Element 3 Pool for use July 1, 2004 through June 30, 2008

QPC REVISED CYCLE DATE: 7/01/04 THROUGH 6/30/07

SUBELEMENT G1 -- COMMISSION'S RULES [6 Exam Questions -- 6 Groups]

G1A General control operator frequency privileges

G1A01 (C) [97.301d]
What are the frequency privileges for a General Class control operator in the 160-meter band (ITU Region 2)?
A. 1800 - 1900-kHz
B. 1900 - 2000-kHz
C. 1800 - 2000-kHz
D. 1825 - 2000-kHz

G1A02 (A) [97.301d]
What are the frequency privileges for a General Class control operator in the 75/80-meter band (ITU Region 2)?
A. 3525 - 3750-kHz and 3850 - 4000-kHz
B. 3525 - 3775-kHz and 3875 - 4000-kHz
C. 3525 - 3750-kHz and 3875 - 4000-kHz
D. 3525 - 3775-kHz and 3850 - 4000-kHz

G1A03 (D) [97.301d]
What are the frequency privileges for a General Class control operator in the 40-meter band (ITU Region 2)?
A. 7025 - 7175-kHz and 7200 - 7300-kHz
B. 7025 - 7175-kHz and 7225 - 7300-kHz
C. 7025 - 7150-kHz and 7200 - 7300-kHz
D. 7025 - 7150-kHz and 7225 - 7300-kHz

G1A04 (A) [97.301d]
What are the frequency privileges for a General Class control operator in the 30-meter band?
A. 10100 - 10150-kHz
B. 10100 - 10175-kHz
C. 10125 - 10150-kHz
D. 10125 - 10175-kHz

G1A05 (B) [97.301d]
What are the frequency privileges for a General Class control operator in the 20-meter band?
A. 14025 - 14100-kHz and 14175 - 14350-kHz
B. 14025 - 14150-kHz and 14225 - 14350-kHz
C. 14025 - 14125-kHz and 14200 - 14350-kHz
D. 14025 - 14175-kHz and 14250 - 14350-kHz

G1A06 (D) [97.301d]

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What are the frequency privileges for a General Class control operator in the 15-meter band?
A. 21025 - 21200-kHz and 21275 - 21450-kHz
B. 21025 - 21150-kHz and 21300 - 21450-kHz
C. 21025 - 21150-kHz and 21275 - 21450-kHz
D. 21025 - 21200-kHz and 21300 - 21450-kHz

G1A07 (B) [97.301d]
What are the frequency privileges for a General Class control operator in the 12-meter band?
A. 24890 - 24975-kHz
B. 24890 - 24990-kHz
C. 24900 - 24990-kHz
D. 24900 - 24975-kHz

G1A08 (A) [97.301d]
What are the frequency privileges for a General Class control operator in the 10-meter band?
A. 28000 - 29700-kHz
B. 28025 - 29700-kHz
C. 28100 - 29600-kHz
D. 28125 - 29600-kHz

G1A09 (D) [97.301d]
What are the frequency privileges for a General Class control operator in the 17-meter band?
A. 18068 - 18300-kHz
B. 18025 - 18200-kHz
C. 18100 - 18200-kHz
D. 18068 - 18168-kHz

G1A10 (C) [97.305a]
What are the frequency segments for General class licensees within the 75/80-meter band in ITU Region 2 for CW emissions?
A. 3500 - 3750 kHz and 3800 - 4000 kHz
B. 3700 - 3750 kHz and 3850 - 4000 kHz
C. 3525 - 3750 kHz and 3850 - 4000 kHz
D. 3525 - 4000 kHz

G1A11 (C) [97.305c]
What are the frequency segments within the 10-meter band for phone emissions?
A. 28000 - 28300 kHz
B. 29000 - 29700 kHz
C. 28300 - 29700 kHz
D. 28000 - 29000 kHz

G1B Antenna structure limitations; good engineering and good amateur practice; beacon operation; restricted operation; retransmitting radio signals

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G1B01 (C) [97.15a]
Provided it is not at or near a public-use airport, what is the maximum height above ground an antenna structure may rise without requiring its owner to notify the FAA and register with the FCC?
A. 50 feet
B. 100 feet
C. 200 feet
D. 300 feet

G1B02 (B) [97.101a]
If the FCC Rules DO NOT specifically cover a situation, how must you operate your amateur station?
A. In accordance with standard licensee operator principles
B. In accordance with good engineering and good amateur practice
C. In accordance with station operating practices adopted by the VECs
D. In accordance with procedures set forth by the International Amateur Radio Union

G1B03 (B) [97.203g]
Which of the following types of stations may transmit only one-way communications?
A. Repeater station
B. Beacon station
C. HF station
D. VHF station

G1B04 (A) [97.113b]
Which of the following does NOT need to be true when an amateur station is being used to gather news information for broadcast purposes?
A. The information is more quickly transmitted by Amateur Radio
B. The information must involve the immediate safety of life of individuals or the immediate protection of property
C. The information must be directly related to the event
D. The information cannot be transmitted by other means

G1B05 (D) [97.113e]
Under what limited circumstances may music be transmitted by an amateur station?
A. When it produces no dissonances or spurious emissions
B. When it is used to jam an illegal transmission
C. When it is transmitted on frequencies above 1215 MHz
D. When it is an incidental part of a space shuttle retransmission

G1B06 (C) [97.113a4]
When may an amateur station in two-way communication transmit a message in a secret code in order to obscure the meaning of the communication?

A. When transmitting above 450 MHz
B. During contests
C. Never
D. During a declared communications emergency

G1B07 (B) [97.113a4]
What are the restrictions on the use of abbreviations or procedural signals in the amateur service?
A. Only "Q" codes are permitted
B. They may be used if they do not obscure the meaning of a message
C. They are not permitted because they obscure the meaning of a message to FCC monitoring stations
D. Only "10-codes" are permitted

G1B08 (D) [97.113a4, 97.113e]
Which of the following amateur station transmissions is NOT prohibited by the FCC Rules?
A. The playing of music
B. The use of obscene or indecent words
C. False or deceptive messages or signals
D. Retransmission of space shuttle communications

G1B09 (C) [97.113a4, 97.113e]
What should you do to prevent your station from retransmitting music or signals from a non-amateur station?
A. Turn up the volume of your transceiver
B. Speak closer to the microphone to increase your signal strength
C. Turn down the volume of background audio
D. Adjust your transceiver noise blanker

G1B10 (A) [97.203]
Which of the following is NOT an FCC requirement regarding beacon stations?
A. All transmissions must use audio frequency shift keying (AFSK)
B. Only one signal per band is permitted from a given location
C. The transmitter power of the beacon station must not exceed 100 watts
D. The control operator of the beacon station must hold a Technician, Technician Plus, General, Advanced or Extra Class operator license

G1C Transmitter power standards; certification of external RF- power-amplifiers; standards for certification of external RF-power amplifiers; HF data emission standards

G1C01 (A) [97.313c1]
What is the maximum transmitting power an amateur station may use on 3690 kHz?
A. 200 watts PEP output
B. 1000 watts PEP output
C. 1500 watts PEP output

D. The minimum power necessary to carry out the desired communications, with a maximum of 2000 watts PEP output

G1C02 (C) [97.313a,b]
What is the maximum transmitting power an amateur station may use on 7080 kHz?
A. 200 watts PEP output
B. 1000 watts PEP output
C. 1500 watts PEP output
D. 2000 watts PEP output

G1C03 (A) [97.313c1]
What is the maximum transmitting power an amateur station may use on 10.140 MHz?
A. 200 watts PEP output
B. 1000 watts PEP output
C. 1500 watts PEP output
D. 2000 watts PEP output

G1C04 (B) [97.313c1]
What is the maximum transmitting power an amateur station may use on 21.3205 MHz?
A. The minimum power necessary to carry out the desired communications, with a maximum of 200 watts PEP output
B. The minimum power necessary to carry out the desired communications, with a maximum of 1500 watts PEP output
C. 1000 watts PEP output
D. 2000 watts PEP output

G1C05 (C) [97.313a,b]
What is the maximum transmitting power an amateur station may use on 24.950 MHz?
A. 200 watts PEP output
B. 1000 watts PEP output
C. 1500 watts PEP output
D. 2000 watts PEP output

G1C06 (B) [97.313]
What is the maximum transmitting power an amateur station may use on 7125 kHz?
A. The minimum power necessary to carry out the desired communications, with a maximum of 200 watts PEP output
B. The minimum power necessary to carry out the desired communications, with a maximum of 1500 watts PEP output
C. 1000 watts PEP output
D. 2000 watts PEP output

G1C07 (A) [97.313]
What is the maximum transmitting power an amateur station may use on 14.300 MHz?

A. The minimum power necessary to carry out the desired communications, with a maximum of 1500 watts PEP output
B. 200 watts PEP output
C. 1000 watts PEP output
D. 2000 watts PEP output

G1C08 (C) [97.313]
What is the maximum transmitting power a station with a General Class control operator may use on 28.400 MHz?
A. The minimum power necessary to carry out the desired communications, with a maximum of 200 watts PEP output
B. The minimum power necessary to carry out the desired communications, with a maximum of 1000 watts PEP output
C. The minimum power necessary to carry out the desired communications, with a maximum of 1500 watts PEP output
D. 2000 watts PEP output

G1C09 (C) [97.313]
What is the maximum transmitting power a station with a General Class control operator may use on 28.150 MHz?
A. The minimum power necessary to carry out the desired communications, with a maximum of 200 watts PEP output
B. The minimum power necessary to carry out the desired communications, with a maximum of 1000 watts PEP output
C. The minimum power necessary to carry out the desired communications, with a maximum of 1500 watts PEP output
D. The minimum power necessary to carry out the desired communications, with a maximum of 2000 watts PEP output

G1C10 (D) [97.313]
What is the maximum transmitting power an amateur station may use on 1825 kHz?
A. 200 watts PEP output
B. The minimum power necessary to carry out the desired communications, with a maximum of 1000 watts PEP output
C. 2000 watts PEP output
D. The minimum power necessary to carry out the desired communications, with a maximum of 1500 watts PEP output

G1C11 (D) [97.303s]
Which of the following is NOT a requirement when a station is transmitting on the 60-meter band?
A. All transmissions may only use Upper Sideband (USB)
B. The 3-dB bandwidth of a signal shall not exceed 2.8 kHz, when centered on any of the five FCC-authorized transmitting frequencies

C. Transmissions shall not exceed an effective radiated power (ERP) of 50 W PEP
D. Antenna height shall not exceed 50 feet above mean sea level (AMSL)

G1D Examination element preparation; examination administration; temporary station identification

G1D01 (B) [97.507a2]
What examination elements may you prepare when you hold a General class operator license?
A. None
B. Elements 1 and 2 only
C. Element 1 only
D. Elements 1, 2 and 3

G1D02 (C) [97.509b3i]
What license examinations may you administer when you are an accredited VE holding a General Class operator license?
A. None
B. General only
C. Technician and Morse code
D. Technician, General and Amateur Extra

G1D03 (A) [97.501e]
What minimum examination elements must an applicant pass for a Technician Class operator license?
A. Element 2 only
B. Elements 1 and 2
C. Elements 2 and 3
D. Elements 1, 2 and 3

G1D04 (B) [97.501d]
What minimum examination elements must an applicant pass for a Technician Class operator license with Morse code credit to operate on the HF bands?
A. Element 2 only
B. Elements 1 and 2
C. Elements 2 and 3
D. Elements 1, 2 and 3

G1D05 (A) [97.509a,b]
What are the requirements for administering a Technician Class operator examination?
A. Three VEC-accredited General Class or higher VEs must be present
B. Two VEC-accredited General Class or higher VEs must be present
C. Two General Class or higher VEs must be present, but only one need be VEC accredited
D. Any two General Class or higher VEs must be present

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G1D06 (D) [97.509b3i]
When may you participate as an administering VE for a Technician Class operator license examination?
A. Once you have notified the FCC that you want to give an examination
B. Once you have a Certificate of Successful Completion of Examination (CSCE) for General class
C. Once you have prepared telegraphy and written examinations for the Technician license, or obtained them from a qualified supplier
D. Once you have been granted your FCC General class or higher license and received your VEC accreditation

G1D07 (B) [97.119f2]
If you are a Technician Class operator with a CSCE for General Class operator privileges, how do you identify your station when transmitting on 14.035 MHz?
A. You must give your call sign and the location of the VE examination where you obtained the CSCE
B. You must give your call sign, followed by the slant mark "/", followed by the identifier "AG"
C. You may not operate on 14.035 MHz until your new license arrives
D. No special form of identification is needed

G1D08 (C) [97.119f2]
If you are a Technician Class operator with a CSCE for General Class operator privileges, how do you identify your station when transmitting phone emissions on 14.325 MHz?
A. No special form of identification is needed
B. You may not operate on 14.325 MHz until your new license arrives
C. You must give your call sign, followed by any suitable word that denotes the slant mark and the identifier "AG"
D. You must give your call sign and the location of the VE examination where you obtained the CSCE

G1D09 (A) [97.119f2]
If you are a Technician Class operator with a CSCE for General Class operator privileges, when must you add the special identifier "AG" after your call sign?
A. Whenever you operate using your new frequency privileges
B. Whenever you operate
C. Whenever you operate using Technician frequency privileges
D. A special identifier is not required as long as your General class license application has been filed with the FCC

G1D10 (D) [97.119f2]
If you are a Technician Class operator with a CSCE for General Class operator privileges, on which of the following band segments must you include the special identifier "AG" after your call sign?
A. Whenever you operate from 18068 - 18168-kHz

