91

3AA-9-2.1 What class of amateur operator license must you hold to operate a beacon station?
A. Technician, General, Advanced or Amateur Extra class
B. General, Advanced or Amateur Extra class
C. Amateur Extra class only
D. Any license class

3AA-10.1 What is the maximum transmitter power an amateur station is permitted when transmitting signals to control a model craft?
A. One watt
B. One milliwatt
C. Two watts
D. Three watts

3AA-10.2 What minimum information must be indicated on the label affixed to a transmitter transmitting signals to control a model craft?
A. Station call sign
B. Station call sign and operating times
C. Station call sign and the station licensee's name and address
D. Station call sign, class of license, and operating times

3AA-10.3 What are the station identification requirements for an amateur station transmitting signals to control a model craft?
A. Once every ten minutes, and at the beginning and end of each transmission
B. Once every ten minutes
C. At the beginning and end of each transmission
D. Station identification is not required provided that a label indicating the station call sign and the station licensee's name and address is affixed to the station transmitter

3AA-10.4 Where must the writing indicating the station call sign and the licensee's name and address be affixed in order to operate under the special rules for radio control of remote model craft and vehicles?
A. It must be in the operator's possession
B. It must be affixed to the transmitter
C. It must be affixed to the craft or vehicle
D. It must be filed with the nearest FCC Field Office

3AA-11-1.1 If an amateur repeater is causing harmful interference to another amateur repeater and a frequency coordinator has coordinated (recommends) the operation of one station and not the other, who is primarily responsible for resolving the interference?
A. The licensee of the non-coordinated (unrecommended) repeater
B. Both repeater licensees
C. The licensee of the coordinated (recommended) repeater
D. The frequency coordinator

3AA-11-1.2 If an amateur repeater is causing harmful interference to another amateur repeater and a frequency coordinator has coordinated (recommends) the operation of both stations, who is primarily responsible for resolving the interference?
A. The licensee of the repeater which has been coordinated for the longest period of time
B. Both repeater licensees
C. The licensee of the repeater which has been coordinated the most recently
D. The frequency coordinator

3AA-11-1.3 If an amateur repeater is causing harmful interference to another amateur repeater and a frequency coordinator has not coordinated the operation of either station, who is primarily responsible for resolving the interference?
A. Both repeater licensees
B. The licensee of the repeater which has been in operation for the longest period of time
C. The licensee of the repeater which has been in operation for the shortest period of time
D. The frequency coordinator

3AA-11-2.1 Under what circumstances does the FCC declare a *temporary state of communication emergency*?
A. When a declaration of war is received from Congress
B. When the maximum usable frequency goes above 28 MHz
C. When communications facilities in Washington, DC, are disrupted
D. When a disaster disrupts normal communications systems in a particular area

3AA-11-2.2 By what means should a request for a declaration of a *temporary state of communication emergency* be initiated?
A. Communication with the FCC Engineer-In-Charge of the affected area
B. Communication with the US senator or congressman for the area affected
C. Communication with the local Emergency Coordinator
D. Communication with the Chief of the FCC Private Radio Bureau

3AA-11-2.3 What information is included in an FCC declaration of a *temporary state of communication emergency*?
A. Designation of the areas affected and of organizations authorized to use radio communications in the affected area
B. Designation of amateur frequency bands for use only by amateurs participating in emergency communications in the affected area, and complete suspension of Novice operating privileges for the duration of the emergency
C. Any special conditions and special rules to be observed during the communication emergency
D. Suspension of amateur rules regarding station identification and business communication

3AA-11-2.4 If a disaster disrupts normal communication systems in an area where the amateur service is regulated by the FCC, what kinds of transmissions are authorized to amateur stations in such an area?
A. Communications which are necessary to meet essential communication needs and facilitate relief actions
B. Communications which allow a commercial business to continue to operate in the affected area
C. Communications for which material compensation has been paid to the amateur operator for delivery into the affected area
D. Communications which are to be used for program production or newsgathering for broadcasting purposes

8-4-91

3AA-12.1 What is meant by the term *broadcasting*?
A. Transmissions intended for reception by the general public, either direct or relayed
B. Retransmission by automatic means of programs or signals emanating from any class of station other than amateur
C. The transmission of any one-way radio communication, regardless of purpose or content
D. Any one-way or two-way radio communication involving more than two stations

3AA-12.2 Which of the following is an amateur station that cannot automatically retransmit radio signals of other amateur stations?
A. Auxiliary station
B. Repeater station
C. Beacon station
D. Space station

3AA-12.3 Which of the following is an amateur station that is permitted to automatically retransmit radio signals of other amateur stations?
A. Beacon station
B. Space station
C. Official bulletin station
D. RACES station

3AA-12.4 What type of radio signals may be directly retransmitted by an amateur station?
A. AM radio station
B. Police or fire department radio station
C. NOAA weather station
D. US Government communications between the space shuttle and associated Earth stations with prior approval from the National Aeronautics and Space Administration (NASA)

3AA-12.5 When may US Government communications between the space shuttle and associated Earth stations be directly retransmitted by an amateur station?
A. After prior approval has been obtained from the FCC in Washington, DC
B. No radio stations other than amateur may be retransmitted in the amateur service
C. After prior approval has been obtained from the National Aeronautics and Space Administration (NASA)
D. After prior approval has been obtained from the nearest FCC Engineer-In-Charge

3AA-13.1 What kinds of one-way communications by amateur stations are not considered broadcasting?
A. All types of one-way communications by amateurs are considered by the FCC as broadcasting
B. Beacon operation, remote control of a device, emergency communications, information bulletins consisting solely of subject matter of direct interest to the amateur service, and telegraphy practice
C. Only code-practice transmissions conducted simultaneously on all available amateur bands below 30 MHz and conducted for more than 40 hours per week are not considered broadcasting
D. Only actual emergency communications during a declared communications emergency are exempt

3AA-13.2 Which of the following one-way communications may not be transmitted in the amateur service?
A. Transmissions to remotely control a device at a distant location
B. Transmissions to assist persons learning or improving their proficiency in Morse code
C. Brief transmissions to make adjustments to the station
D. Transmission of music

3AA-13.3 What kinds of one-way information bulletins may be transmitted by amateur stations?
A. NOAA weather bulletins
B. Commuter traffic reports from local radio stations
C. Regularly scheduled announcements concerning Amateur Radio equipment for sale or trade
D. Messages directed only to amateur operators consisting solely of subject matter of direct interest to the amateur service

3AA-13.4 What types of one-way amateur communications may be transmitted by an amateur station?
A. Beacon operation, radio control, code practice, retransmission of other services
B. Beacon operation, radio control, transmitting an unmodulated carrier, NOAA weather bulletins
C. Beacon operation, remote control of a device, information bulletins consisting solely of subject matter of direct interest to the amateur service, telegraphy practice and emergency communications
D. Beacon operation, emergency-drill-practice transmissions, automatic retransmission of NOAA weather transmissions, code practice

3AA-14.1 What types of material compensation, if any, may be involved in third-party communications transmitted by an amateur station?
A. Payment of an amount agreed upon by the amateur operator and the parties involved
B. Assistance in maintenance of auxiliary station equipment
C. Donation of amateur equipment to the control operator
D. No compensation may be accepted

3AA-14.2 What types of business communications, if any, may be transmitted by an amateur station on behalf of a third party?
A. The FCC rules specifically prohibit communications with a business for any reason
B. Business communications involving the sale of Amateur Radio equipment
C. Communications to a business may be provided during an emergency as provided by the FCC rules
D. Business communications aiding a broadcast station

8-4-91

3AA-14.3 Does the FCC allow third-party messages when communicating with Amateur Radio operators in a foreign country?

A. Third-party messages with a foreign country are only allowed on behalf of other amateurs.
B. Yes, provided the third-party message involves the immediate family of one of the communicating amateurs
C. Under no circumstances may US amateurs exchange third-party messages with an amateur in a foreign country
D. Yes, when communicating with a person in a country with which the US shares a third-party agreement

3AA-15.1 Under what circumstances, if any, may a third party participate in radio communications from an amateur station if the third party is ineligible to be a control operator of one of the stations?