B. Whenever you operate from 14025 - 14150-kHz and 14225 - 14350-kHz
C. Whenever you operate from 10100 - 10150-kHz
D. All of these choices are correct

G1D11 (D) [97.509b3i]
When may you participate as a VE in administering a Morse code examination?
A. Once you have notified the FCC that you want to give an examination
B. Once you have a Certificate of Successful Completion of Examination (CSCE) for General class
C. Once you have prepared telegraphy and written examinations for the Technician license, or obtained them from a qualified supplier
D. Once you have been granted your FCC General Class or higher operator license and received your VEC accreditation

G1D12 (C) [97.119f2]
If you are a Technician licensee with Morse code credit and hold a CSCE for Element 3, what is one way you could identify your station when transmitting phone emissions on a General class amateur frequency?
A. Give your call sign followed by the words "general class"
B. No special identification is needed, since your license upgrade would already be shown in the FCC's database
C. Give your call sign followed by the words "temporary AG"
D. You must wait until your new license arrives by mail from the FCC before using general class frequencies

G1E Local control; repeater and harmful interference definitions; third party communications

G1E01 (B) [97.119e]
As a General Class control operator at the station of a Technician Class operator, how must you identify the station while transmitting on 7250 kHz?
A. With your call sign, followed by the word "controlling" and the Technician call sign
B. With the Technician Class operator's station call sign, followed by the slant bar "/" (or any suitable word) and your own call sign
C. With your call sign, followed by the slant bar "/" (or any suitable word) and the Technician call sign
D. A Technician station should not be operated on 7250-kHz, even with a General control operator

G1E02 (D) [97.205a]
Under what circumstances may a 10-meter repeater retransmit the 2-meter signal from a station having a Technician Class control operator?
A. Under no circumstances
B. Only if the station on 10 meters is operating under a Special Temporary Authorization allowing such retransmission

C. Only during an FCC-declared general state of communications emergency
D. Only if the 10-meter control operator holds at least a General class license

G1E03 (A) [97.3a37]
What kind of amateur station simultaneously retransmits the signals of other stations on a different channel?
A. Repeater station
B. Space station
C. Telecommand station
D. Relay station

G1E04 (B) [97.3a22]
What name is given to a form of interference that seriously degrades, obstructs or repeatedly interrupts a radiocommunication service?
A. Intentional interference
B. Harmful interference
C. Adjacent interference
D. Disruptive interference

G1E05 (C) [97.115, 97.117]
What types of messages for a third party may be transmitted by an amateur station to a foreign country?
A. Messages for which the amateur operator is paid
B. Messages facilitating the business affairs of any party
C. Messages of a technical nature or remarks of a personal character
D. No messages may be transmitted to foreign countries for third parties

G1E06 (A) [97.3a23]
Should a repeater cause harmful interference to another repeater when a frequency coordinator has recommended the operation of one station only, who is responsible for resolving the interference?
A. The licensee of the uncoordinated repeater
B. Both repeater licensees
C. The licensee of the recommended repeater
D. The frequency coordinator

G1E07 (C) [97.303]
What does it mean where the FCC rules say that the amateur service is a secondary user and another service is a primary user?
A. Nothing special; all users of the frequency band have equal rights to operate
B. Amateur stations are only allowed to use the frequency band during emergencies
C. Amateur stations are allowed to use the frequency band only if they do not cause harmful interference to primary users
D. Amateur stations must increase transmitter power to overcome any interference caused by

primary users

G1E08 (D) [97.303]
What action must you take while using the 30-meter band when a station assigned to the band's primary service causes interference?
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 be causing harmful interference to the other station, in violation of FCC rules

G1E09 (C) [97.119b2]
While you are using a language other than English in making a contact, what language must you use when identifying your station?
A. The language being used for the contact
B. The language being used for the contact, provided the US has a third-party communications agreement with that country
C. English
D. Any language of a country that is a member of the International Telecommunication Union

G1E10 (A) [97.303s]
What protection from harmful interference caused by primary service users do amateur radio stations have while operating in the 60-meter band?
A. None
B. Stations in the mobile and fixed service must not interfere with amateur stations
C. Stations in the mobile and fixed service must not interfere if an amateur station is already on the frequency
D. Stations in the mobile and fixed service must not interfere with amateur stations if they are located in ITU Region 2

G1E11 (A) [97.303s]
What operating restrictions must amateur radio stations observe while operating in the 60-meter band?
A. They must not cause harmful interference to stations operating in other radio services
B. They must transmit no more than 30 minutes during each hour to minimize harmful interference
C. They must use lower sideband, suppressed-carrier, only
D. They must not exceed 2.0 kHz of bandwidth

G1E12 (B) [97.109e]
What must be done at an amateur radio station while it is transmitting third party messages?
A. Keep a station log of when the message was handled
B. Use local or remote station control
C. Identify both stations that handle the message

D. Use local, remote or automatic station control

G1F Certification of external RF-power-amplifiers; standards for certification of external RF-power amplifiers; HF data emission standards

G1F01 (D) [97.315a]
External RF power amplifiers designed to operate below what frequency may require FCC certification?
A. 28 MHz
B. 35 MHz
C. 50 MHz
D. 144 MHz

G1F02 (B) [97.315a]
Without a grant of FCC certification, how many external RF amplifiers of a given design capable of operation below 144 MHz may you build or modify in one calendar year?
A. None
B. 1
C. 5
D. 10

G1F03 (B) [97.317a3]
Which of the following standards must be met where FCC certification of an external RF amplifier is required?
A. The amplifier must not be able to amplify a 28-MHz signal to more than ten times the input power
B. The amplifier must not be capable of reaching its designed output power when driven with less than 50 watts
C. The amplifier must not be able to be operated for more than ten minutes without a time delay circuit
D. The amplifier must not be able to be modified by an amateur operator

G1F04 (D) [97.317b,c]
Which of the following would NOT disqualify an external RF power amplifier from a FCC certification grant?
A. The capability of being modified by the operator for use outside the amateur service bands
B. The capability of achieving full output power when driven with less than 50 watts
C. The capability of achieving full output power on amateur service frequencies between 24 and 35 MHz
D. The capability of being switched by the operator to all amateur service frequencies below 24 MHz

G1F05 (D) [97.305c, 97.307f3]
What is the maximum symbol rate permitted for RTTY emissions transmitted on frequency

bands below 10 meters?
A. 56 kilobauds
B. 19.6 kilobauds
C. 1200 bauds
D. 300 bauds

G1F06 (C) [97.307f5]
What is the maximum symbol rate permitted for packet emission ~~transmissions~~ on the 2-meter band?
A. 300 bauds
B. 1200 bauds
C. 19.6 kilobauds
D. 56 kilobauds

G1F07 (C) [97.307f4]
What is the maximum symbol rate permitted for RTTY or data emission ~~transmissions~~ on the 10-meter band?
A. 56 kilobauds
B. 19.6 kilobauds
C. 1200 bauds
D. 300 bauds

G1F08 (B) [97.307f5]
What is the maximum symbol rate permitted for RTTY or data emission ~~transmissions~~ on the 6- and 2-meter bands?
A. 56 kilobauds
B. 19.6 kilobauds
C. 1200 bauds
D. 300 bauds

G1F09 (A) [97.307f5]
What is the maximum authorized bandwidth for RTTY, data or multiplexed emissions using an unspecified digital code transmitted on the 6- and 2-meter bands?
A. 20 kHz
B. 50 kHz
C. The total bandwidth shall not exceed that of a single-sideband phone emission
D. The total bandwidth shall not exceed 10 times that of a CW emission

G1F10 (A) [97.317b]
What must an external RF amplifier exhibit in order to receive a FCC grant of certification?
A. It must not be capable of operation on any frequency between 24 MHz and 35 MHz
B. Its wiring must be accessible to permit modification of the amplifier
C. It must have an internal RF sensing switch to place the amplifier in the transmit mode
D. Its manual must provide instructions for modification of the amplifier

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G1F11 (A) [97.317b1]
What is the maximum power gain that a 10-meter RF amplifier can have to receive FCC certification?
A. 6 dB
B. 3 dB
C. 4 dB
D. 10 dB

SUBELEMENT G2 -- OPERATING PROCEDURES [6 Exam Questions -- 6 Groups]

G2A Phone operating procedures

G2A01 (A)
Which sideband is commonly used for 20-meter phone operation?
A. Upper
B. Lower
C. Amplitude compandored
D. Double

G2A02 (B)
Which sideband is commonly used on 3925-kHz for phone operation?
A. Upper
B. Lower
C. Amplitude compandored
D. Double

G2A03 (B)
Which sideband is commonly used for 40-meter phone operation?
A. Upper
B. Lower
C. Amplitude compandored
D. Double

G2A04 (D)
Which sideband is commonly used for 10-meter phone operation?
A. Double
B. Lower
C. Amplitude compandored
D. Upper

G2A05 (A)
Which sideband is commonly used for 15-Meter phone operation?
A. Upper

B. Lower
C. Amplitude compandored
D. Double

G2A06 (C)
Which sideband is commonly used for 17-Meter phone operation?
A. Amplitude compandored
B. Lower
C. Upper
D. Double

G2A07 (C)
Which of the following modes of voice communication is most commonly used on the High Frequency Amateur bands?
A. Frequency modulation (FM)
B. Amplitude modulation (AM)
C. Single sideband (SSB)
D. Phase modulation (PM)

G2A08 (D)
Why is the single sideband mode of voice transmission used more frequently than Amplitude Modulation (AM) on the HF amateur bands?
A. Single sideband transmissions use less spectrum space
B. Single sideband transmissions are more power efficient
C. No carrier is transmitted with a single sideband transmission
D. All of these choices are correct

G2A09 (B)
Which of the following statements is true of a lower sideband transmission?
A. It is called lower sideband because the lower sideband is greatly attenuated
B. It is called lower sideband because the lower sideband is the only sideband transmitted, since the upper sideband is suppressed
C. The lower sideband is wider than the upper sideband
D. The lower sideband is the only sideband that is authorized on the 160-, 75- and 40-meter amateur bands

G2A10 (A)
Which of the following statements is true of an upper sideband transmission?
A. Only the upper sideband is transmitted, since the lower sideband is suppressed
B. The upper sideband is greatly attenuated as compared with the carrier
C. The upper sideband is greatly attenuated as compared with the lower sideband
D. Only the upper sideband may be used for phone transmissions on the amateur bands with frequencies above 14 MHz

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G2A11 (D)
Why do most amateur stations use lower sideband on the 160-, 75- and 40-meter bands?
A. The lower sideband is more efficient at these frequency bands
B. The lower sideband is the only sideband legal on these frequency bands
C. Because it is fully compatible with an AM detector
D. Current amateur practice is to use lower sideband on these frequency bands

G2B Operating courtesy

G2B01 (C)
If you are the net control station of a daily HF net, what should you do if the frequency on which you normally meet is in use just before the net begins?
A. Reduce your output power and start the net as usual
B. Increase your power output so that net participants will be able to hear you over the existing activity
C. Conduct the net on a clear frequency 3 to 5-kHz away from the regular net frequency
D. Cancel the net for that day

G2B02 (A)
If a net is about to begin on a frequency which you and another station are using, what should you do?
A. As a courtesy to the net, move to a different frequency
B. Increase your power output to ensure that all net participants can hear you
C. Transmit as long as possible on the frequency so that no other stations may use it
D. Turn off your radio

G2B03 (C)
If propagation changes during your contact and you notice increasing interference from other activity on the same frequency, what should you do?
A. Tell the interfering stations to change frequency, since you were there first
B. Report the interference to your local Amateur Auxiliary Coordinator
C. Move your contact to another frequency
D. Turn on your amplifier to overcome the interference

G2B04 (B)
When selecting a CW transmitting frequency, what minimum frequency separation from a contact in progress should you allow to minimize interference?
A. 5 to 50 Hz
B. 150 to 500 Hz
C. 1 to 3 kHz
D. 3 to 6 kHz

G2B05 (B)
When selecting a single-sideband phone transmitting frequency, what minimum frequency

separation from a contact in progress should you allow (between suppressed carriers) to minimize interference?
A. 150 to 500 Hz
B. Approximately 3 kHz
C. Approximately 6 kHz
D. Approximately 10 kHz

G2B06 (B)
When selecting a RTTY transmitting frequency, what minimum frequency separation from a contact in progress should you allow (center to center) to minimize interference?
A. 60 Hz
B. 250 to 500 Hz
C. Approximately 3 kHz
D. Approximately 6 kHz

G2B07 (A)
What is a band plan?
A. A voluntary guideline beyond the divisions established by the FCC for using different operating modes within an amateur band
B. A guideline from the FCC for making amateur frequency band allocations
C. A plan of operating schedules within an amateur band published by the FCC
D. A plan devised by a club to best use a frequency band during a contest

G2B08 (A)
What is another name for a voluntary guideline that guides amateur activities and extends beyond the divisions established by the FCC for using different operating modes within an amateur band?
A. A "Band Plan"
B. A "Frequency and Solar Cycle Guide"
C. The "Knowledgeable Operator's Guide"
D. The "Frequency Use Guidebook"

G2B09 (D)
When choosing a frequency for Slow-Scan TV (SSTV) operation, what should you do to comply with good amateur practice?
A. Review FCC Part 97 Rules regarding permitted frequencies and emissions
B. Follow generally accepted gentlemen's agreement band plans
C. Before transmitting, listen to the frequency to be used to avoid interfering with an ongoing communication
D. All of these choices

G2B10 (D)
When choosing a frequency for radioteletype (RTTY) operation, what should you do to comply with good amateur practice?

A. Review FCC Part 97 Rules regarding permitted frequencies and emissions
B. Follow generally accepted gentlemen's agreement band plans
C. Before transmitting, first listen to the frequency to be used to avoid interfering with an ongoing communication
D. All of these choices

G2B11 (D)
When choosing a frequency for HF Packet operation, what should you do to comply with good amateur practice?
A. Review FCC Part 97 Rules regarding permitted frequencies and emissions
B. Follow generally accepted gentlemen's agreement band plans
C. Before transmitting, first listen on the frequency to be used to avoid interfering with an ongoing communication
D. All of these choices

G2B12 (A)
What is a considerate way to avoid harmful interference when using phone?
A. Ask if the frequency is in use, and say your call sign
B. Call MAYDAY to make sure that the frequency is clear
C. Call CQ for two minutes and see if anyone responds
D. Turn on your amplifier, then go ahead and transmit

G2B13 (C)
What is a considerate way to avoid harmful interference when using Morse code or CW?
A. Send the letter "V" 12 times and then listen for a response
B. Call CQ for two minutes and see if anyone responds
C. Send "QRL? de" followed by your call sign and listen for a response
D. Turn on your amplifier, then go ahead and transmit

G2C Emergencies, including drills and emergency communications

G2C01 (C)
What means may an amateur station in distress use to attract attention, make known its condition and location, and obtain assistance?
A. Only Morse code signals sent on internationally recognized emergency channels
B. Any means of radiocommunication, but only on internationally recognized emergency channels
C. Any means of radiocommunication
D. Only those means of radiocommunication for which the station is licensed

G2C02 (A)
During a disaster in the US, when may an amateur station make transmissions necessary to meet essential communication needs and assist relief operations?
A. When normal communication systems are overloaded, damaged or disrupted

B. Only when the local RACES net is activated
C. Never; only official emergency stations may transmit in a disaster
D. When normal communication systems are working but are not convenient

G2C03 (A)
If a disaster disrupts normal communications in your area, what may the FCC do?
A. Declare a temporary state of communication emergency
B. Temporarily seize your equipment for use in disaster communications
C. Order all stations across the country to stop transmitting at once
D. Nothing until the President declares the area a disaster area

G2C04 (D)
If a disaster disrupts normal communications in an area what would the FCC include in any notice of a temporary state of communication emergency?
A. Any additional test questions needed for the licensing of amateur emergency communications workers
B. A list of organizations authorized to temporarily seize your equipment for disaster communications
C. Any special conditions requiring the use of non-commercial power systems
D. Any special conditions and special rules to be observed by stations during the emergency

G2C05 (D)
During an emergency, what power output limitations must be observed by a station in distress?
A. 200 watts PEP
B. 1500 watts PEP
C. 1000 watts PEP during daylight hours, reduced to 200 watts PEP during the night
D. There are no limitations during an emergency

G2C06 (C)
During a disaster in the US, what frequencies may be used to obtain assistance?
A. Only frequencies in the 80-meter band
B. Only frequencies in the 40-meter band
C. Any frequency
D. Any United Nations approved frequency

G2C07 (B)
If you are communicating with another amateur station and hear a station in distress break in, what is the first thing you should do?
A. Continue your communication because you were on frequency first
B. Acknowledge the station in distress and determine its location and what assistance may be needed
C. Change to a different frequency so the station in distress may have a clear channel to call for assistance
D. Immediately cease all transmissions because stations in distress have emergency rights to the

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frequency

G2C08 (A)
Why do stations in the Radio Amateur Civil Emergency Service (RACES) participate in training tests and drills?
A. To provide orderly and efficient operations for the civil defense organization they serve in the event of an emergency
B. To ensure that members attend monthly on-the-air meetings of the civil defense organization they serve
C. To ensure that RACES members are able to conduct tests and drills
D. To acquaint members of RACES with other members they may meet in an emergency

G2C09 (C)
When are you prohibited from helping a station in distress?
A. When that station is not transmitting on amateur frequencies
B. When the station in distress offers no call sign
C. You are not ever prohibited from helping any station in distress
D. When the station is not another amateur station

G2C10 (B)
When FCC declares a temporary state of communication emergency, what must you do?
A. Stay off the air until 30 days after FCC lifts the emergency notice
B. Abide by the limitations or conditions set forth in the FCC notice
C. Only communicate with stations within 2 miles of your location
D. Nothing; wait until the President declares a formal emergency before taking further action

G2C11 (C)
During a disaster in the US, which of the following emission modes must be used to obtain assistance?
A. Only SSB
B. Only SSB and CW
C. Any mode
D. Only CW

G2C12 (B)
What information should anyone who sends a distress transmission give to stations who answer?
A. The ITU region and grid square locator of the emergency
B. The location and nature of the distress
C. The time that the emergency occurred and the names of the persons involved
D. The agencies to notify and the name of the emergency coordinator

G2C13 (A)
What frequency should be used to send a distress call?
A. Whatever frequency has the best chance of communicating the distress message

B. 3873 kHz at night or 7285 kHz during the day
C. Only frequencies that are within your operating privileges
D. Only frequencies used by police, fire or emergency medical services

G2D Amateur auxiliary to the FCC's Compliance and Information Bureau; antenna orientation to minimize interference; HF operations, including logging practices

G2D01 (A)
What is the Amateur Auxiliary to the FCC's Compliance and Information Bureau?
A. Amateur volunteers who are formally enlisted to monitor the airwaves for rules violations
B. Amateur volunteers who conduct amateur licensing examinations
C. Amateur volunteers who conduct frequency coordination for amateur VHF repeaters
D. Amateur volunteers who use their station equipment to help civil defense organizations in times of emergency

G2D02 (B)
What are the objectives of the Amateur Auxiliary to the FCC's Compliance and Information Bureau?
A. To conduct efficient and orderly amateur licensing examinations
B. To encourage amateur self-regulation and compliance with the rules
C. To coordinate repeaters for efficient and orderly spectrum usage
D. To provide emergency and public safety communications

G2D03 (B)
Why are direction-finding "Fox Hunts" important to the Amateur Auxiliary?
A. Fox Hunts compel amateurs to upgrade their licenses
B. Fox Hunts provide an opportunity to practice direction-finding skills
C. Someone always receives an FCC Notice of Apparent Liability (NAL) when a Fox Hunt is concluded
D. Fox Hunts allow amateurs to work together with Environmental Protection Agencies

G2D04 (B)
What is an azimuthal projection map?
A. A map projection centered on the North Pole
B. A map projection centered on a particular location, used to determine the shortest path between points on the surface of the earth
C. A map that shows the angle at which an amateur satellite crosses the equator
D. A map that shows the number of degrees longitude that an amateur satellite appears to move westward at the equator with each orbit

G2D05 (A)
What is the most useful type of map to use when orienting a directional HF antenna toward a distant station?
A. Azimuthal projection

B. Mercator
C. Polar projection
D. Topographical

G2D06 (C)
A directional antenna pointed in the long-path direction to another station is generally oriented how many degrees from its short-path heading?
A. 45 degrees
B. 90 degrees
C. 180 degrees
D. 270 degrees

G2D07 (B) [97.103b]
If a visiting amateur transmits from your station on 14.325 MHz, which of these is NOT true?
A. You must first give permission for the visiting amateur to use your station
B. You must keep in your station log the call sign of the visiting amateur together with the time and date of transmissions
C. The FCC may think that you were the station's control operator, unless your station records show otherwise
D. You both are equally responsible for the proper operation of the station

G2D08 (D)
Why should I keep a log if the FCC doesn't require it?
A. To help with your reply, if FCC requests information on who was control operator of your station for a given date and time
B. Logs provide information (callsigns, dates & times of contacts) used for many operating contests and awards
C. Logs are necessary to accurately verify contacts made weeks, months or years earlier, especially when completing QSL cards
D. All of these choices

G2D09 (D)
What information is normally contained in a station log?
A. Date and time of contact
B. Band and/or frequency of the contact
C. Call sign of station contacted and the RST signal report given
D. All of these choices

G2D10 (C)
Which of the following is a good reason to keep a log of your station's activities?
A. It is required by the FCC's rules
B. It is a tradition from the earliest days of amateur radio
C. It can aid you in resolving interference complaints
D. It can be a source of great enjoyment when reviewed in later years

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G2D11 (C)
Which HF antenna would best be used to focus your signal to minimize interference?
A. A bidirectional antenna
B. A horizontal antenna positioned broadside to the desired direction
C. A unidirectional antenna
D. An omnidirectional antenna at low power

G2D12 (A) [97.303s]
Which of the following is required by the FCC rules when operating in the 60-meter band?
A. If you are using other than a dipole antenna, you must keep a record of the gain of your antenna
B. You must keep a record of the date, time, frequency, power level and stations worked
C. No records are required
D. You must keep a record of the manufacturer of your equipment and the antenna used

G2E Third-party communications; ITU Regions; VOX operation

G2E01 (C) [97.117]
What type of messages may be transmitted to an amateur station in a foreign country?
A. Messages of any type
B. Messages that are not religious, political, or patriotic in nature
C. Messages of a technical nature or personal remarks of relative unimportance
D. Messages of any type, but only if the foreign country has a third-party communications agreement with the US

G2E02 (B)
Which of the following statements is true of VOX operation?
A. The received signal is more natural sounding
B. This mode allows "Hands Free' operation
C. Frequency spectrum is conserved
D. The duty cycle of the transmitter is reduced

G2E03 (D)
Which of the following user adjustable controls are usually associated with VOX circuitry?
A. Anti-VOX
B. VOX Delay
C. VOX Sensitivity
D. All of these choices are correct

G2E04 (C)
What is the purpose of the VOX sensitivity control?
A. To set the timing of transmitter activation
B. To set the audio frequency range at which the transmitter activates

C. To set the audio level at which the transmitter activates
D. None of these choices is correct

G2E05 (B)
In which International Telecommunication Union Region is the continental United States?
A. Region 1
B. Region 2
C. Region 3
D. Region 4

G2E06 (A)
In which International Telecommunication Union Region are Europe and Africa?
A. Region 1
B. Region 2
C. Region 3
D. Region 4

G2E07 (C)
In which International Telecommunication Union Region is Australia?
A. Region 1
B. Region 2
C. Region 3
D. Region 4

G2E08 (C)
Which of the following organizations is responsible for international regulation of the radio spectrum?
A. The International Regulatory Commission
B. The International Radio Union
C. The International Telecommunications Union
D. The International Frequency-Spectrum Commission

G2E09 (D)
What do the initials "ITU" stand for?
A. Interstate Telecommunications Union
B. International Telephony Union
C. International Transmission Union
D. International Telecommunications Union

G2E10 (B)
What is the circuit called that causes a transmitter to automatically transmit when an operator speaks into its microphone?
A. VXO
B. VOX

C. VCO
D. VFO

G2E11 (A)
What is the best reason to use a headset with an attached microphone and VOX control when using a mobile station?
A. For safer, hands-free operation
B. It allows you to make quicker transmissions
C. To eliminate ambient noise from your transmissions
D. To reduce outside distractions while operating

G2E12 (A)
What function does an anti-VOX circuit perform?
A. It prevents received audio from keying the transmitter
B. It prevents background noise from keying the transmitter
C. It prevents unauthorized persons from keying the transmitter
D. It prevents activation of the transmitter during CW operation

G2E13 (A)
Which of the following would indicate the completion of the transmitting of a formal message when using phone?
A. The phrase, "End of message"
B. The word "Break"
C. The Q-signal "QSL?"
D. The Q-signal "QRV"

G2F CW operating procedures, including procedural signals, Q signals and common abbreviations; full break-in; RTTY operating procedures, including procedural signals and common abbreviations and operating procedures for other digital modes, such as HF packet, AMTOR, PacTOR, G-TOR, Clover and PSK31

G2F01 (D)
Which of the following describes full break-in telegraphy (QSK)?
A. Breaking stations send the Morse code prosign BK
B. Automatic keyers are used to send Morse code instead of hand keys
C. An operator must activate a manual send/receive switch before and after every transmission
D. Incoming signals are received between transmitted key pulses

G2F02 (A)
In what segment of the 80-meter band do most data transmissions take place?
A. 3580 - 3620-kHz
B. 3500 - 3525-kHz
C. 3700 - 3750-kHz
D. 3775 - 3825-kHz

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G2F03 (B)
In what segment of the 20-meter band do most RTTY transmissions take place?
A. 14.000 - 14.050 MHz
B. 14.070 - 14.095 MHz
C. 14.150 - 14.225 MHz
D. 14.275 - 14.350 MHz

G2F04 (D)
Which of the following is NOT correct?
A. ASCII is a 7-bit code, with start, stop and parity bits
B. The benefit of using AMTOR is its error detection and correction properties
C. Baudot is a 5-bit code, with additional start and stop bits
D. The two major AMTOR operating modes are SELCAL and LISTEN

G2F05 (B)
What is the most common frequency shift for RTTY emissions in the amateur HF bands?
A. 85 Hz
B. 170 Hz
C. 425 Hz
D. 850 Hz

G2F06 (A)
Why are the string of letters R and Y (sent as "RYRYRYRY...") occasionally used at the beginning of RTTY or other data transmissions?
A. This allows time to 'tune in' a station prior to the actual message being sent
B. To keep these commonly-used keys functional
C. These are the important mark and space keys
D. To make sure the transmitter is functional before sending a message