A. A control operator must be present at the control point and continuously monitor and supervise the third party participation. Also, contacts may only be made with amateurs in the US and countries with which the US has a third-party communications agreement
B. A control operator must be present and continuously monitor and supervise the radio communication to ensure compliance with the rules only if contacts are made with amateurs in countries with which the US has no third-party communications agreement
C. A control operator must be present and continuously monitor and supervise the radio communication to ensure compliance with the rules. In addition, the control operator must key the transmitter and make the station identification.
D. A control operator must be present and continuously monitor and supervise the radio communication to ensure compliance with the rules. In addition, if contacts are made on frequencies below 30 MHz, the control operator must transmit the call signs of both stations involved in the contact at 10-minute intervals

3AA-15.2 Where must the control operator be situated when a third party is participating in radio communications from an amateur station?

A. If a radio remote control is used, the control operator may be physically separated from the control point, when provisions are incorporated to shut off the transmitter by remote control
B. If the control operator supervises the third party until he or she is satisfied of the competence of the third party, the control operator may leave the control point
C. The control operator must be present at the control point
D. If the third party holds a valid radiotelegraph license issued by the FCC, no supervision is necessary

3AA-15.3 What must the control operator do while a third party is participating in radio communications?

A. If the third party holds a valid commercial radiotelegraph license, no supervision is necessary
B. The control operator must tune up and down 5 kHz from the transmitting frequency on another receiver, to ensure that no interference is taking place
C. If a radio control link is available, the control operator may leave the room
D. The control operator must continuously monitor and supervise the third party's participation

3AA-15.4 In an exchange of international third-party communications, when is the station identification procedure required?

A. Only at the beginning of the communications
B. At the end of each exchange of communications
C. The station identification procedure is not required during international third-party communications
D. Only at the end of multiple exchanges of communications

3AA-16.1 Under what circumstances, if any, may an amateur station transmit radio communications containing obscene words?

A. Obscene words are permitted when they do not cause interference to any other radio communication or signal
B. Obscene words are prohibited in Amateur Radio transmissions
C. Obscene words are permitted when they are not retransmitted through repeater or auxiliary stations
D. Obscene words are permitted, but there is an unwritten rule among amateurs that they should not be used on the air

3AA-16.2 Under what circumstances, if any, may an amateur station transmit radio communications containing indecent words?

A. Indecent words are permitted when they do not cause interference to any other radio communication or signal
B. Indecent words are permitted when they are not retransmitted through repeater or auxiliary stations
C. Indecent words are permitted, but there is an unwritten rule among amateurs that they should not be used on the air
D. Indecent words are prohibited in Amateur Radio transmissions

3AA-16.3 Under what circumstances, if any, may an amateur station transmit radio communications containing profane words?

A. Profane words are permitted when they are not retransmitted through repeater or auxiliary stations
B. Profane words are permitted, but there is an unwritten rule among amateurs that they should not be used on the air
C. Profane words are prohibited in Amateur Radio transmissions
D. Profane words are permitted when they do not cause interference to any other radio communication or signal

5

8-4-91

3AA-17.1 Which of the following VHF/UHF bands may not be used by Earth stations for satellite communications?
A. 6 meters
B. 2 meters
C. 23 centimeters
D. 70 centimeters

SUBELEMENT 3AB—Operating Procedures (3 Exam Questions)

3AB-1.1 What is the meaning of: "Your report is five seven . . ."?
A. Your signal is perfectly readable and moderately strong
B. Your signal is perfectly readable, but weak
C. Your signal is readable with considerable difficulty
D. Your signal is perfectly readable with near pure tone

3AB-1.2 What is the meaning of: "Your report is three three . . ."?
A. The contact is serial number thirty-three
B. The station is located at latitude 33 degrees
C. Your signal is readable with considerable difficulty and weak in strength
D. Your signal is unreadable, very weak in strength

3AB-1.3 What is the meaning of: "Your report is five nine plus 20 dB . . ."?
A. Your signal strength has increased by a factor of 100
B. Repeat your transmission on a frequency 20 kHz higher
C. The bandwidth of your signal is 20 decibels above linearity
D. A relative signal-strength meter reading is 20 decibels greater than strength 9

3AB-2-1.1 How should a QSO be initiated through a station in repeater operation?
A. Say "breaker, breaker 79"
B. Call the desired station and then identify your own station
C. Call "CQ" three times and identify three times
D. Wait for a "CQ" to be called and then answer it

3AB-2-1.2 Why should users of a station in repeater operation pause briefly between transmissions?
HO #1 pg 4
HO #2 pg 1
A. To check the SWR of the repeater
B. To reach for pencil and paper for third-party communications
C. To listen for any hams wanting to break in
D. To dial up the repeater's autopatch

3AB-2-1.3 Why should users of a station in repeater operation keep their transmissions short and thoughtful?
HO #2 pg 1
A. A long transmission may prevent someone with an emergency from using the repeater
B. To see if the receiving station operator is still awake
C. To give any non-hams that are listening a chance to respond
D. To keep long-distance charges down

3AB-2-1.4 What is the proper procedure to break into an on-going QSO through a station in repeater operation?
A. Wait for the end of a transmission and start calling
B. Shout, "break, break!" to show that you're eager to join the conversation
C. Turn on your 100-watt amplifier and override whoever is talking
D. Send your call sign during a break between transmissions

6

8-4-91

3AB-2-1.5 What is the purpose of repeater operation?
A. To cut your power bill by using someone's higher power system
B. To enable mobile and low-power stations to extend their usable range
C. To reduce your telephone bill
D. To call the ham radio distributor 50 miles away

3AB-2-1.6 What is meant by "making the repeater time out"?
A. The repeater's battery supply has run out
B. The repeater's transmission time limit has expired during a single transmission
C. The warranty on the repeater duplexer has expired
D. The repeater is in need of repairs

3AB-2-1.7 During commuting rush hours, which types of operation should relinquish the use of the repeater?
A. Mobile operators
B. Low-power stations
C. Highway traffic information nets
D. Third-party communications nets

3AB-2-2.1 Why should simplex be used where possible instead of using a station in repeater operation?
A. Farther distances can be reached
B. To avoid long distance toll charges
C. To avoid tying up the repeater unnecessarily
D. To permit the testing of the effectiveness of your antenna

3AB-2-2.2 When a frequency conflict arises between a simplex operation and a repeater operation, why does good amateur practice call for the simplex operation to move to another frequency?
A. The repeater's output power can be turned up to ruin the front end of the station in simplex operation
B. There are more repeaters than simplex operators
C. Changing the repeater's frequency is not practical
D. Changing a repeater frequency requires the authorization of the Federal Communications Commission

3AB-2-3.1 What is the usual input/output frequency separation for stations in repeater operation in the 2-meter wavelength band?
A. 1 MHz
B. 1.6 MHz
C. 170 Hz
D. 0.6 MHz

3AB-2-3.2 What is the usual input/output frequency separation for stations in repeater operation in the 70-centimeter band?
A. 1.6 MHz
B. 5 MHz
C. 600 kHz
D. 5 kHz

3AB-2-3.3 What is the usual input/output frequency separation for a 6-meter station in repeater operation?
A. 1 MHz
B. 600 kHz
C. 1.6 MHz
D. 20 kHz

3AB-2-3.4 What is the usual input/output frequency separation for a 1.25-meter station in repeater operation?
A. 1000 kHz
B. 600 kHz
C. 1600 kHz
D. 1.6 GHz

3AB-2-4.1 What is a *repeater frequency coordinator?*
A. Someone who coordinates the assembly of a repeater station
B. Someone who provides advice on what kind of system to buy
C. The club's repeater trustee
D. A person or group that recommends frequency pairs for repeater usage

3AB-3.1 Why should local amateur communications be conducted on VHF and UHF frequencies?
A. To minimize interference on HF bands capable of long-distance sky-wave communication
B. Because greater output power is permitted on VHF and UHF
C. Because HF transmissions are not propagated locally
D. Because absorption is greater at VHF and UHF frequencies

3AB-3.2 How can on-the-air transmissions be minimized during a lengthy transmitter testing or loading up procedure?
A. Choose an unoccupied frequency
B. Use a dummy antenna
C. Use a non-resonant antenna
D. Use a resonant antenna that requires no loading up procedure

3AB-3.3 What is the proper Q signal to use to determine whether a frequency is in use before making a transmission?
A. QRV?
B. QRU?
C. QRL?
D. QRZ?

3AB-4.1 What is the proper distress calling procedure when using telephony?
A. Transmit MAYDAY
B. Transmit QRRR
C. Transmit QRZ
D. Transmit SOS

3AB-4.2 What is the proper distress calling procedure when using telegraphy?
A. Transmit MAYDAY
B. Transmit QRRR
C. Transmit QRZ
D. Transmit SOS

3AB-5-1.1 What is one requirement you must meet before you can participate in RACES drills?
A. You must be registered with ARRL
B. You must be registered with a local racing organization
C. You must be registered with the responsible civil defense organization
D. You need not register with anyone to operate RACES

3AB-5-1.2 What is the maximum amount of time allowed per week for RACES drills?
A. Eight hours
B. One hour
C. As many hours as you want
D. Six hours, but not more than one hour per day

8-4-91

3AB-5-2.1 How must you identify messages sent during a RACES drill?
A. As emergency messages
B. As amateur traffic
C. As official government messages
D. As drill or test messages

3AB-6-1.1 What is the term used to describe first-response communications in an emergency situation?
A. Tactical communications
B. Emergency communications
C. Formal message traffic
D. National Traffic System messages

3AB-6-1.2 What is one reason for using tactical call signs such as "command post" or "weather center" during an emergency?
A. They keep the general public informed about what is going on
B. They promote efficiency and coordination in public-service communications activities
C. They are required by the FCC
D. They promote goodwill among amateurs

3AB-6-2.1 What is the term used to describe messages sent into or out of a disaster area that pertain to a person's well being?
A. Emergency traffic
B. Tactical traffic
C. Formal message traffic
D. Health and welfare traffic

3AB-6-3.1 Why is it important to provide a means of operating your amateur station separate from the commercial AC power lines?
A. So that you can take your station mobile
B. So that you can provide communications in an emergency
C. So that you can operate field day
D. So that you will comply with Subpart 97.169 of the FCC Rules

3AB-6-3.2 Which type of antenna would be a good choice as part of a portable HF amateur station that could be set up in case of a communications emergency?
A. A three-element quad
B. A three-element Yagi
C. A dipole
D. A parabolic dish

SUBELEMENT 3AC—Radio-Wave Propagation (3 Exam Questions)

3AC-1-1.1 What is the *ionosphere*?
A. That part of the upper atmosphere where enough ions and free electrons exist to affect radio-wave propagation
B. The boundary between two air masses of different temperature and humidity, along which radio waves can travel
C. The ball that goes on the top of a mobile whip antenna
D. That part of the atmosphere where weather takes place

3AC-1-1.2 What is the region of the outer atmosphere that makes long-distance radio communications possible as a result of bending of radio waves?
A. Troposphere
B. Stratosphere
C. Magnetosphere
D. Ionosphere

3AC-1-1.3 What type of solar radiation is most responsible for ionization in the outer atmosphere?
A. Thermal
B. Ionized particle
C. Ultraviolet
D. Microwave

3AC-1-2.1 Which ionospheric layer limits daytime radio communications in the 80-meter wavelength band to short distances?
A. D layer
B. F1 layer
C. E layer
D. F2 layer

3AC-1-2.2 What is the lowest ionospheric layer?
A. The A layer
B. The D layer
C. The E layer
D. The F layer

3AC-1-3.1 What is the lowest region of the ionosphere that is useful for long-distance radio wave propagation?
A. The D layer
B. The E layer
C. The F1 layer
D. The F2 layer

3AC-1-4.1 Which layer of the ionosphere is mainly responsible for long-distance sky-wave radio communications?
A. D layer
B. E layer
C. F1 layer
D. F2 layer

3AC-1-4.2 What are the two distinct sub-layers of the F layer of the ionosphere during the daytime?
A. Troposphere and stratosphere
B. F1 and F2
C. Electrostatic and electromagnetic
D. D and E

3AC-1-4.3 Which two daytime ionospheric layers combine into one layer at night?
A. E and F1
B. D and E
C. F1 and F2
D. E1 and E2

8-4-91

3AC-2.1 Which layer of the ionosphere is most responsible for absorption of radio signals during daylight hours?
A. The E layer
B. The F1 layer
C. The F2 layer
D. The D layer

3AC-2.2 When is ionospheric absorption most pronounced?
A. When tropospheric ducting occurs
B. When radio waves enter the D layer at low angles
C. When radio waves travel to the F layer
D. When a temperature inversion occurs

3AC-2.3 During daylight hours, what effect does the D layer of the ionosphere have on 80-meter radio waves?
A. The D layer absorbs the signals
B. The D layer bends the radio waves out into space
C. The D layer refracts the radio waves back to earth
D. The D layer has little or no effect on 80-meter radio wave propagation

3AC-2.4 What causes *ionospheric absorption* of radio waves?
A. A lack of D layer ionization
B. D layer ionization
C. The presence of ionized clouds in the E layer
D. Splitting of the F layer

3AC-3.1 What is usually the condition of the ionosphere just before sunrise?
A. Atmospheric attenuation is at a maximum
B. Ionization is at a maximum
C. The E layer is above the F layer
D. Ionization is at a minimum

3AC-3.2 At what time of day does maximum ionization of the ionosphere occur?
A. Dusk
B. Midnight
C. Midday
D. Dawn

3AC-3.3 Minimum ionization of the ionosphere occurs daily at what time?
A. Shortly before dawn
B. Just after noon
C. Just after dusk
D. Shortly before midnight

3AC-3.4 When is E layer ionization at a maximum?
A. Dawn
B. Midday
C. Dusk
D. Midnight

3AC-4.1 What is the name for the highest radio frequency that will be refracted back to earth?
A. Lowest usable frequency
B. Optimum working frequency
C. Ultra high frequency
D. Critical frequency

3AC-4.2 What causes the *maximum usable frequency* to vary?
A. Variations in the temperature of the air at ionospheric levels
B. Upper-atmospheric wind patterns
C. The amount of ultraviolet and other types of radiation received from the sun
D. Presence of ducting

3AC-4.3 What does the term *maximum usable frequency* refer to?
A. The maximum frequency that allows a radio signal to reach its destination in a single hop
B. The minimum frequency that allows a radio signal to reach its destination in a single hop
C. The maximum frequency that allows a radio signal to be absorbed in the lowest ionospheric layer
D. The minimum frequency that allows a radio signal to be absorbed in the lowest ionospheric layer

3AC-5.1 When two stations are within each other's skip zone on the frequency being used, what mode of propagation would it be desirable to use?
A. Ground wave propagation
B. Sky wave propagation
C. Scatter-mode propagation
D. Ionospheric ducting propagation

3AC-5.2 You are in contact with a distant station and are operating at a frequency close to the maximum usable frequency. If the received signals are weak and somewhat distorted, what type of propagation are you probably experiencing?
A. Tropospheric ducting
B. Line-of-sight propagation
C. Backscatter propagation
D. Waveguide propagation

3AC-6.1 What is the transmission path of a wave that travels directly from the transmitting antenna to the receiving antenna called?
A. Line of sight
B. The sky wave
C. The linear wave
D. The plane wave

3AC-6.2 How are VHF signals within the range of the visible horizon propagated?
A. By sky wave
B. By direct wave
C. By plane wave
D. By geometric wave

3AC-7.1 Ducting occurs in which region of the atmosphere?
A. F2
B. Ionosphere
C. Troposphere
D. Stratosphere

3AC-7.2 What effect does tropospheric bending have on 2-meter radio waves?
A. It increases the distance over which they can be transmitted
B. It decreases the distance over which they can be transmitted
C. It tends to garble 2-meter phone transmissions
D. It reverses the sideband of 2-meter phone transmissions

3AC-7.3 What atmospheric phenomenon causes tropospheric ducting of radio waves?
A. A very low pressure area
B. An aurora to the north
C. Lightning between the transmitting and receiving station
D. A temperature inversion

8-4-91

3AC-7.4 Tropospheric ducting occurs as a result of what phenomenon?
A. A temperature inversion
B. Sun spots
C. An aurora to the north
D. Lightning between the transmitting and receiving station

Pg 6

3AC-7.5 What atmospheric phenomenon causes VHF radio waves to be propagated several hundred miles through stable air masses over oceans?
A. Presence of a maritime polar air mass
B. A widespread temperature inversion
C. An overcast of cirriform clouds
D. Atmospheric pressure of roughly 29 inches of mercury or higher

Pg 6

3AC-7.6 In what frequency range does tropospheric ducting occur most often?
A. LF
B. MF
C. HF
D. VHF

Pg 6

SUBELEMENT 3AD—Amateur Radio Practice (4 Exam Questions)

3AD-1-1.1 Where should the green wire in an AC line cord be attached in a power supply?
A. To the fuse
B. To the "hot" side of the power switch
C. To the chassis
D. To the meter

3AD-1-1.2 Where should the black (or red) wire in a three-wire line cord be attached in a power supply?
A. To the filter capacitor
B. To the DC ground
C. To the chassis
D. To the fuse