G2F07 (B)
What does the abbreviation "RTTY" stand for?
A. "Returning to you", meaning "your turn to transmit"
B. Radioteletype
C. A general call to all digital stations
D. Morse code practice over the air

G2F08 (C)
What prosign is sent using CW to indicate the end of a formal message?
A. SK - I acknowledge
B. BK - break
C. AR - end of ~~transmission~~message
D. KN - called station only, go ahead

G2F09 (D)
What character sequence is sent using RTTY or other data modes to indicate the end of a formal message?
A. CZCZ
B. KKKK
C. XXXXX
D. NNNN

G2F10 (A)
How many data bits are sent in a single PSK31 character?
A. The number varies
B. 5
C. 7
D. 8

G2F11 (C)
What part of a data packet contains the routing and handling information?
A. Directory
B. Preamble
C. Header
D. Footer

SUBELEMENT G3 -- RADIO WAVE PROPAGATION [3 Exam Questions -- 3 Groups]

G3A Ionospheric disturbances; sunspots and solar radiation

G3A01 (A)
What can be done at an amateur station to continue communications during a sudden ionospheric disturbance?
A. Try a higher frequency
B. Try the other sideband
C. Try a different antenna polarization
D. Try a different frequency shift

G3A02 (B)
What effect does a sudden ionospheric disturbance have on the day-time ionospheric propagation of HF radio waves?
A. It disrupts higher-latitude paths more than lower-latitude paths
B. It disrupts signals on lower frequencies more than those on higher frequencies
C. It disrupts communications via satellite more than direct communications
D. None, only areas on the night side of the earth are affected

G3A03 (C)
How long does it take the increased ultraviolet and X-ray radiation from solar flares to affect

radio-wave propagation on the earth?
A. The effect is almost instantaneous
B. 1.5 minutes
C. 8 minutes
D. 20 to 40 hours

G3A04 (B)
What is solar flux?
A. The density of the sun's magnetic field
B. The radio energy emitted by the sun
C. The number of sunspots on the side of the sun facing the earth
D. A measure of the tilt of the earth's ionosphere on the side toward the sun

G3A05 (D)
What is the solar-flux index?
A. A measure of solar activity that is taken annually
B. A measure of solar activity that compares daily readings with results from the last six months
C. Another name for the American sunspot number
D. A measure of solar activity that is taken at a specific frequency

G3A06 (D)
What is a geomagnetic disturbance?
A. A sudden drop in the solar-flux index
B. A shifting of the earth's magnetic pole
C. Ripples in the ionosphere
D. A dramatic change in the earth's magnetic field over a short period of time

G3A07 (A)
At which latitudes are propagation paths more sensitive to geomagnetic disturbances?
A. Those greater than 45 degrees latitude
B. Those between 5 and 45 degrees latitude
C. Those near the equator
D. All paths are affected equally

G3A08 (B)
What can be the effect of a major geomagnetic storm on radio-wave propagation?
A. Improved high-latitude HF propagation
B. Degraded high-latitude HF propagation
C. Improved ground-wave propagation
D. Improved chances of UHF ducting

G3A09 (C)
When sunspot numbers are high, what is the effect on radio communications?
A. High-frequency radio signals are absorbed

B. Frequencies above 300 MHz become usable for long-distance communication
C. Long-distance communication in the upper HF and lower VHF range is enhanced
D. High-frequency radio signals become weak and distorted

G3A10 (A)
What is the sunspot number?
A. A daily index of sunspot activity
B. The number of sunspots observed during one solar rotation
C. The number of sunspots observed during a sunspot cycle
D. The number of sunspots observed averaged over a seven day period

G3A11 (C)
What is the sunspot cycle?
A. The 9- to 11-year periods when sunspots move from the sun's pole to its equatorial region
B. The 9- to 11-year periods when sunspots cause coronal holes to appear
C. The approximately 11-year variation in the sunspot number
D. The approximately 11-year periods when sunspots combine to form flares

G3A12 (B)
What is the K-index?
A. A linear index of solar activity
B. A measure of geomagnetic stability
C. An index of solar flux measured at Boulder, Colorado
D. A daily value measured on a scale from 0 to 400 to express the range of disturbance of the geomagnetic field

G3A13 (C)
What is the A-index?
A. A monthly linear index of solar activity
B. An weekly index of solar flux measured at Boulder, Colorado
C. A daily value measured on a scale from 0 to 400 to express the range of disturbance of the geomagnetic field
D. An index used by NOAA to correlate the visual color wavelengths seen with Aurora Borealis (Northern Lights)

G3A14 (C)
How does solar coronal hole activity affect radio communications?
A. The activity emits charged particles that improve HF communications
B. The activity emits charged particles that improve VHF/UHF ducting
C. The activity emits charged particles that usually disrupt HF communications
D. The activity emits charged particles, but they never reach Earth's magnetosphere

G3A15 (D)
How long does it take charged particles from coronal mass ejections (CMEs) to affect radio-wave

propagation on the earth?
A. Almost instantaneously
B. About 5 minutes
C. About 8 minutes
D. 20 to 40 hours

G3A16 (A)
What might result during periods of high geomagnetic activity?
A. A visible aurora
B. Excellent high-frequency radio conditions
C. Poor 6-meter conditions
D. F-layer absorption

G3B Maximum usable frequency; propagation "hops"
G3B01 (B)
If the maximum usable frequency (MUF) on the path from Minnesota to France is 24 MHz, which band should offer the best chance for a successful contact?
A. 10 meters
B. 15 meters
C. 20 meters
D. 40 meters

G3B02 (C)
If the maximum usable frequency (MUF) on the path from Ohio to Germany is 17 MHz, which band should offer the best chance for a successful contact?
A. 80 meters
B. 40 meters
C. 20 meters
D. 2 meters

G3B03 (C)
If the HF radio-wave propagation (skip) is generally good on the 24-MHz and 28-MHz bands for several days, when might you expect a similar condition to occur?
A. 7 days later
B. 14 days later
C. 28 days later
D. 90 days later

G3B04 (A)
What is one way to determine if the maximum usable frequency (MUF) is high enough to support 28-MHz propagation between your station and western Europe?
A. Listen for signals on a 10-meter beacon frequency
B. Listen for signals on a 20-meter beacon frequency
C. Listen for signals on a 39-meter broadcast frequency

D. Listen for WWVH time signals on 20 MHz

G3B05 (A)
What usually happens to radio waves with frequencies below the maximum usable frequency (MUF) when they are sent into the ionosphere?
A. They are bent back to the earth
B. They pass through the ionosphere
C. They are completely absorbed by the ionosphere
D. They are bent and trapped in the ionosphere to circle the Earth

G3B06 (C)
Where would you tune to hear beacons that would help you determine propagation conditions on the 20-meter band?
A. 28.2 MHz
B. 21.1 MHz
C. 14.1 MHz
D. 18.1 MHz

G3B07 (D)
During periods of low solar activity, which frequencies are the least reliable for long-distance communication?
A. Frequencies below 3.5 MHz
B. Frequencies near 3.5 MHz
C. Frequencies on or above 10 MHz
D. Frequencies above 20 MHz

G3B08 (D)
At what point in the solar cycle does the 20-meter band usually support worldwide propagation during daylight hours?
A. At the summer solstice
B. Only at the maximum point of the solar cycle
C. Only at the minimum point of the solar cycle
D. At any point in the solar cycle

G3B09 (C)
What is the maximum distance along the Earth's surface that is normally covered in one hop using the F2 region?
A. 180 miles
B. 1200 miles
C. 2500 miles
D. None; the F2 region does not support radio-wave propagation

G3B10 (B)
What is the maximum distance along the Earth's surface that is normally covered in one hop

using the E region?
A. 180 miles
B. 1200 miles
C. 2500 miles
D. None of these choices is correct

G3B11 (A)
What happens to HF propagation when the lowest usable frequency (LUF) exceeds the maximum usable frequency (MUF)?
A. No HF radio frequency will support communications along an ionospheric signal path
B. The lowest usable frequency can never exceed the maximum usable frequency
C. The ionospheric absorption of HF radio signals increases by 3 dB along every signal path
D. All ionospheric propagation paths are still usable, but the signal-to-noise ratio decreases

G3B12 (D)
What factors affect the maximum usable frequency (MUF)?
A. Path distance and locations
B. Time of day and season
C. Solar radiation and ionospheric disturbances
D. All of these choices are correct

G3B13 (D)
How might a skywave signal sound if it arrives at your receiver by both short path and long path propagation?
A. Periodic fading every 10 seconds
B. Signal strength increased by 3 dB
C. Signal strength decreased by 3 dB
D. A well-defined echo can be heard

G3B14 (A)
A short distance hop on 10 meters might indicate what conditions on 6 meters?
A. The MUF exceeds 50 MHz
B. Absolutely no chance of a skywave 6-meter band opening
C. 6-meter ground waves will diminish
D. 10-meter propagation has no bearing on possible 6-meter propagation

G3C Height of ionospheric regions; critical angle and frequency; HF scatter

G3C01 (B)
What is the average height of maximum ionization of the E region?
A. 45 miles
B. 70 miles
C. 200 miles
D. 1200 miles

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G3C02 (A)
When can the F2 region be expected to reach its maximum height at your location?
A. At noon during the summer
B. At midnight during the summer
C. At dusk in the spring and fall
D. At noon during the winter

G3C03 (C)
Why is the F2 region mainly responsible for the longest-distance radio-wave propagation?
A. Because it exists only at night
B. Because it is the lowest ionospheric region
C. Because it is the highest ionospheric region
D. Because it does not absorb radio waves as much as other ionospheric regions

G3C04 (D)
What is the "critical angle" as used in radio-wave propagation?
A. The lowest takeoff angle that will return a radio wave to the earth under specific ionospheric conditions
B. The compass direction of a distant station
C. The compass direction opposite that of a distant station
D. The highest takeoff angle that will return a radio wave to the earth under specific ionospheric conditions

G3C05 (C)
What is the main reason the 160-, 80- and 40-meter amateur bands tend to be useful only for short-distance communications during daylight hours?
A. Because of a lack of activity
B. Because of auroral propagation
C. Because of D-region absorption
D. Because of magnetic flux

G3C06 (B)
What is a characteristic of HF scatter signals?
A. High intelligibility
B. A wavering sound
C. Reversed modulation
D. Reversed sidebands

G3C07 (D)
What makes HF scatter signals often sound distorted?
A. Auroral activity and changes in the earth's magnetic field
B. Propagation through ground waves that absorb much of the signal
C. The state of the E-region at the point of refraction

D. Energy scattered into the skip zone through several radio-wave paths

G3C08 (A)
Why are HF scatter signals usually weak?
A. A part of the signal energy is propagated into the skip zone
B. Auroral activity absorbs most of the signal energy
C. Propagation through ground waves absorbs most of the signal energy
D. The F region of the ionosphere absorbs most of the signal energy

G3C09 (B)
What type of radio-wave propagation allows a signal to be detected at a distance too far for ground-wave propagation but too near for normal sky-wave propagation?
A. Ground wave
B. Scatter
C. Sporadic-E skip
D. Short-path skip

G3C10 (D)
When does scatter propagation on the HF bands most often occur?
A. When the sunspot cycle is at a minimum and D-region absorption is high
B. At night
C. When the F1 and F2 regions are combined
D. When communicating on frequencies above the maximum usable frequency (MUF)

G3C11 (A)
Which is true about ionospheric absorption near the maximum usable frequency (MUF)?
A. Absorption will be minimum
B. Absorption is independent of frequency
C. Absorption approaches maximum
D. There is no correlation between MUF and absorption

G3C12 (D)
Daylight fading on the 40-meter band is associated most with which ionospheric layer?
A. The F2 layer
B. The F1 layer
C. The E layer
D. The D layer

SUBELEMENT G4 -- AMATEUR RADIO PRACTICES [5 Exam Questions -- 5 Groups]

G4A Two-tone test; electronic TR switch; amplifier neutralization

G4A01 (C)
What kind of input signal is used to test the amplitude linearity of a single-sideband phone

transmitter while viewing the output on an oscilloscope?
A. Normal speech
B. An audio-frequency sine wave
C. Two audio-frequency sine waves
D. An audio-frequency square wave

G4A02 (C)
When testing the amplitude linearity of a single-sideband transmitter, what kind of audio tones are fed into the microphone input and on what kind of instrument is the transmitter output observed?
A. Two harmonically related tones are fed in, and the output is observed on an oscilloscope
B. Two harmonically related tones are fed in, and the output is observed on a distortion analyzer
C. Two non-harmonically related tones are fed in, and the output is observed on an oscilloscope
D. Two non-harmonically related tones are fed in, and the output is observed on a distortion analyzer

G4A03 (D)
What audio frequencies are used in a two-tone test of the linearity of a single-sideband phone transmitter?
A. 20 Hz and 20 kHz tones must be used
B. 1200 Hz and 2400 Hz tones must be used
C. Any two audio tones may be used, but they must be within the transmitter audio passband, and must be harmonically related
D. Any two audio tones may be used, but they must be within the transmitter audio passband, and should not be harmonically related

G4A04 (A)
At what point in an HF transceiver block diagram would an electronic TR switch normally appear?
A. Between the transmitter and low-pass filter
B. Between the low-pass filter and antenna
C. At the antenna feed point
D. At the power supply feed point

G4A05 (C)
Why is an electronic TR switch preferable to a mechanical one?
A. It allows greater receiver sensitivity
B. Its circuitry is simpler
C. It has a higher operating speed
D. It allows cleaner output signals

G4A06 (A)
As a power amplifier is tuned, what reading on its grid-current meter indicates the best neutralization?