3AD-1-1.3 Where should the white wire in a three-wire line cord be attached in a power supply?
A. To the side of the transformer's primary winding that has a fuse
B. To the side of the transformer's primary winding without a fuse
C. To the black wire
D. To the rectifier junction

3AD-1-1.4 Why is the retaining screw in one terminal of a light socket made of brass while the other one is silver colored?
A. To prevent galvanic action
B. To indicate correct wiring polarity
C. To better conduct current
D. To reduce skin effect

3AD-1-2.1 How much electrical current flowing through the human body is usually fatal?
A. As little as 100 milliamperes may be fatal
B. Approximately 10 amperes is required to be fatal
C. More than 20 amperes is needed to kill a human being
D. No amount of current will harm you. Voltages of over 2000 volts are always fatal, however

3AD-1-2.2 What is the minimum voltage considered to be dangerous to humans?
A. 30 volts
B. 100 volts
C. 1000 volts
D. 2000 volts

3AD-1-2.3 How much electrical current flowing through the human body is usually painful?
A. As little as 50 milliamperes may be painful
B. Approximately 10 amperes is required to be painful
C. More than 20 amperes is needed to be painful to a human being
D. No amount of current will be painful. Voltages of over 2000 volts are always painful, however

3AD-1-3.1 Where should the main power-line switch for a high voltage power supply be situated?
A. Inside the cabinet, to interrupt power when the cabinet is opened
B. On the rear panel of the high-voltage supply
C. Where it can be seen and reached easily
D. This supply should not be switch-operated

3AD-2-1.1 How is a voltmeter typically connected to a circuit under test?
A. In series with the circuit
B. In parallel with the circuit
C. In quadrature with the circuit
D. In phase with the circuit

Pg 7

8-4-91

3AD-2-2.1 How can the range of a voltmeter be extended?
A. By adding resistance in series with the circuit under test
B. By adding resistance in parallel with the circuit under test
C. By adding resistance in series with the meter
D. By adding resistance in parallel with the meter

3AD-3-1.1 How is an ammeter typically connected to a circuit under test?
A. In series with the circuit
B. In parallel with the circuit
C. In quadrature with the circuit
D. In phase with the circuit

3AD-3-2.1 How can the range of an ammeter be extended?
A. By adding resistance in series with the circuit under test
B. By adding resistance in parallel with the circuit under test
C. By adding resistance in series with the meter
D. By adding resistance in parallel with the meter

3AD-4.1 What is a *multimeter*?
A. An instrument capable of reading SWR and power
B. An instrument capable of reading resistance, capacitance and inductance
C. An instrument capable of reading resistance and reactance
D. An instrument capable of reading voltage, current and resistance

3AD-5-1.1 Where in the antenna transmission line should a peak-reading wattmeter be attached to determine the transmitter output power?
A. At the transmitter output
B. At the antenna feed point
C. One-half wavelength from the antenna feed point
D. One-quarter wavelength from the transmitter output

3AD-5-1.2 For the most accurate readings of transmitter output power, where should the RF wattmeter be inserted?
A. The wattmeter should be inserted and the output measured one-quarter wavelength from the antenna feed point
B. The wattmeter should be inserted and the output measured one-half wavelength from the antenna feed point
C. The wattmeter should be inserted and the output power measured at the transmitter antenna jack
D. The wattmeter should be inserted and the output power measured at the Transmatch output

3AD-5-1.3 At what line impedance are RF wattmeters usually designed to operate?
A. 25 ohms
B. 50 ohms
C. 100 ohms
D. 300 ohms

3AD-5-1.4 What is a *directional wattmeter*?
A. An instrument that measures forward or reflected power
B. An instrument that measures the directional pattern of an antenna
C. An instrument that measures the energy consumed by the transmitter
D. An instrument that measures thermal heating in a load resistor

3AD-5-2.1 If a directional RF wattmeter indicates 90 watts forward power and 10 watts reflected power, what is the actual transmitter output power?
A. 10 watts
B. 80 watts
C. 90 watts
D. 100 watts

3AD-5-2.2 If a directional RF wattmeter indicates 96 watts forward power and 4 watts reflected power, what is the actual transmitter output power?
A. 80 watts
B. 88 watts
C. 92 watts
D. 100 watts

3AD-6.1 What is a *marker generator*?
A. A high-stability oscillator that generates a series of reference signals at known frequency intervals
B. A low-stability oscillator that "sweeps" through a band of frequencies
C. An oscillator often used in aircraft to determine the craft's location relative to the inner and outer markers at airports
D. A high-stability oscillator whose output frequency and amplitude can be varied over a wide range

3AD-6.2 What type of circuit is used to inject a frequency calibration signal into a communications receiver?
A. A product detector
B. A receiver incremental tuning circuit
C. A balanced modulator
D. A crystal calibrator

3AD-6.3 How is a *marker generator* used?
A. To calibrate the tuning dial on a receiver
B. To calibrate the volume control on a receiver
C. To test the amplitude linearity of an SSB transmitter
D. To test the frequency deviation of an FM transmitter

3AD-7.1 What piece of test equipment produces a stable, low-level signal that can be set to a specific frequency?
A. A wavemeter
B. A reflectometer
C. A signal generator
D. A balanced modulator

3AD-7.2 What is an *RF signal generator* commonly used for?
A. Measuring RF signal amplitude
B. Aligning receiver tuned circuits
C. Adjusting the transmitter impedance-matching network
D. Measuring transmission line impedance

8-4-91

3AD-8-1.1 What is a *reflectometer*?
A. An instrument used to measure signals reflected from the ionosphere
B. An instrument used to measure radiation resistance
C. An instrument used to measure transmission-line impedance
D. An instrument used to measure standing wave ratio

3AD-8-1.2 What is the device that can indicate an impedance mismatch in an antenna system?
A. A field-strength meter
B. A set of lecher wires
C. A wavemeter
D. A reflectometer

3AD-8-2.1 For best accuracy when adjusting the impedance match between an antenna and feed line, where should the match-indicating device be inserted?
A. At the antenna feed point
B. At the transmitter
C. At the midpoint of the feed line
D. Anywhere along the feed line

3AD-8-2.2 Where should a reflectometer be inserted into a long antenna transmission line in order to obtain the most valid standing wave ratio indication?
A. At any quarter-wavelength interval along the transmission line
B. At the receiver end
C. At the antenna end
D. At any even half-wavelength interval along the transmission line

3AD-9.1 When adjusting a transmitter filter circuit, what device is connected to the transmitter output?
A. A multimeter
B. A set of Litz wires
C. A receiver
D. A dummy antenna

3AD-9.2 What is a *dummy antenna*?
A. An isotropic radiator
B. A nonradiating load for a transmitter
C. An antenna used as a reference for gain measurements
D. The image of an antenna, located below ground

3AD-9.3 Of what materials may a dummy antenna be made?
A. A wire-wound resistor
B. A diode and resistor combination
C. A noninductive resistor
D. A coil and capacitor combination

3AD-9.4 What station accessory is used in place of an antenna during transmitter tests so that no signal is radiated?
A. A Transmatch
B. A dummy antenna
C. A low-pass filter
D. A decoupling resistor

3AD-9.5 What is the purpose of a *dummy load*?
A. To allow off-the-air transmitter testing
B. To reduce output power for QRP operation
C. To give comparative signal reports
D. To allow Transmatch tuning without causing interference

3AD-9.6 How many watts should a dummy load for use with a 100-watt single-sideband phone transmitter be able to dissipate?
A. A minimum of 100 watts continuous
B. A minimum of 141 watts continuous
C. A minimum of 175 watts continuous
D. A minimum of 200 watts continuous

3AD-10.1 What is an *S-meter*?
A. A meter used to measure sideband suppression
B. A meter used to measure spurious emissions from a transmitter
C. A meter used to measure relative signal strength in a receiver
D. A meter used to measure solar flux

3AD-10.2 A meter that is used to measure relative signal strength in a receiver is known as what?
A. An S-meter
B. An RST-meter
C. A signal deviation meter
D. An SSB meter

3AD-11-1.1 Large amounts of RF energy may cause damage to body tissue, depending on the wavelength of the signal, the energy density of the RF field, and other factors. How does RF energy effect body tissue?
A. It causes radiation poisoning
B. It heats the tissue
C. It cools the tissue
D. It produces genetic changes in the tissue

3AD-11-1.2 Which body organ is most susceptible to damage from the heating effects of radio frequency radiation?
A. Eyes
B. Hands
C. Heart
D. Liver