A. A minimum change in grid current as the output circuit is changed
B. A maximum change in grid current as the output circuit is changed
C. Minimum grid current
D. Maximum grid current

G4A07 (D)
Why is neutralization necessary for some vacuum-tube amplifiers?
A. To reduce the limits of loaded Q
B. To reduce grid-to-cathode leakage
C. To cancel AC hum from the filament transformer
D. To cancel oscillation caused by the effects of interelectrode capacitance

G4A08 (C)
In a properly neutralized RF amplifier, what type of feedback is used?
A. 5%
B. 10%
C. Negative
D. Positive

G4A09 (B)
What does a neutralizing circuit do in an RF amplifier?
A. It controls differential gain
B. It cancels the effects of positive feedback
C. It eliminates AC hum from the power supply
D. It reduces incidental grid modulation

G4A10 (B)
What is the reason for neutralizing the final amplifier stage of a transmitter?
A. To limit the modulation index
B. To eliminate self oscillations
C. To cut off the final amplifier during standby periods
D. To keep the carrier on frequency

G4A11 (A)
What type of transmitter performance does a two-tone test analyze?
A. Linearity
B. Carrier and undesired sideband suppression
C. Percentage of frequency modulation
D. Percentage of carrier phase shift

G4A12 (B)
What type of signals are used to conduct a two-tone test?
A. Two audio signals of the same frequency, but shifted 90-degrees and are within the transmitter's modulation bandpass

B. Two non-harmonically related audio signals that are within the modulation bandpass of a transmitter
C. Any two audio frequency signals as long as they are within the transmitter's modulation bandpass
D. Two audio frequency range square wave signals of equal amplitude that are within the transmitter's modulation bandpass

G4A13 (D)
In what way is a diode like a switch?
A. It permits current flow at bias voltages less than its zener voltage and blocks current at bias voltages greater than its zener voltage
B. It permits current flow when reverse biased and blocks current when forward biased
C. The voltage drop across it increases as forward bias increases and decreases as reverse bias decreases
D. It permits current flow when forward biased and blocks current when reverse biased

G4B Test equipment: oscilloscope; signal tracer; antenna noise bridge; monitoring oscilloscope; field-strength meters

G4B01 (D)
What item of test equipment contains horizontal- and vertical-channel amplifiers?
A. An ohmmeter
B. A signal generator
C. An ammeter
D. An oscilloscope

G4B02 (D)
What is a digital oscilloscope?
A. An oscilloscope used only for signal tracing in digital circuits
B. An oscilloscope used only for troubleshooting computers
C. An oscilloscope used only for troubleshooting switching power supply circuits
D. An oscilloscope designed around digital technology rather than analog technology

G4B03 (D)
How would a signal tracer normally be used?
A. To identify the source of radio transmissions
B. To make exact drawings of signal waveforms
C. To show standing wave patterns on open-wire feed-lines
D. To identify an inoperative stage in a receiver

G4B04 (C)
How is a noise bridge normally used?
A. It is connected at an antenna's feed point and reads the antenna's noise figure
B. It is connected between a transmitter and an antenna and is tuned for minimum SWR

C. It is connected between a receiver and an antenna of unknown impedance and is tuned for minimum noise
D. It is connected between an antenna and ground and is tuned for minimum SWR

G4B05 (A)
What is the best instrument to use to check the signal quality of a CW or single-sideband phone transmitter?
A. A monitoring oscilloscope
B. A field-strength meter
C. A sidetone monitor
D. A signal tracer and an audio amplifier

G4B06 (D)
What signal source is connected to the vertical input of a monitoring oscilloscope when checking the quality of a transmitted signal?
A. The IF output of a monitoring receiver
B. The audio input of the transmitter
C. The RF signals of a nearby receiving antenna
D. The RF output of the transmitter

G4B07 (C)
What is the purpose of a field-strength meter?
A. To determine the standing-wave ratio on a transmission line
B. To check the output modulation of a transmitter
C. To monitor relative RF output
D. To increase average transmitter output

G4B08 (A)
What simple instrument may be used to monitor relative RF output during antenna and transmitter adjustments?
A. A field-strength meter
B. An antenna noise bridge
C. A multimeter
D. A metronome

G4B09 (C)
In order to raise the S-meter reading on a receiver from S8 to S9, how much must the power output of a transmitter be increased?
A. Approximately 2 times
B. Approximately 3 times
C. Approximately 4 times
D. Approximately 5 times

G4B10 (B)

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What type of information does a field strength meter provide?
A. The gain in dBi of an antenna
B. The field pattern of an antenna
C. The presence and amount of phase distortion of a transmitter
D. The presence and amount of amplitude distortion of a transmitter

G4B11 (A)
For which of the following applications might you use a field strength meter?
A. Close-in RDF work
B. A modulation monitor for a frequency or phase modulation transmitter
C. An overmodulation indicator for a SSB transmitter
D. A keying indicator for a RTTY or packet transmitter

G4B12 (B)
What is one way a noise bridge might be used?
A. Determining an antenna's gain in dBi
B. Pre-tuning an antenna tuner
C. Determining the directivity of an antenna
D. Determining the line loss of the antenna system

G4B13 (A)
What information could a noise bridge directly provide about an unknown length and type of transmission line?
A. Its characteristic impedance
B. Its velocity factor
C. Its loss in dB per 100-feet
D. Its reflection coefficient

G4B14 (B)
How would you connect an oscilloscope to an AM or SSB transmitter to check transmitter modulation using double trapezoidal patterns?
A. Couple the detected RF output signal to the vertical plates; set the internal sweep to twice the modulating frequency
B. Couple the RF output signal to the vertical plates and external trigger; set the internal sweep to twice the modulating frequency
C. Couple the RF output signal to the vertical plates; apply the unmodulated RF drive signal to the horizontal plates
D. Couple the detected RF output signal to the vertical plates; apply a constant DC signal to the horizontal plates

G4C Audio rectification in consumer electronics; RF ground

G4C01 (B)
What devices would you install in home-entertainment systems to reduce or eliminate audio-

frequency interference?
A. Bypass inductors
B. Bypass capacitors
C. Metal-oxide varistors
D. Bypass resistors

G4C02 (B)
What should be done if a properly operating amateur station is the cause of interference to a nearby telephone?
A. Make internal adjustments to the telephone equipment
B. Install RFI filters at the affected telephone
C. Stop transmitting whenever the telephone is in use
D. Ground and shield the local telephone distribution amplifier

G4C03 (C)
What sound is heard from a public-address system if audio rectification of a nearby single-sideband phone transmission occurs?
A. A steady hum whenever the transmitter's carrier is on the air
B. On-and-off humming or clicking
C. Distorted speech from the transmitter's signals
D. Clearly audible speech from the transmitter's signals

G4C04 (A)
What sound is heard from a public-address system if audio rectification of a nearby CW transmission occurs?
A. On-and-off humming or clicking
B. Audible, possibly distorted speech
C. Muffled, severely distorted speech
D. A steady whistling

G4C05 (D)
If your third-floor amateur station has a ground wire running 33 feet down to a ground rod, why might you get an RF burn if you touch the front panel of your HF transceiver?
A. Because the ground rod is not making good contact with moist earth
B. Because the transceiver's heat-sensing circuit is not working to start the cooling fan
C. Because of a bad antenna connection, allowing the RF energy to take an easier path out of the transceiver through you
D. Because the ground wire is a resonant length on several HF bands and acts more like an antenna than an RF ground connection

G4C06 (A)
Which of the following is NOT an important reason to have a good station ground?
A. To reduce the cost of operating a station
B. To reduce electrical noise

C. To reduce interference
D. To reduce the possibility of electric shock

G4C07 (A)
What is one good way to avoid stray RF energy in your amateur station?
A. Keep the station's ground wire as short as possible
B. Use a beryllium ground wire for best conductivity
C. Drive the ground rod at least 14 feet into the ground
D. Make a couple of loops in the ground wire where it connects to your station

G4C08 (B)
Which of the following statements about station grounding is NOT true?
A. Braid from RG-213 coaxial cable makes a good conductor to tie station equipment together into a station ground
B. Only transceivers and power amplifiers need to be tied into a station ground
C. According to the National Electrical Code, there should be only one grounding system in a building
D. The minimum length for a good ground rod is 8 feet

G4C09 (C)
Which of the following statements about station grounding is true?
A. The chassis of each piece of station equipment should be tied together with high-impedance conductors
B. If the chassis of all station equipment is connected with a good conductor, there is no need to tie them to an earth ground
C. RF hot spots can occur in a station located above the ground floor if the equipment is grounded by a long ground wire
D. A ground loop is an effective way to ground station equipment

G4C10 (D)
Which of the following is NOT covered in the National Electrical Code?
A. Minimum conductor sizes for different lengths of amateur antennas
B. The size and composition of grounding conductors
C. Electrical safety inside the ham shack
D. The RF exposure limits of the human body

G4C11 (A)
What can cause the unintended rectification of an RF signal?
A. Induced currents in conductors that are in poor electrical contact
B. Induced voltages in conductors that are in good electrical contact
C. Capacitive coupling of the RF signal to ground
D. Excessive standing wave ratio (SWR) of the transmission line system

G4C12 (C)

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What is one cause of severe, broadband radio frequency noise at an amateur radio station?
A. Not using a balun or line isolator to feed balanced antennas
B. Lack of rectification of the transmitter's signal in power conductors
C. An intermittent RF ground
D. The use of horizontal, rather than vertical antennas

G4C13 (D)
How can a ground loop be avoided?
A. Series connect ("daisy chain") all ground conductors
B. Connect the AC neutral conductor to the ground wire
C. Avoid using lockwashers and star washers in making ground connections
D. Connect all ground conductors to a single point

G4D Speech processors; PEP calculations; wire sizes and fuses

G4D01 (D)
What is the reason for using a properly adjusted speech processor with a single-sideband phone transmitter?
A. It reduces average transmitter power requirements
B. It reduces unwanted noise pickup from the microphone
C. It improves voice-frequency fidelity
D. It improves signal intelligibility at the receiver

G4D02 (B)
If a single-sideband phone transmitter is 100% modulated, what will a speech processor do to the transmitter's power?
A. It will increase the output PEP
B. It will add nothing to the output PEP
C. It will decrease the peak power output
D. It will decrease the average power output

G4D03 (A)
What is the output PEP from a transmitter if an oscilloscope measures 200 volts peak-to-peak across a 50-ohm resistor connected to the transmitter output?
A. 100 watts
B. 200 watts
C. 400 watts
D. 1000 watts

G4D04 (B)
What is the output PEP from a transmitter if an oscilloscope measures 500 volts peak-to-peak across a 50-ohm resistor connected to the transmitter output?
A. 500 watts
B. 625 watts

C. 1250 watts
D. 2500 watts

G4D05 (B)
What is the output PEP of an unmodulated carrier transmitter if an average-reading wattmeter connected to the transmitter output indicates 1060 watts?
A. 530 watts
B. 1060 watts
C. 1500 watts
D. 2120 watts

G4D06 (A)
Which wires in a four-conductor line cord should be attached to fuses in a 240-VAC primary (single phase) power supply?
A. Only the "hot" (black and red) wires
B. Only the "neutral" (white) wire
C. Only the ground (bare) wire
D. All wires

G4D07 (D)
What size wire is normally used on a 20-ampere, 120-VAC household appliance circuit?
A. AWG number 20
B. AWG number 16
C. AWG number 14
D. AWG number 12

G4D08 (D)
What maximum size fuse or circuit breaker should be used in a household appliance circuit using AWG number 12 wiring?
A. 100 amperes
B. 60 amperes
C. 30 amperes
D. 20 amperes

G4D09 (C)
What operating benefit does properly adjusted speech clipping provide?
A. It removes any distortion in the audio waveform
B. Deep clipping restores the natural sound of the audio
C. It prevents overdriving the transmitter's modulator stage
D. It removes any AC hum and noise that might be in the audio

G4D10 (~~C~~B)
What would be the voltage across a 50-ohm dummy load dissipating 1200 watts?
A. 173 volts

B. 245 volts
C. 346 volts
D. 692 volts

G4E Common connectors used in amateur stations: types; when to use; fastening methods; precautions when using; HF mobile radio installations; emergency power systems; generators; battery storage devices and charging sources including solar; wind generation

G4E01 (B)
Which of the following connectors is NOT designed for RF transmission lines?
A. PL-259
B. DB-25
C. Type N
D. BNC

G4E02 (D)
When installing a power plug on a line cord, which of the following should you do?
A. Twist the wire strands neatly and fasten them so they don't cause a short circuit
B. Observe the correct wire color conventions for plug terminals
C. Use proper grounding techniques
D. All of these choices

G4E03 (A)
Which of the following power connections would be the best for a 100-watt HF mobile installation?
A. A direct, fused connection to the battery using heavy gauge wire
B. A connection to the fuse-protected accessory terminal strip or distribution panel
C. A connection to the cigarette lighter
D. A direct connection to the alternator or generator

G4E04 (B)
Why is it best NOT to draw the DC power for a 100-watt HF transceiver from an automobile's cigarette lighter socket?
A. The socket is not wired with an RF-shielded power cable
B. The socket's wiring may not be adequate for the current being drawn by the transceiver
C. The DC polarity of the socket is reversed from the polarity of modern HF transceivers
D. The power from the socket is never adequately filtered for HF transceiver operation