3AD-11-2.1 Scientists have devoted a great deal of effort to determine safe RF exposure limits. What organization has established an RF protection guide?
A. The Institute of Electrical and Electronics Engineers
B. The American Radio Relay League
C. The Environmental Protection Agency
D. The American National Standards Institute

3AD-11-2.2 What is the purpose of the ANSI RF protection guide?
A. It protects you from unscrupulous radio dealers
B. It sets RF exposure limits under certain circumstances
C. It sets transmitter power limits
D. It sets antenna height requirements

3AD-11-2.3 The American National Standards Institute RF protection guide sets RF exposure limits under certain circumstances. In what frequency range is the maximum exposure level the most stringent (lowest)?
A. 3 to 30 MHz
B. 30 to 300 MHz
C. 300 to 3000 MHz
D. Above 1.5 GHz

8-4-91

3AD-11-2.4 The American National Standards Institute RF protection guide sets RF exposure limits under certain circumstances. Why is the maximum exposure level the most stringent (lowest) in the ranges between 30 MHz and 300 MHz?
A. There are fewer transmitters operating in this frequency range
B. There are more transmitters operating in this frequency range
C. Most transmissions in this frequency range are for an extended time
D. Human body lengths are close to whole-body resonance in that range

3AD-11-2.5 The American National Standards Institute RF protection guide sets RF exposure limits under certain circumstances. What is the maximum safe power output to the antenna terminal of a hand-held VHF or UHF radio, as set by this RF protection guide?
A. 125 milliwatts
B. 7 watts
C. 10 watts
D. 25 watts

3AD-11-3.1 After you make internal tuning adjustments to your VHF power amplifier, what should you do before you turn the amplifier on?
A. Remove all amplifier shielding to ensure maximum cooling
B. Connect a noise bridge to eliminate any interference
C. Be certain all amplifier shielding is fastened in place
D. Be certain no antenna is attached so that you will not cause any interference

SUBELEMENT 3AE—Electrical Principles (3 Exam Questions)

3AE-1-1.1 What is meant by the term *resistance*?
A. The opposition to the flow of current in an electric circuit containing inductors
B. The opposition to the flow of current in an electric circuit containing capacitance
C. The opposition to the flow of current in an electric circuit containing reactance
D. The opposition to the flow of current in an electric circuit that does not contain reactance

3AE-1-2.1 What is an *ohm*?
A. The basic unit of resistance
B. The basic unit of capacitance
C. The basic unit of inductance
D. The basic unit of admittance

3AE-1-2.2 What is the unit measurement of resistance?
A. Volt
B. Ampere
C. Joule
D. Ohm

3AE-1-3.1 Two equal-value resistors are connected in series. How does the total resistance of this combination compare with the value of either resistor by itself?
A. The total resistance is half the value of either resistor
B. The total resistance is twice the value of either resistor
C. The total resistance is the same as the value of either resistor
D. The total resistance is the square of the value of either resistor

3AE-1-3.2 How does the total resistance of a string of series-connected resistors compare to the values of the individual resistors?
A. The total resistance is the square of the sum of all the individual resistor values
B. The total resistance is the square root of the sum of the individual resistor values
C. The total resistance is the sum of the squares of the individual resistor values
D. The total resistance is the sum of all the individual resistance values

3AE-1-4.1 Two equal-value resistors are connected in parallel. How does the total resistance of this combination compare with the value of either resistor by itself?
A. The total resistance is twice the value of either resistor
B. The total resistance is half the value of either resistor
C. The total resistance is the square of the value of either resistor
D. The total resistance is the same as the value of either resistor

3AE-1-4.2 How does the total resistance of a string of parallel-connected resistors compare to the values of the individual resistors?
A. The total resistance is the square of the sum of the resistor values
B. The total resistance is more than the highest-value resistor in the combination
C. The total resistance is less than the smallest-value resistor in the combination
D. The total resistance is the same as the highest-value resistor in the combination

8-4-91

3AE-2.1 What is *Ohm's Law*?
A. A mathematical relationship between resistance, voltage and power in a circuit
B. A mathematical relationship between current, resistance and power in a circuit
C. A mathematical relationship between current, voltage and power in a circuit
D. A mathematical relationship between resistance, current and applied voltage in a circuit

3AE-2.2 How is the current in a DC circuit calculated when the voltage and resistance are known?
A. I = E / R
B. P = I × E
C. I = R × E
D. I = E × R

3AE-2.3 What is the input resistance of a load when a 12-volt battery supplies 0.25 amperes to it?
A. 0.02 ohms
B. 3 ohms
C. 48 ohms
D. 480 ohms

3AE-2.4 The product of the current and what force gives the electrical power in a circuit?
A. Magnetomotive force
B. Centripetal force
C. Electrochemical force
D. Electromotive force

3AE-2.5 What is the input resistance of a load when a 12-volt battery supplies 0.15 amperes to it?
A. 8 ohms
B. 80 ohms
C. 100 ohms
D. 800 ohms

3AE-2.6 When 120 volts is measured across a 4700-ohm resistor, approximately how much current is flowing through it?
A. 39 amperes
B. 3.9 amperes
C. 0.26 ampere
D. 0.026 ampere

3AE-2.7 When 120 volts is measured across a 47000-ohm resistor, approximately how much current is flowing through it?
A. 392 A
B. 39.2 A
C. 26 mA
D. 2.6 mA

3AE-2.8 When 12 volts is measured across a 4700-ohm resistor, approximately how much current is flowing through it?
A. 2.6 mA
B. 26 mA
C. 39.2 A
D. 392 A

3AE-2.9 When 12 volts is measured across a 47000-ohm resistor, approximately how much current is flowing through it?
A. 255 μA
B. 255 mA
C. 3917 mA
D. 3917 A

3AE-3-1.1 What is the term used to describe the ability of a component to store energy in a magnetic field?
A. Admittance
B. Capacitance
C. Inductance
D. Resistance

3AE-3-2.1 What is the basic unit of inductance?
A. Coulomb
B. Farad
C. Henry
D. Ohm

3AE-3-2.2 What is a *henry*?
A. The basic unit of admittance
B. The basic unit of capacitance
C. The basic unit of inductance
D. The basic unit of resistance

3AE-3-2.3 What is a *microhenry*?
A. A basic unit of inductance equal to 10^{-12} henrys
B. A basic unit of inductance equal to 10^{-6} henrys
C. A basic unit of inductance equal to 10^{-3} henrys
D. A basic unit of inductance equal to 10^{6} henrys

3AE-3-2.4 What is a *millihenry*?
A. A basic unit of inductance equal to 10^{-12} henrys
B. A basic unit of inductance equal to 10^{-6} henrys
C. A basic unit of inductance equal to 10^{-3} henrys
D. A basic unit of inductance equal to 10^{6} henrys

3AE-3-3.1 Two equal-value inductors are connected in series. How does the total inductance of this combination compare with the value of either inductor by itself?
A. The total inductance is half the value of either inductor
B. The total inductance is twice the value of either inductor
C. The total inductance is equal to the value of either inductor
D. No comparison can be made without knowing the exact inductances

3AE-3-3.2 How does the total inductance of a string of series-connected inductors compare to the values of the individual inductors?
A. The total inductance is equal to the average of all the individual inductances
B. The total inductance is equal to less than the value of the smallest inductance
C. The total inductance is equal to the sum of all the individual inductances
D. No comparison can be made without knowing the exact inductances

3AE-3-4.1 Two equal-value inductors are connected in parallel. How does the total inductance of this combination compare with the value of either inductor by itself?
A. The total inductance is half the value of either inductor
B. The total inductance is twice the value of either inductor
C. The total inductance is equal to the square of either inductance
D. No comparison can be made without knowing the exact inductances

12

8-4-91

3AE-3-4.2 How does the total inductance of a string of parallel-connected inductors compare to the values of the individual inductors?
A. The total inductance is equal to the sum of the inductances in the combination
B. The total inductance is less than the smallest inductance value in the combination
C. The total inductance is equal to the average of the inductances in the combination
D. No comparison can be made without knowing the exact inductances

3AE-4-1.1 What is the term used to describe the ability of a component to store energy in an electric field?
A. Capacitance
B. Inductance
C. Resistance
D. Tolerance

3AE-4-2.1 What is the basic unit of capacitance?
A. Farad
B. Ohm
C. Volt
D. Ampere