G4E05 (C)
Which of the following most limits the effectiveness of an HF mobile transceiver operating in the 75-meter band?
A. The vehicle's electrical system wiring
B. The wire gauge of the DC power line to the transceiver
C. The HF mobile antenna system

D. The rating of the vehicle's alternator or generator

G4E06 (D)
Which of the following is true of both a permanent or temporary emergency generator installation?
A. The generator should be located in a well ventilated area
B. The installation should be grounded
C. Extra fuel supplies, especially gasoline, should not be stored in an inhabited area
D. All of these choices

G4E07 (C)
Which of the following is true of a lead-acid storage battery as it is being charged?
A. It tends to cool off
B. It gives off explosive oxygen gas
C. It gives off explosive hydrogen gas
D. It takes in oxygen from the surrounding air

G4E08 (A)
What is the name of the process by which sunlight is directly changed into electricity?
A. Photovoltaic conversion
B. Photosensitive conduction
C. Photosynthesis
D. Photocoupling

G4E09 (B)
What is the approximate open-circuit voltage from a modern, well illuminated photovoltaic cell?
A. 0.02 VDC
B. 0.5 VDC
C. 0.2 VDC
D. 1.38 VDC

G4E10 (A)
What determines the proper size solar panel to use in a solar-powered battery-charging circuit?
A. The panel's voltage rating and maximum output current
B. The amount of voltage available per square inch of panel
C. The panel's open-circuit current
D. The panel's short-circuit voltage

G4E11 (C)
What is the biggest disadvantage to using wind power as the primary source of power for an emergency station?
A. The conversion efficiency from mechanical energy to electrical energy is less that 2 percent
B. The voltage and current ratings of such systems are not compatible with amateur equipment
C. A large electrical storage system is needed to supply power when the wind is not blowing

D. All of these choices are correct

G4E12 (A)
What type of coaxial connector would be a good choice to use for 10 GHz feed-line connections?
A. Type N
B. Type BNC
C. Type UHF
D. Type F

G4E13 (A)
Where should you avoid placing a gasoline-fueled generator to power your station?
A. Inside a building or outside an open window
B. Close to cold water pipes or other grounded metal objects
C. Close to a driven ground
D. Downwind from your station

G4E14 (D)
What safety precaution should you observe when using a gasoline-fueled generator to power your home station?
A. Always ground the frame of the generator
B. Use only generators that produce a clean sine wave output
C. Make sure that the engine is well lubricated
D. All of these choices are correct

G4E15 (D)
During a commercial power outage, why would it be unwise to back feed the output of a gasoline generator into your house wiring by connecting the generator through an AC wall outlet?
A. It presents a hazard for electric company workers
B. You may draw too much current, overloading your generator
C. Power may be restored to your house, damaging your generator
D. All of these choices are correct

SUBELEMENT G5 -- ELECTRICAL PRINCIPLES [2 Exam Questions -- 2 Groups]

G5A Impedance, including matching; resistance, including ohm; reactance; inductance; capacitance; and metric divisions of these values

G5A01 (C)
What is impedance?
A. The electric charge stored by a capacitor
B. The opposition to the flow of AC in a circuit containing only capacitance
C. The opposition to the flow of AC in a circuit
D. The force of repulsion between one electric field and another with the same charge

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G5A02 (B)
What is reactance?
A. Opposition to DC caused by resistors
B. Opposition to AC caused by inductors and capacitors
C. A property of ideal resistors in AC circuits
D. A large spark produced at switch contacts when an inductor is de-energized

G5A03 (D)
In an inductor, what causes opposition to the flow of AC?
A. Resistance
B. Reluctance
C. Admittance
D. Reactance

G5A04 (C)
In a capacitor, what causes opposition to the flow of AC?
A. Resistance
B. Reluctance
C. Reactance
D. Admittance

G5A05 (D)
How does a coil react to AC?
A. As the frequency of the applied AC increases, the reactance decreases
B. As the amplitude of the applied AC increases, the reactance increases
C. As the amplitude of the applied AC increases, the reactance decreases
D. As the frequency of the applied AC increases, the reactance increases

G5A06 (A)
How does a capacitor react to AC?
A. As the frequency of the applied AC increases, the reactance decreases
B. As the frequency of the applied AC increases, the reactance increases
C. As the amplitude of the applied AC increases, the reactance increases
D. As the amplitude of the applied AC increases, the reactance decreases

G5A07 (D)
What happens when the impedance of an electrical load is equal to the internal impedance of the power source?
A. The source delivers minimum power to the load
B. The electrical load is shorted
C. No current can flow through the circuit
D. The source delivers maximum power to the load

G5A08 (A)

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Why is impedance matching important?
A. So the source can deliver maximum power to the load
B. So the load will draw minimum power from the source
C. To ensure that there is less resistance than reactance in the circuit
D. To ensure that the resistance and reactance in the circuit are equal

G5A09 (B)
What unit is used to measure reactance?
A. Mho
B. Ohm
C. Ampere
D. Siemens

G5A10 (B)
What unit is used to measure impedance?
A. Volt
B. Ohm
C. Ampere
D. Watt

G5A11 (A)
Why should core saturation of a conventional impedance matching transformer be avoided?
A. Harmonics and distortion could result from saturation
B. Magnetic flux would increase with frequency
C. RF susceptance would increase
D. Temporary changes of the core permeability could result from saturation

G5B Decibel; Ohm's Law; current and voltage dividers; electrical power calculations and series and parallel components; transformers (either voltage or impedance); sine wave root-mean-square (RMS) value

G5B01 (B)
A two-times increase in power results in a change of how many dB?
A. 1 dB higher
B. 3 dB higher
C. 6 dB higher
D. 12 dB higher

G5B02 (B)
In a parallel circuit with a voltage source and several branch resistors, how is the total current related to the current in the branch resistors?
A. It equals the average of the branch current through each resistor
B. It equals the sum of the branch current through each resistor
C. It decreases as more parallel resistors are added to the circuit

D. It is the sum of each resistor's voltage drop multiplied by the total number of resistors

G5B03 (B)
How many watts of electrical power are used if 400 VDC is supplied to an 800-ohm load?
A. 0.5 watts
B. 200 watts
C. 400 watts
D. 320,000 watts

G5B04 (D)
How many watts of electrical power are used by a 12-VDC light bulb that draws 0.2 amperes?
A. 60 watts
B. 24 watts
C. 6 watts
D. 2.4 watts

G5B05 (A)
How many watts are being dissipated when 7.0 milliamperes flow through 1.25 kilohms?
A. Approximately 61 milliwatts
B. Approximately 39 milliwatts
C. Approximately 11 milliwatts
D. Approximately 9 milliwatts

G5B06 (C)
What is the voltage across a 500-turn secondary winding in a transformer if the 2250-turn primary is connected to 120 VAC?
A. 2370 volts
B. 540 volts
C. 26.7 volts
D. 5.9 volts

G5B07 (A)
What is the turns ratio of a transformer to match an audio amplifier having a 600-ohm output impedance to a speaker having a 4-ohm impedance?
A. 12.2 to 1
B. 24.4 to 1
C. 150 to 1
D. 300 to 1

G5B08 (B)
A DC voltage equal to what value of an applied sine-wave AC voltage would produce the same amount of heat over time in a resistive element?
A. The peak-to-peak value
B. The RMS value

C. The average value
D. The peak value

G5B09 (D)
What is the peak-to-peak voltage of a sine wave that has an RMS voltage of 120 volts?
A. 84.8 volts
B. 169.7 volts
C. 204.8 volts
D. 339.4 volts

G5B10 (B)
A sine wave of 17 volts peak is equivalent to how many volts RMS?
A. 8.5 volts
B. 12 volts
C. 24 volts
D. 34 volts

G5B11 (A)
What would be the RMS voltage if you combined two or more sine wave voltages?
A. The square root of the average of the sum of the squares of each voltage waveform
B. The sum of the RMS values for each voltage waveform
C. The sum of the average values for each waveform
D. The square of the sum of the average value for each waveform

G5B12 (C)
What causes a voltage to appear across the secondary winding of a transformer when a voltage source is connected across its primary winding?
A. Capacitive coupling
B. Displacement current coupling
C. Mutual inductance
D. Mutual capacitance

G5B13 (A)
What would be the capacitance and voltage rating of a series circuit consisting of two equal value capacitors with equal voltage ratings?
A. Total capacitance would be half that of each capacitor and maximum voltage would be twice that of each capacitor
B. Total capacitance would be half that of each capacitor and maximum voltage would be the same as each capacitor
C. Total capacitance and maximum voltage would be the same as each capacitor
D. Total capacitance and maximum voltage would be half that of each capacitor

G5B14 (D)
What percentage loss would result from a transmission line loss of 1 dB?

A. 16.6%
B. 12.5%
C. 14.7%
D. 20.6%

G5B15 (C)
If three equal resistors in parallel produce 50-ohms of resistance and the same resistors in series produce 450-ohms, what is the value of each resistor?
A. 1500-ohms
B. 90-ohms
C. 150-ohms
D. 175-ohms

SUBELEMENT G6 -- CIRCUIT COMPONENTS [1 exam question -- 1 group]

G6A Resistors; capacitors; inductors; rectifiers and transistors; etc.

G6A01 (C)
If a carbon resistor's temperature is increased, what will happen to the resistance?
A. It will increase by 20% for every 10 degrees centigrade
B. It will stay the same
C. It will change depending on the resistor's temperature coefficient rating
D. It will become time dependent

G6A02 (D)
What type of capacitor is often used in power-supply circuits to filter the rectified AC?
A. Disc ceramic
B. Vacuum variable
C. Mica
D. Electrolytic

G6A03 (D)
What function does a capacitor serve if it is used in a power-supply circuit to filter transient voltage spikes across the transformer's secondary winding?
A. Clipper capacitor
B. Trimmer capacitor
C. Feedback capacitor
D. Suppressor capacitor

G6A04 (B)
Where is the source of energy connected in a transformer?
A. To the secondary winding
B. To the primary winding
C. To the core

D. To the plates

G6A05 (A)
If no load is attached to the secondary winding of a transformer, what is current in the primary winding called?
A. Magnetizing current
B. Direct current
C. Excitation current
D. Stabilizing current

G6A06 (C)
What is the peak-inverse-voltage rating of a power-supply rectifier?
A. The maximum transient voltage the rectifier will handle in the conducting direction
B. 1.4 times the AC frequency
C. The maximum voltage the rectifier will handle in the non-conducting direction
D. 2.8 times the AC frequency

G6A07 (A)
What are the two major ratings that must not be exceeded for silicon-diode rectifiers used in power-supply circuits?
A. Peak inverse voltage; average forward current
B. Average power; average voltage
C. Capacitive reactance; avalanche voltage
D. Peak load impedance; peak voltage

G6A08 (A)
What is the output waveform of an unfiltered full-wave rectifier connected to a resistive load?
A. A series of pulses at twice the frequency of the AC input
B. A series of pulses at the same frequency as the AC input
C. A sine wave at half the frequency of the AC input
D. A steady DC voltage

G6A09 (B)
A half-wave rectifier conducts during how many degrees of each cycle?
A. 90 degrees
B. 180 degrees
C. 270 degrees
D. 360 degrees

G6A10 (D)
A full-wave rectifier conducts during how many degrees of each cycle?
A. 90 degrees
B. 180 degrees
C. 270 degrees

D. 360 degrees

G6A11 (C)
When two or more diodes are connected in parallel to increase the current-handling capacity of a power supply, what is the purpose of the resistor connected in series with each diode?
A. The resistors ensure the thermal stability of the power supply
B. The resistors regulate the power supply output voltage
C. The resistors ensure that one diode doesn't take most of the current
D. The resistors act as swamping resistors in the circuit

G6A12 (B)
Why would it not be a good idea to use a wire-wound resistor in a resonant circuit?
A. The resistor's tolerance value would not be adequate for such a circuit
B. The resistor's inductance would detune the circuit
C. The resistor would overheat
D. The resistor's internal capacitance would detune the circuit

G6A13 (D)
What is an advantage of ferrite toroidal inductors?
A. Large values of inductance may be obtained
B. The inductor may be used in applications where core saturation is desirable
C. Most of the magnetic field is contained in the core
D. All of these choices are correct

G6A14 (A)
Where would be the stable operating points for a bipolar transistor that is used as a switch in a logic circuit?
A. In its saturation and cut-off regions
B. In its active region (between cut-off and saturation regions)
C. Between its peak and valley current points
D. Between its enhancement and deletion modes

G6A15 (C)
How should two solenoid inductors be placed so as to minimize their mutual inductance?
A. In line with their winding axis
B. With their winding axis parallel to each other
C. At right angles to their winding axis
D. Within the same shielded enclosure

G6A16 (B)
Why might it be important to minimize the mutual inductance between two inductors?
A. To increase the energy transfer between both circuits
B. To reduce or eliminate stray coupling between RF stages
C. To reduce conducted emissions

D. To increase the self-resonant frequency of both inductors

SUBELEMENT G7 -- PRACTICAL CIRCUITS [1 exam question -- 1 group]

G7A Power supplies and filters; single-sideband transmitters and receivers

G7A01 (B)
What safety feature does a power-supply bleeder resistor provide?
A. It does not affect voltage regulation
B. It discharges the filter capacitors
C. It removes shock hazards from the induction coils
D. It eliminates ground-loop current

G7A02 (D)
What components are used in a power-supply filter network?
A. Diodes
B. Transformers and transistors
C. Quartz crystals
D. Capacitors and inductors