3AE-4-2.2 What is a *microfarad*?
A. A basic unit of capacitance equal to 10^{-12} farads
B. A basic unit of capacitance equal to 10^{-6} farads
C. A basic unit of capacitance equal to 10^{-2} farads
D. A basic unit of capacitance equal to 10^{6} farads

3AE-4-2.3 What is a *picofarad*?
A. A basic unit of capacitance equal to 10^{-12} farads
B. A basic unit of capacitance equal to 10^{-6} farads
C. A basic unit of capacitance equal to 10^{-2} farads
D. A basic unit of capacitance equal to 10^{6} farads

3AE-4-2.4 What is a *farad*?
A. The basic unit of resistance
B. The basic unit of capacitance
C. The basic unit of inductance
D. The basic unit of admittance

3AE-4-3.1 Two equal-value capacitors are connected in series. How does the total capacitance of this combination compare with the value of either capacitor by itself?
A. The total capacitance is twice the value of either capacitor
B. The total capacitance is equal to the value of either capacitor
C. The total capacitance is half the value of either capacitor
D. No comparison can be made without knowing the exact capacitances

3AE-4-3.2 How does the total capacitance of a string of series-connected capacitors compare to the values of the individual capacitors?
A. The total capacitance is equal to the sum of the capacitances in the combination
B. The total capacitance is less than the smallest value of capacitance
C. The total capacitance is equal to the average of the capacitances in the combination
D. No comparison can be made without knowing the exact capacitances

3AE-4-4.1 Two equal-value capacitors are connected in parallel. How does the total capacitance of this combination compare with the value of either capacitor by itself?
A. The total capacitance is twice the value of either capacitor
B. The total capacitance is half the value of either capacitor
C. The total capacitance is equal to the value of either capacitor
D. No comparison can be made without knowing the exact capacitances

3AE-4-4.2 How does the total capacitance of a string of parallel-connected capacitors compare to the values of the individual capacitors?
A. The total capacitance is equal to the sum of the capacitances in the combination
B. The total capacitance is less than the smallest value of capacitance in the combination
C. The total capacitance is equal to the average of the capacitances in the combination
D. No comparison can be made without knowing the exact capacitances

SUBELEMENT 3AF—Circuit Components
(2 Exam Questions)

3AF-1-1.1 What are the four common types of resistor construction?
- A. Carbon-film, metal-film, micro-film and wire-film
- B. Carbon-composition, carbon-film, metal-film and wire-wound
- C. Carbon-composition, carbon-film, electrolytic and metal-film
- D. Carbon-film, ferrite, carbon-composition and metal-film

3AF-1-2.1 What is the primary function of a resistor?
- A. To store an electric charge
- B. To store a magnetic field
- C. To match a high-impedance source to a low-impedance load
- D. To limit the current in an electric circuit

3AF-1-2.2 What is a *variable resistor*?
- A. A resistor that changes value when an AC voltage is applied to it
- B. A device that can transform a variable voltage into a constant voltage
- C. A resistor with a slide or contact that makes the resistance adjustable
- D. A resistor that changes value when it is heated

3AF-1-3.1 What do the first three color bands on a resistor indicate?
- A. The value of the resistor in ohms
- B. The resistance tolerance in percent
- C. The power rating in watts
- D. The value of the resistor in henrys

3AF-1-3.2 How can a carbon resistor's electrical tolerance rating be found?
- A. By using a wavemeter
- B. By using the resistor's color code
- C. By using Thevenin's theorem for resistors
- D. By using the Baudot code

3AF-1-3.3 What does the fourth color band on a resistor indicate?
- A. The value of the resistor in ohms
- B. The resistance tolerance in percent
- C. The power rating in watts
- D. The resistor composition

3AF-1-3.4 When the color bands on a group of resistors indicate that they all have the same resistance, what further information about each resistor is needed in order to select those that have nearly equal value?
- A. The working voltage rating of each resistor
- B. The composition of each resistor
- C. The tolerance of each resistor
- D. The current rating of each resistor

3AF-1-4.1 Why do resistors generate heat?
- A. They convert electrical energy to heat energy
- B. They exhibit reactance
- C. Because of skin effect
- D. To produce thermionic emission

3AF-1-4.2 Why would a large size resistor be substituted for a smaller one of the same resistance?
- A. To obtain better response
- B. To obtain a higher current gain
- C. To increase power dissipation capability
- D. To produce a greater parallel impedance

8-4-91

3AF-1-5.1 What is the symbol used to represent a fixed resistor on schematic diagrams?

A.  B. 

C.  D. 

3AF-1-5.2 What is the symbol used to represent a variable resistor on schematic diagrams.

A.  B. 

C.  D. 

3AF-2-1.1 What is an inductor *core*?
- A. The point at which an inductor is tapped to produce resonance
- B. A tight coil of wire used in a transformer
- C. An insulating material placed between the plates of an inductor
- D. The central portion of a coil; may be made from air, iron, brass or other material

3AF-2-1.2 What are the component parts of a coil?
- A. The wire in the winding and the core material
- B. Two conductive plates and an insulating material
- C. Two or more layers of silicon material
- D. A donut-shaped iron core and a layer of insulating tape

3AF-2-1.3 Describe an *inductor*.
- A. A semiconductor in a conducting shield
- B. Two parallel conducting plates
- C. A straight wire conductor mounted inside a Faraday shield
- D. A coil of conducting wire

3AF-2-1.4 For radio frequency power applications, which type of inductor has the least amount of loss?
- A. Magnetic wire
- B. Iron core
- C. Air core
- D. Slug tuned

3AF-2-2.1 What is an *inductor*?
- A. An electronic component that stores energy in an electric field
- B. An electronic component that converts a high voltage to a lower voltage
- C. An electronic component that opposes DC while allowing AC to pass
- D. An electronic component that stores energy in a magnetic field

8-4-91

3AF-2-2.2 What are the electrical properties of an inductor?

A. An inductor stores a charge electrostatically and opposes a change in voltage
B. An inductor stores a charge electrochemically and opposes a change in current
C. An inductor stores a charge electromagnetically and opposes a change in current
D. An inductor stores a charge electromechanically and opposes a change in voltage

3AF-2-3.1 What factors determine the amount of inductance in a *coil*?

A. The type of material used in the core, the diameter of the core and whether the coil is mounted horizontally or vertically
B. The diameter of the core, the number of turns of wire used to wind the coil and the type of metal used in the wire
C. The type of material used in the core, the number of turns used to wind the core and the frequency of the current through the coil
D. The type of material used in the core, the diameter of the core, the length of the coil and the number of turns of wire used to wind the coil

3AF-2-3.2 What can be done to raise the inductance of a 5-microhenry air-core coil to a 5-millihenry coil with the same physical dimensions?

A. The coil can be wound on a non-conducting tube
B. The coil can be wound on an iron core
C. Both ends of the coil can be brought around to form the shape of a donut, or toroid
D. The coil can be made of a heavier-gauge wire

3AF-2-3.3 As an iron core is inserted in a coil, what happens to the inductance?

A. It increases
B. It decreases
C. It stays the same
D. It becomes voltage-dependent

3AF-2-3.4 As a brass core is inserted in a coil, what happens to the inductance?

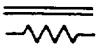
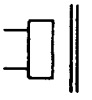
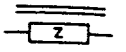
A. It increases
B. It decreases
C. It stays the same
D. It becomes voltage-dependent

3AF-2-4.1 What is the symbol used to represent an adjustable inductor on schematic diagrams?

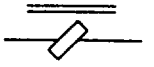
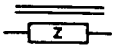
A. 
B.
C. 
D. 

HO #1 pg 3 Q18

3AF-2-4.2 What is the symbol used to represent an iron-core inductor on schematic diagrams?

A. 
B. 
C. 
D. 

3AF-2-4.3 What is the symbol used to represent an inductor wound over a toroidal core on schematic diagrams?

A. 
B. 
C. 
D. 

3AF-3-1.1 What is a capacitor *dielectric*?

A. The insulating material used for the plates
B. The conducting material used between the plates
C. The ferrite material that the plates are mounted on
D. The insulating material between the plates

HO not due

3AF-3-1.2 What are the component parts of a capacitor?

A. Two or more conductive plates with an insulating material between them
B. The wire used in the winding and the core material
C. Two or more layers of silicon material
D. Two insulating plates with a conductive material between them

HO not due

3AF-3-1.3 What is an *electrolytic capacitor*?

A. A capacitor whose plates are formed on a thin ceramic layer
B. A capacitor whose plates are separated by a thin strip of mica insulation
C. A capacitor whose dielectric is formed on one set of plates through electrochemical action
D. A capacitor whose value varies with applied voltage

3AF-3-1.4 What is a *paper capacitor*?