G7A03 (C)
What should be the minimum peak-inverse-voltage rating of the rectifier in a full-wave power supply?
A. One-quarter the normal output voltage of the power supply
B. Half the normal output voltage of the power supply
C. Double the normal peak output voltage of the power supply
D. Equal to the normal output voltage of the power supply

G7A04 (D)
What should be the minimum peak-inverse-voltage rating of the rectifier in a half-wave power supply?
A. One-quarter to one-half the normal peak output voltage of the power supply
B. Half the normal output voltage of the power supply
C. Equal to the normal output voltage of the power supply
D. One to two times the normal peak output voltage of the power supply

G7A05 (B)
What should be the impedance of a low-pass filter as compared to the impedance of the transmission line into which it is inserted?
A. Substantially higher
B. About the same
C. Substantially lower
D. Twice the transmission line impedance

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G7A06 (B)
In a typical single-sideband phone transmitter, what circuit processes signals from the balanced modulator and sends signals to the mixer?
A. Carrier oscillator
B. Filter
C. IF amplifier
D. RF amplifier

G7A07 (D)
In a single-sideband phone transmitter, what circuit processes signals from the carrier oscillator and the speech amplifier and sends signals to the filter?
A. Mixer
B. Detector
C. IF amplifier
D. Balanced modulator

G7A08 (C)
In a single-sideband phone superheterodyne receiver, what circuit processes signals from the RF amplifier and the local oscillator and sends signals to the IF filter?
A. Balanced modulator
B. IF amplifier
C. Mixer
D. Detector

G7A09 (D)
In a single-sideband phone superheterodyne receiver, what circuit processes signals from the IF amplifier and the BFO and sends signals to the AF amplifier?
A. RF oscillator
B. IF filter
C. Balanced modulator
D. Detector

G7A10 (A)
What type of power supply circuit is often used to provide overvoltage protection at its output?
A. Crowbar
B. Circuit breaker
C. Ferrite transformer
D. Buck-out transistor

G7A11 (A)
What type of capacitors should be used to filter the rectified DC output of a switching power supply?
A. Capacitors with low equivalent series resistance
B. Ordinary, large value electrolytic capacitors

C. NPO-type ceramic disc or silver mica capacitors
D. Capacitors with high equivalent series inductance

G7A12 (C)
Which of the following is an advantage of a switched-mode power supply as compared to a linear power supply?
A. Higher output voltages are possible with the switched-mode supply
B. Fewer circuit components are required for the switched-mode supply
C. The relatively high frequency power oscillator allows the use of small, lightweight and low-cost transformers in the switched-mode supply
D. All of these choices are correct

G7A13 (A)
In a switched-mode power supply, what is the first step in converting the 120 volt AC input voltage to a 12 volt DC output voltage?
A. The 120 volt AC is first rectified and filtered
B. The 120 volt AC is first converted to 12 volt AC with a transformer
C. The 120 volt AC is switched off when the waveform exceeds 12 volts, and is switched on again when the waveform drops below 12 volts
D. An AC clamp is used to limit the input signal to no more than 20 volts DC

SUBELEMENT G8 -- SIGNALS AND EMISSIONS [2 Exam Questions -- 2 Groups]

G8A Signal information; AM; FM; single and double sideband and carrier; bandwidth; modulation envelope; deviation; overmodulation

G8A01 (D)
What type of modulation system changes the amplitude of an RF wave for the purpose of conveying information?
A. Frequency modulation
B. Phase modulation
C. Amplitude-rectification modulation
D. Amplitude modulation

G8A02 (B)
What type of modulation system changes the phase of an RF wave for the purpose of conveying information?
A. Pulse modulation
B. Phase modulation
C. Phase-rectification modulation
D. Amplitude modulation

G8A03 (D)
What type of modulation system changes the frequency of an RF wave for the purpose of conveying information?

A. Phase-rectification modulation
B. Frequency-rectification modulation
C. Amplitude modulation
D. Frequency modulation

G8A04 (B)
What emission is produced by a reactance modulator connected to an RF power amplifier?
A. Multiplex modulation
B. Phase modulation
C. Amplitude modulation
D. Pulse modulation

G8A05 (D)
In what emission type does the instantaneous amplitude (envelope) of the RF signal vary in accordance with the modulating audio?
A. Frequency shift keying
B. Pulse modulation
C. Frequency modulation
D. Amplitude modulation

G8A06 (C)
How much should the carrier be suppressed below peak output power in a properly designed single-sideband (SSB) transmitter?
A. No more than 20 dB
B. No more than 30 dB
C. At least 40 dB
D. At least 60 dB

G8A07 (C)
What is one advantage of carrier suppression in a double-sideband phone transmission?
A. Only half the bandwidth is required for the same information content
B. Greater modulation percentage is obtainable with lower distortion
C. More power can be put into the sidebands
D. Simpler equipment can be used to receive a double-sideband suppressed-carrier signal

G8A08 (A)
Which popular phone emission uses the narrowest frequency bandwidth?
A. Single-sideband
B. Double-sideband
C. Phase-modulated
D. Frequency-modulated

G8A09 (D)
What happens to the signal of an overmodulated single-sideband or double-sideband phone

transmitter?
A. It becomes louder with no other effects
B. It occupies less bandwidth with poor high-frequency response
C. It has higher fidelity and improved signal-to-noise ratio
D. It becomes distorted and occupies more bandwidth

G8A10 (B)
How should the microphone gain control be adjusted on a single-sideband phone transmitter?
A. For full deflection of the ALC meter on modulation peaks
B. For slight movement of the ALC meter on modulation peaks
C. For 100% frequency deviation on modulation peaks
D. For a dip in plate current

G8A11 (C)
What is meant by flattopping in a single-sideband phone transmission?
A. Signal distortion caused by insufficient collector current
B. The transmitter's automatic level control is properly adjusted
C. Signal distortion caused by excessive drive
D. The transmitter's carrier is properly suppressed

G8A12 (A)
What happens to the RF carrier signal when a modulating audio signal is applied to an FM transmitter?
A. The carrier frequency changes proportionally to the instantaneous amplitude of the modulating signal
B. The carrier frequency changes proportionally to the amplitude and frequency of the modulating signal
C. The carrier amplitude changes proportionally to the instantaneous frequency of the modulating signal
D. The carrier phase changes proportionally to the instantaneous amplitude of the modulating signal

G8A13 (A)
What signal(s) would be found at the output of a properly adjusted balanced modulator?
A. Both upper and lower sidebands
B. Either upper or lower sideband, but not both
C. Both upper and lower sidebands and the carrier
D. The modulating signal and the unmodulated carrier

G8B Frequency mixing; multiplication; bandwidths; HF data communications

G8B01 (A)
What receiver stage combines a 14.25-MHz input signal with a 13.795-MHz oscillator signal to produce a 455-kHz intermediate frequency (IF) signal?

A. Mixer
B. BFO
C. VFO
D. Multiplier

G8B02 (B)
If a receiver mixes a 13.800-MHz VFO with a 14.255-MHz received signal to produce a 455-kHz intermediate frequency (IF) signal, what type of interference will a 13.345-MHz signal produce in the receiver?
A. Local oscillator
B. Image response
C. Mixer interference
D. Intermediate interference

G8B03 (A)
What stage in a transmitter would change a 5.3-MHz input signal to 14.3 MHz?
A. A mixer
B. A beat frequency oscillator
C. A frequency multiplier
D. A linear translator

G8B04 (D)
What is the name of the stage in a VHF FM transmitter that selects a harmonic of an HF signal to reach the desired operating frequency?
A. Mixer
B. Reactance modulator
C. Preemphasis network
D. Multiplier

G8B05 (C)
Why isn't frequency modulated (FM) phone used below 29.5 MHz?
A. The transmitter efficiency for this mode is low
B. Harmonics could not be attenuated to practical levels
C. The bandwidth would exceed FCC limits
D. The frequency stability would not be adequate

G8B06 (D)
What is the total bandwidth of an FM-phone transmission having a 5-kHz deviation and a 3-kHz modulating frequency?
A. 3 kHz
B. 5 kHz
C. 8 kHz
D. 16 kHz

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G8B07 (B)
What is the frequency deviation for a 12.21-MHz reactance-modulated oscillator in a 5-kHz deviation, 146.52-MHz FM-phone transmitter?
A. 41.67 Hz
B. 416.7 Hz
C. 5 kHz
D. 12 kHz

G8B08 (C)
How is frequency shift related to keying speed in an FSK signal?
A. The frequency shift in hertz must be at least four times the keying speed in WPM
B. The frequency shift must not exceed 15 Hz per WPM of keying speed
C. Greater keying speeds require greater frequency shifts
D. Greater keying speeds require smaller frequency shifts

G8B09 (B)
What do RTTY, Morse code, PSK31 and packet communications have in common?
A. They are multipath communications
B. They are digital communications
C. They are analog communications
D. They are only for emergency communications

G8B10 (B)
When sending data modes, why is it important to know the duty cycle of the mode you are using?
A. Your connectors, feed line or antenna may be rated for intermittent amateur service
B. To prevent damage to your transmitter's final output stage due to its inability to dissipate excess heat
C. To prevent blowing your power supply's fuse due to its inability to dissipate excess heat
D. All of these choices are correct

G8B11 (D)
In what segment of the 20-meter band are most PSK31 operations found?
A. At the bottom of the slow-scan TV segment, near 14.230 MHz
B. At the top of the SSB phone segment, near 14.325 MHz
C. In the middle of the CW segment, near 14.100 MHz
D. Below the RTTY segment, near 14.070 MHz

G8B12 (A) [97.303s]
What is the maximum bandwidth permitted by FCC rules for amateur radio stations when operating on USB frequencies in the 60-meter band?
A. 2.8 kHz
B. 5.6 kHz
C. +/-2.8 kHz
D. 3 kHz

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G8B13 (A)
What is another term for the mixing of two RF signals?
A. Heterodyning
B. Synthesizing
C. Cancellation
D. Multiplying

SUBELEMENT G9 -- ANTENNAS AND FEED-LINES [4 Exam Questions -- 4 Groups]

G9A Yagi antennas - physical dimensions; impedance matching; radiation patterns; directivity and major lobes

G9A01 (A)
When designing a Yagi antenna, how can the SWR bandwidth be increased?
A. Use larger diameter elements
B. Use closer element spacing
C. Use traps on the elements
D. Use tapered-diameter elements

G9A02 (B)
Approximately how long is the driven element of a Yagi antenna for 14.0 MHz?
A. 17 feet
B. 33 feet
C. 35 feet
D. 66 feet

G9A03 (B)
Approximately how long is the director element of a Yagi antenna for 21.1 MHz?
A. 42 feet
B. 21 feet
C. 17 feet
D. 10.5 feet

G9A04 (C)
Approximately how long is the reflector element of a Yagi antenna for 28.1 MHz?
A. 8.75 feet
B. 16.6 feet
C. 17.5 feet
D. 35 feet

G9A05 (B)
Which statement about a three-element Yagi antenna is true?
A. The reflector is normally the shortest parasitic element

B. The director is normally the shortest parasitic element
C. The driven element is the longest parasitic element
D. Low feed-point impedance increases bandwidth

G9A06 (A)
What is one effect of increasing the boom length and adding directors to a Yagi antenna?
A. Gain increases
B. SWR increases
C. Weight decreases
D. Wind load decreases

G9A07 (C)
Why is a Yagi antenna often used for radio communications on the 20-meter band?
A. It provides excellent omnidirectional coverage in the horizontal Plane
B. It is smaller, less expensive and easier to erect than a dipole or vertical antenna
C. It helps reduce interference from other stations off to the side or behind
D. It provides the highest possible angle of radiation for the HF bands

G9A08 (C)
What does "antenna front-to-back ratio" mean in reference to a Yagi antenna?
A. The number of directors versus the number of reflectors
B. The relative position of the driven element with respect to the reflectors and directors
C. The power radiated in the major radiation lobe compared to the power radiated in exactly the opposite direction
D. The power radiated in the major radiation lobe compared to the power radiated 90 degrees away from that direction

G9A09 (D)
What is the "main lobe" of a Yagi antenna radiation pattern?
A. The direction of least radiation from the antenna
B. The point of maximum current in a radiating antenna element
C. The maximum voltage standing wave point on a radiating element
D. The direction of maximum radiated field strength from the antenna

G9A10 (A)
What is a good way to get maximum performance from a Yagi antenna?
A. Optimize the lengths and spacing of the elements
B. Use RG-58 feed-line
C. Use a reactance bridge to measure the antenna performance from each direction around the antenna
D. Avoid using towers higher than 30 feet above the ground

G9A11 (D)
Which of the following is NOT a Yagi antenna design variable that should be considered to

optimize the forward gain, front-to-rear ratio and SWR bandwidth?
A. The physical length of the boom
B. The number of elements on the boom
C. The spacing of each element along the boom
D. The polarization of the antenna elements

G9B Loop antennas - physical dimensions; impedance matching; radiation patterns; directivity and major lobes

G9B01 (B)
Approximately how long is each side of a cubical-quad antenna driven element for 21.4 MHz?
A. 1.17 feet
B. 11.7 feet
C. 47 feet
D. 469 feet

G9B02 (A)
Approximately how long is each side of a cubical-quad antenna driven element for 14.3 MHz?
A. 17.6 feet
B. 23.4 feet
C. 70.3 feet
D. 175 feet

G9B03 (B)
Approximately how long is each side of a cubical-quad antenna reflector element for 29.6 MHz?
A. 8.23 feet
B. 8.7 feet
C. 9.7 feet
D. 34.8 feet