A. A capacitor whose plates are formed on a thin ceramic layer
B. A capacitor whose plates are separated by a thin strip of mica insulation
C. A capacitor whose plates are separated by a layer of paper
D. A capacitor whose dielectric is formed on one set of plates through electrochemical action

3AF-3-2.1 What is a *capacitor*?

A. An electronic component that stores energy in a magnetic field
B. An electronic component that stores energy in an electric field
C. An electronic component that converts a high voltage to a lower voltage
D. An electronic component that converts power into heat

HO #2 Pg 5

11

8-4-91

3AF-3-2.2 What are the electrical properties of a capacitor?
A. A capacitor stores a charge electrochemically and opposes a change in current
B. A capacitor stores a charge electromagnetically and opposes a change in current
C. A capacitor stores a charge electromechanically and opposes a change in voltage
D. A capacitor stores a charge electrostatically and opposes a change in voltage

3AF-3-2.3 What factors must be considered when selecting a capacitor for a circuit?
A. Type of capacitor, capacitance and voltage rating
B. Type of capacitor, capacitance and the kilowatt-hour rating
C. The amount of capacitance, the temperature coefficient and the KVA rating
D. The type of capacitor, the microscopy coefficient and the temperature coefficient

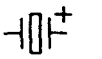
3AF-3-2.4 How are the characteristics of a capacitor usually *specified*?
A. In volts and amperes
B. In microfarads and volts
C. In ohms and watts
D. In millihenrys and amperes

3AF-3-3.1 What factors determine the amount of capacitance in a *capacitor*?
A. The dielectric constant of the material between the plates, the area of one side of one plate, the separation between the plates and the number of plates
B. The dielectric constant of the material between the plates, the number of plates and the diameter of the leads connected to the plates
C. The number of plates, the spacing between the plates and whether the dielectric material is N type or P type
D. The dielectric constant of the material between the plates, the surface area of one side of one plate, the number of plates and the type of material used for the protective coating

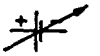
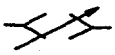
3AF-3-3.2 As the plate area of a capacitor is increased, what happens to its capacitance?
A. Decreases
B. Increases
C. Stays the same
D. Becomes voltage dependent

3AF-3-3.3 As the plate spacing of a capacitor is increased, what happens to its capacitance?
A. Increases
B. Stays the same
C. Becomes voltage dependent
D. Decreases

3AF-3-4.1 What is the symbol used to represent an electrolytic capacitor on schematic diagrams?

A. 
B. 
C. 
D. 

3AF-3-4.2 What is the symbol used to represent a variable capacitor on schematic diagrams?

A. 
B. 
C. 
D. 

8-4-91

SUBELEMENT 3AG—Practical Circuits
(1 Exam Question)

3AG-1-1.1 Which frequencies are attenuated by a low-pass filter?
A. Those above its cut-off frequency
B. Those within its cut-off frequency
C. Those within 50 kHz on either side of its cut-off frequency
D. Those below its cut-off frequency

3AG-1-1.2 What circuit passes electrical energy below a certain frequency and blocks electrical energy above that frequency?
A. A band-pass filter
B. A high-pass filter
C. An input filter
D. A low-pass filter

3AG-1-2.1 Why does virtually every modern transmitter have a built-in low-pass filter connected to its output?
A. To attenuate frequencies below its cutoff point
B. To attenuate low frequency interference to other amateurs
C. To attenuate excess harmonic radiation
D. To attenuate excess fundamental radiation

3AG-1-2.2 You believe that excess harmonic radiation from your transmitter is causing interference to your television receiver. What is one possible solution for this problem?
A. Install a low-pass filter on the television receiver
B. Install a low-pass filter at the transmitter output
C. Install a high-pass filter on the transmitter output
D. Install a band-pass filter on the television receiver

3AG-2-1.1 What circuit passes electrical energy above a certain frequency and attenuates electrical energy below that frequency?
A. A band-pass filter
B. A high-pass filter
C. An input filter
D. A low-pass filter

3AG-2-2.1 Where is the proper place to install a high-pass filter?
A. At the antenna terminals of a television receiver
B. Between a transmitter and a Transmatch
C. Between a Transmatch and the transmission line
D. On a transmitting antenna

3AG-2-2.2 Your Amateur Radio transmissions cause interference to your television receiver even though you have installed a low-pass filter at the transmitter output. What is one possible solution for this problem?
A. Install a high-pass filter at the transmitter terminals
B. Install a high-pass filter at the television antenna terminals
C. Install a low-pass filter at the television antenna terminals also
D. Install a band-pass filter at the television antenna terminals

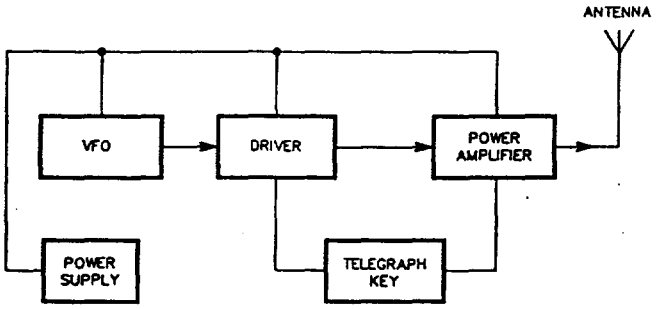
3AG-3-1.1 What circuit attenuates electrical energy above a certain frequency and below a lower frequency?
A. A band-pass filter
B. A high-pass filter
C. An input filter
D. A low-pass filter

3AG-3-1.2 What general range of RF energy does a band-pass filter reject?
A. All frequencies above a specified frequency
B. All frequencies below a specified frequency
C. All frequencies above the upper limit of the band in question
D. All frequencies above a specified frequency and below a lower specified frequency

3AG-3-2.1 The IF stage of a communications receiver uses a filter with a peak response at the intermediate frequency. What term describes this filter response?
A. A band-pass filter
B. A high-pass filter
C. An input filter
D. A low-pass filter

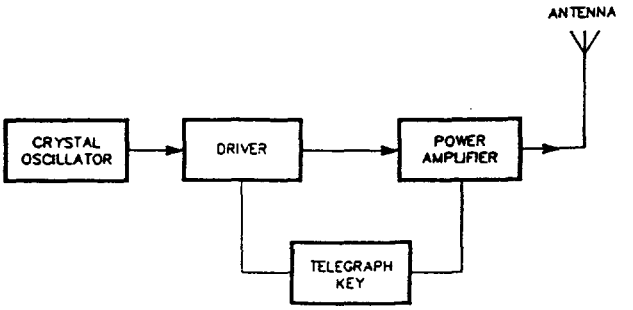
3AG-4-1.1 What circuit is likely to be found in all types of receivers?
A. An audio filter
B. A beat frequency oscillator
C. A detector
D. An RF amplifier

3AG-4-1.2 What type of transmitter does this block diagram represent?



A. A simple packet-radio transmitter
B. A simple crystal-controlled transmitter
C. A single-sideband transmitter
D. A VFO-controlled transmitter

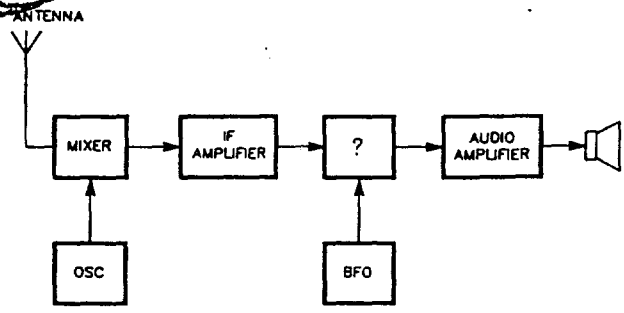
3AG-4-1.3 What type of transmitter does this block diagram represent?



A. A simple packet-radio transmitter
B. A simple crystal-controlled transmitter
C. A single-sideband transmitter
D. A VFO-controlled transmitter

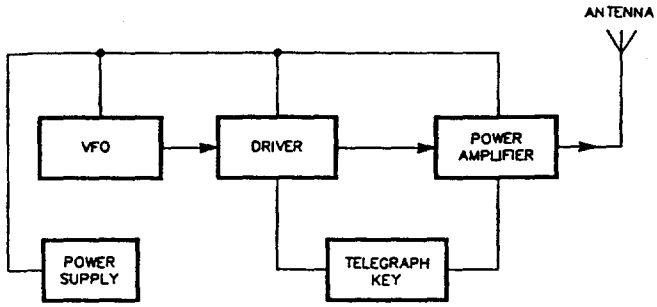
8-4-91

3AG-4-1.4 What is the unlabeled block (?) in this diagram?



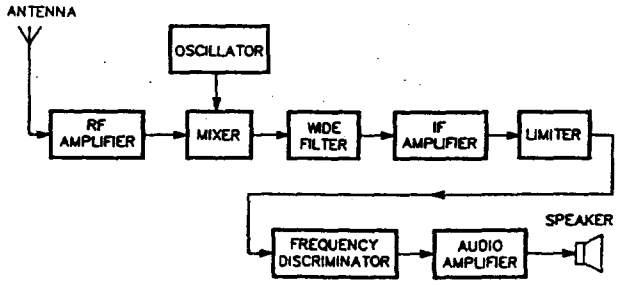
A. An AGC circuit
B. A detector
C. A power supply
D. A VFO circuit

3AG-4-1.5 What type of device does this block diagram represent?



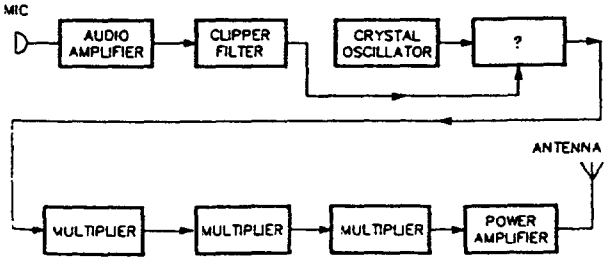
A. A double-conversion receiver
B. A variable-frequency oscillator
C. A simple superheterodyne receiver
D. A simple CW transmitter

3AG-4-2.1 What type of device does this block diagram represent?



A. A double-conversion receiver
B. A variable-frequency oscillator
C. A simple superheterodyne receiver
D. A simple FM receiver

3AG-4-2.2 What is the unlabeled block (?) in this diagram?



A. A band-pass filter
B. A crystal oscillator
C. A reactance modulator
D. A rectifier modulator

SUBELEMENT 3AH—Signals and Emissions (2 Exam Questions)

3AH-1.1 What is the meaning of the term *modulation*?
A. The process of varying some characteristic of a carrier wave for the purpose of conveying information
B. The process of recovering audio information from a received signal
C. The process of increasing the average power of a single-sideband transmission
D. The process of suppressing the carrier in a single-sideband transmitter

3AH-2-1.1 If the modulator circuit of your FM transmitter fails, what emission type would likely result?
A. An unmodulated carrier wave
B. A phase modulated carrier wave
C. An amplitude modulated carrier wave
D. A frequency modulated carrier wave

3AH-2-1.2 What emission does not have sidebands resulting from modulation?
A. AM phone
B. Test
C. FM phone
D. RTTY

3AH-2-2.1 What is the FCC emission designator for a Morse code telegraphy signal produced by switching the transmitter output on and off?
A. Test
B. AM phone
C. CW
D. RTTY

Q22 p28

3AH-2-2.2 What is CW?
A. Morse code telegraphy using amplitude modulation
B. Morse code telegraphy using frequency modulation
C. Morse code telegraphy using phase modulation
D. Morse code telegraphy using pulse modulation

p28

3AH-2-3.1 What is RTTY?
A. Amplitude-keyed telegraphy
B. Frequency-shift-keyed telegraphy
C. Frequency-modulated telephony
D. Phase-modulated telephony

3AH-2-3.2 What is the emission designation for telegraphy by frequency shift keying without the use of a modulating tone?
A. RTTY
B. MCW
C. CW
D. Single-sideband phone

3AH-2-4.1 What emission type results when an on/off keyed audio tone is applied to the microphone input of an FM transmitter?
A. RTTY
B. MCW
C. CW
D. Single-sideband phone

3AH-2-4.2 What is tone-modulated international Morse code telegraphy?
A. Telephony produced by audio fed into an FM transmitter
B. Telegraphy produced by an on/off keyed audio tone fed into a CW transmitter
C. Telegraphy produced by on/off keying of the carrier amplitude
D. Telegraphy produced by an on/off keyed audio tone fed into an FM transmitter

11

8-4-91

3AH-2-5.1 What is the emission designated as "MCW"?
A. Frequency-modulated telegraphy using audio tones
B. Frequency-modulated telephony
C. Frequency-modulated facsimile using audio tones
D. Phase-modulated television

3AH-2-5.2 In an ITU emission designator like A1A, what does the first symbol describe?
A. The nature of the signal modulating the main carrier
B. The type of modulation of the main carrier
C. The speed of a radiotelegraph transmission
D. The type of the information to be transmitted

3AH-2-5.3 What emission type results when an on-off keyed audio oscillator is connected to the microphone jack of an FM phone transmitter?
A. SS
B. RTTY
C. MCW
D. Image

3AH-2-6.1 In an ITU emission designator like F3B, what does the second symbol describe?
A. The nature of the signal modulating the main carrier
B. The type of modulation of the main carrier
C. The type of information to be transmitted
D. The frequency modulation index of a carrier

3AH-2-6.2 How would you transmit packet using an FM 2-meter transceiver?
A. Use your telegraph key to interrupt the carrier wave
B. Modulate your FM transmitter with audio tones from a terminal node controller
C. Use your mike for telephony
D. Use your touch-tone (DTMF) key pad to signal in Morse code.

Q21 not covered

3AH-2-7.1 What type of emission results when speaking into the microphone of a 2-meter FM hand-held transceiver?
A. Amplitude modulated phone
B. Code telegraphy
C. An unmodulated carrier wave
D. Frequency modulated phone

P28

3AH-2-7.2 What emission type do most 2-meter FM transmitters transmit?
A. Interrupted pure carrier wave
B. Frequency modulated phone
C. Single-sideband voice emissions
D. Amplitude modulated carrier waves

P28

*3AH-2-8.1 What is the most important consideration when installing a 10-meter dipole inside an attic?
A. It will exhibit a low angle of radiation
B. The dipole must always be run horizontally polarized
C. It will be covered by an insulation to prevent fire and high enough to prevent being accidentally touched during transmission
D. Dipoles usually don't work in attics

*There is a problem with the answer (C) to question 3AH-2-8.1, as released by the VEC Question Pool Committee. The most important consideration is that an indoor antenna should be treated with respect because of the possibility of adverse biological effects due to near-field radiation. Another point to keep in mind is that insulated wire does *not* reduce or eliminate the risk of RF burns. Finally, a dipole does not pose a fire hazard from RF, whether it uses insulated or uninsulated wire.

3AH-2-8.2 Which type of transmitter will produce a frequency modulated carrier wave?
A. A CW transmitter
B. An amplitude modulated transmitter
C. A single-sideband transmitter
D. A phase modulated transmitter

3AH-3.1 What is the term used to describe a constant-amplitude radio-frequency signal?
A. An RF carrier
B. An AF carrier
C. A sideband carrier
D. A subcarrier

3AH-3.2 What is another name for an unmodulated radio-frequency signal?
A. An AF carrier
B. An RF carrier
C. A sideband carrier
D. A subcarrier

HD not clear

3AH-4.1 What characteristic makes FM telephony especially well-suited for local VHF/UHF radio communications?
A. Good audio fidelity and intelligibility under weak-signal conditions
B. Better rejection of multipath distortion than the AM modes
C. Good audio fidelity and high signal-to-noise ratio above a certain signal amplitude threshold
D. Better carrier frequency stability than the AM modes

3AH-5.1 What emission is produced by a transmitter using a reactance modulator?
A. CW
B. Unmodulated carrier
C. Single-sideband, suppressed-carrier phone
D. Phase modulated phone

3AH-5.2 What other emission does phase modulation most resemble?
A. Amplitude modulation
B. Pulse modulation
C. Frequency modulation
D. Single-sideband modulation

3AH-6.1 Many communications receivers have several IF filters that can be selected by the operator. Why do these filters have different bandwidths?
A. Because some ham bands are wider than others
B. Because different bandwidths help increase the receiver sensitivity
C. Because different bandwidths improve S-meter readings
D. Because some emission types occupy a wider frequency range than others

3AH-6.2 List the following signals in order of increasing bandwidth (narrowest signal first): CW, FM voice, RTTY, SSB voice.
A. RTTY, CW, SSB voice, FM voice
B. CW, FM voice, RTTY, SSB voice
C. CW, RTTY, SSB voice, FM voice
D. CW, SSB voice, RTTY, FM voice

14