G9B04 (B)
Approximately how long is each leg of a symmetrical delta-loop antenna driven element for 28.7 MHz?
A. 8.75 feet
B. 11.7 feet
C. 23.4 feet
D. 35 feet

G9B05 (C)
Approximately how long is each leg of a symmetrical delta-loop antenna driven element for 24.9 MHz?
A. 10.99 feet
B. 12.95 feet
C. 13.45 feet

D. 40.36 feet

G9B06 (C)
Approximately how long is each leg of a symmetrical delta-loop antenna reflector element for 14.1 MHz?
A. 18.26 feet
B. 23.76 feet
C. 24.35 feet
D. 73.05 feet

G9B07 (A)
Which statement about two-element quad antennas is true?
A. They compare favorably with a three-element Yagi
B. They perform poorly above HF
C. They perform very well only at HF
D. They are effective only when constructed using insulated wire

G9B08 (D)
Compared to a dipole antenna, what are the directional radiation characteristics of a cubical-quad antenna?
A. The quad has more directivity in the horizontal plane but less directivity in the vertical plane
B. The quad has less directivity in the horizontal plane but more directivity in the vertical plane
C. The quad has less directivity in both horizontal and vertical planes
D. The quad has more directivity in both horizontal and vertical planes

G9B09 (D)
Moving the feed point of a multielement quad antenna from a side parallel to the ground to a side perpendicular to the ground will have what effect?
A. It will significantly increase the antenna feed-point impedance
B. It will significantly decrease the antenna feed-point impedance
C. It will change the antenna polarization from vertical to horizontal
D. It will change the antenna polarization from horizontal to vertical

G9B10 (D)
What does the term "antenna front-to-back ratio" mean in reference to a cubical-quad antenna?
A. The number of directors versus the number of reflectors
B. The relative position of the driven element with respect to the reflectors and directors
C. The power radiated in the major radiation lobe compared to the power radiated 90 degrees away from that direction
D. The power radiated in the major radiation lobe compared to the power radiated in exactly the opposite direction

G9B11 (C)
What is the "main lobe" of a cubical-quad antenna radiation pattern?

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A. The direction of least radiation from an antenna
B. The point of maximum current in a radiating antenna element
C. The direction of maximum radiated field strength from the antenna
D. The maximum voltage standing wave point on a radiating element

G9C Random wire antennas - physical dimensions; impedance matching; radiation patterns; directivity and major lobes; feed point impedance of 1/2-wavelength dipole and 1/4-wavelength vertical antennas

G9C01 (A)
What type of multiband transmitting antenna does NOT require a feed-line?
A. An end-fed random-wire antenna
B. A triband Yagi antenna
C. A delta-loop antenna
D. A Beverage antenna

G9C02 (D)
What is one advantage of using a random-wire antenna?
A. It is more efficient than any other kind of antenna
B. It will keep RF energy out of your station
C. It doesn't need an impedance matching network
D. It is a multiband antenna

G9C03 (B)
What is one disadvantage of a random-wire antenna?
A. It must be longer than 1 wavelength
B. You may experience RF feedback in your station
C. It usually produces vertically polarized radiation
D. You must use an inverted-T matching network for multiband operation

G9C04 (D)
What is an advantage of downward sloping radials on a ground-plane antenna?
A. It lowers the radiation angle
B. It brings the feed-point impedance closer to 300 ohms
C. It increases the radiation angle
D. It brings the feed-point impedance closer to 50 ohms

G9C05 (B)
What happens to the feed-point impedance of a ground-plane antenna when its radials are changed from horizontal to downward-sloping?
A. It decreases
B. It increases
C. It stays the same
D. It approaches zero

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G9C06 (A)
What is the low-angle radiation pattern of an ideal half-wavelength dipole HF antenna installed a half-wavelength high, parallel to the earth?
A. It is a figure-eight at right angles to the antenna
B. It is a figure-eight off both ends of the antenna
C. It is a circle (equal radiation in all directions)
D. It is two smaller lobes on one side of the antenna, and one larger lobe on the other side

G9C07 (C)
How does antenna height affect the horizontal (azimuthal) radiation pattern of a horizontal dipole HF antenna?
A. If the antenna is too high, the pattern becomes unpredictable
B. Antenna height has no effect on the pattern
C. If the antenna is less than one-half wavelength high, the azimuthal pattern is almost omnidirectional
D. If the antenna is less than one-half wavelength high, radiation off the ends of the wire is eliminated

G9C08 (D)
If the horizontal radiation pattern of an antenna shows a major lobe at 0 degrees and a minor lobe at 180 degrees, how would you describe the radiation pattern of this antenna?
A. Most of the signal would be radiated towards 180 degrees and a smaller amount would be radiated towards 0 degrees
B. Almost no signal would be radiated towards 0 degrees and a small amount would be radiated towards 180 degrees
C. Almost all the signal would be radiated equally towards 0 degrees and 180 degrees
D. Most of the signal would be radiated towards 0 degrees and a smaller amount would be radiated towards 180 degrees

G9C09 (D)
If a slightly shorter parasitic element is placed 0.1 wavelength away and parallel to an HF dipole antenna mounted above ground, what effect will this have on the antenna's radiation pattern?
A. The radiation pattern will not be affected
B. A major lobe will develop in the horizontal plane, parallel to the two elements
C. A major lobe will develop in the vertical plane, away from the ground
D. A major lobe will develop in the horizontal plane, toward the parasitic element

G9C10 (B)
If a slightly longer parasitic element is placed 0.1 wavelength away and parallel to an HF dipole antenna mounted above ground, what effect will this have on the antenna's radiation pattern?
A. The radiation pattern will not be affected
B. A major lobe will develop in the horizontal plane, away from the parasitic element, toward the dipole

C. A major lobe will develop in the vertical plane, away from the ground
D. A major lobe will develop in the horizontal plane, parallel to the two elements

G9C11 (C)
Where should the radial wires of a ground-mounted vertical antenna system be placed?
A. As high as possible above the ground
B. Parallel to the antenna element
C. On the surface or buried a few inches below the ground
D. At the top of the antenna

G9D Popular antenna feed-lines - characteristic impedance and impedance matching; SWR calculations

G9D01 (A)
Which of the following factors help determine the characteristic impedance of a parallel-conductor antenna feed-line?
A. The distance between the centers of the conductors and the radius of the conductors
B. The distance between the centers of the conductors and the length of the line
C. The radius of the conductors and the frequency of the signal
D. The frequency of the signal and the length of the line

G9D02 (B)
What is the typical characteristic impedance of coaxial cables used for antenna feed-lines at amateur stations?
A. 25 and 30 ohms
B. 50 and 75 ohms
C. 80 and 100 ohms
D. 500 and 750 ohms

G9D03 (D)
What is the characteristic impedance of flat-ribbon TV-type twin-lead?
A. 50 ohms
B. 75 ohms
C. 100 ohms
D. 300 ohms

G9D04 (C)
What is the typical cause of power being reflected back down an antenna feed-line?
A. Operating an antenna at its resonant frequency
B. Using more transmitter power than the antenna can handle
C. A difference between feed line impedance and antenna feed-point impedance
D. Feeding the antenna with unbalanced feed-line

G9D05 (D)

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What must be done to prevent standing waves of voltage and current on an antenna feed-line?
A. The antenna feed point must be at DC ground potential
B. The feed line must be cut to an odd number of electrical quarter-wavelengths long
C. The feed line must be cut to an even number of physical half wavelengths long
D. The antenna feed-point impedance must be matched to the characteristic impedance of the feed-line

G9D06 (C)
Under what conditions would you use an inductively coupled matching network with a dipole antenna fed with parallel-conductor feed line?
A. It would not normally be used with parallel-conductor feed lines
B. It would be used to increase the SWR to an acceptable level
C. It would be used to match the unbalanced transmitter output to the balanced parallel-conductor feed line
D. It would be used at the antenna feed point to tune out the radiation resistance

G9D07 (A)
If a 160-meter signal and a 2-meter signal pass through the same coaxial cable, how will the attenuation of the two signals compare?
A. It will be greater at 2 meters
B. It will be less at 2 meters
C. It will be the same at both frequencies
D. It will depend on the emission type in use

G9D08 (D)
In what values are RF feed line losses usually expressed?
A. Bels/1000 ft
B. dB/1000 ft
C. Bels/100 ft
D. dB/100 ft

G9D09 (A)
What standing-wave-ratio will result from the connection of a 50-ohm feed line to a resonant antenna having a 200-ohm feed-point impedance?
A. 4:1
B. 1:4
C. 2:1
D. 1:2

G9D10 (D)
What standing-wave-ratio will result from the connection of a 50-ohm feed line to a resonant antenna having a 10-ohm feed-point impedance?
A. 2:1
B. 50:1

C. 1:5
D. 5:1

G9D11 (B)
What standing-wave-ratio will result from the connection of a 50-ohm feed line to a resonant antenna having a 50-ohm feed-point impedance?
A. 2:1
B. 1:1
C. 50:50
D. 0:0

G9D12 (B)
What physical aspects of an air-insulated parallel-conductor transmission line determine its characteristic impedance?
A. The RF resistance of the conductors and the length of the conductors
B. The diameter of the conductors and the distance between their centers
C. The RF resistance of the conductors and the dielectric constant of the insulation
D. The resistance of each wire to RF ground and the antenna's impedance

G9D13 (A)
What would be the SWR if you feed a vertical antenna that has a 25-ohm feed-point impedance with 50-ohm coaxial cable?
A. 2:1
B. 2.5:1
C. 1.25:1
D. You cannot determine SWR from impedance values

G9D14 (C)
What would be the SWR if you feed a folded dipole antenna that has a 300-ohm feed-point impedance with 50-ohm coaxial cable?
A. 1.5:1
B. 3:1
C. 6:1
D. You cannot determine SWR from impedance values

SUBELEMENT G0 -- RF SAFETY [5 Exam Questions -- 5 Groups]

G0A RF Safety Principles

G0A01 (A)
Depending on the wavelength of the signal, the energy density of the RF field, and other factors, in what way can RF energy affect body tissue?
A. It heats body tissue
B. It causes radiation poisoning

C. It causes the blood count to reach a dangerously low level
D. It cools body tissue

G0A02 (B)
Which property is NOT important in estimating RF energy's effect on body tissue?
A. Its duty cycle
B. Its critical angle
C. Its power density
D. Its frequency

G0A03 (B)
Which of the following has the most direct effect on the permitted exposure level of RF radiation?
A. The maximum usable frequency of the ionosphere
B. The frequency (or wavelength) of the energy
C. The environment near the transmitter
D. The distance from the antenna

G0A04 (C)
What unit of measurement best describes the biological effects of RF fields at frequencies used by amateur operators?
A. Electric field strength (V/m)
B. Magnetic field strength (A/m)
C. Specific absorption rate (W/kg)
D. Power density (W/cm2)

G0A05 (D)
RF radiation in which of the following frequency ranges has the most effect on the human eyes?
A. The 3.5-MHz range
B. The 2-MHz range
C. The 50-MHz range
D. The 1270-MHz range

G0A06 (A)
What does the term "athermal effects" of RF radiation mean?
A. Biological effects from RF energy other than heating
B. Chemical effects from RF energy on minerals and liquids
C. A change in the phase of a signal resulting from the heating of an antenna
D. Biological effects from RF energy in excess of the maximum permissible exposure level

G0A07 (B)
At what frequencies does the human body absorb RF energy at a maximum rate?
A. The high-frequency (3-30-MHz) range
B. The very-high-frequency (30-300-MHz) range

C. The ultra-high-frequency (300-MHz to 3-GHz) range
D. The super-high-frequency (3-GHz to 30-GHz) range

G0A08 (D)
What does "time averaging" mean when it applies to RF radiation exposure?
A. The average time of day when the exposure occurs
B. The average time it takes RF radiation to have any long term effect on the body
C. The total time of the exposure, e.g. 6 minutes or 30 minutes
D. The total RF exposure averaged over a certain time

G0A09 (D)
What guideline is used to determine whether or not a routine RF evaluation must be performed for an amateur station?
A. If the transmitter's PEP is 50 watts or more, an evaluation must always be performed
B. If the RF radiation from the antenna system falls within a controlled environment, an evaluation must be performed
C. If the RF radiation from the antenna system falls within an uncontrolled environment, an evaluation must be performed
D. If the transmitter's PEP and frequency are within certain limits given in Part 97, an evaluation must be performed

G0A10 (A)
If you perform a routine RF evaluation on your station and determine that its RF fields exceed the FCC's exposure limits in human-accessible areas, what are you required to do?
A. Take action to prevent human exposure to the excessive RF fields
B. File an Environmental Impact Statement (EIS-97) with the FCC
C. Secure written permission from your neighbors to operate above the controlled MPE limits
D. Nothing; simply keep the evaluation in your station records

G0A11 (C)
At a site with multiple transmitters operating at the same time, how is each transmitter included in the RF exposure site evaluation?
A. Only the RF field of the most powerful transmitter need be considered
B. The RF fields of all transmitters are multiplied together
C. Transmitters that produce more than 5% of the maximum permissible power density exposure limit for that transmitter must be included
D. Only the RF fields from any transmitters operating with high duty-cycle modes (greater than 50%) need to be considered

G0A12 (D)
What factors can affect the thermal aspects of RF energy exposure to human body tissues?
A. The body part and duration of its exposure
B. Frequency and power density
C. Wave polarization

D. All of these choices are correct

G0B RF Safety Rules and Guidelines

G0B01 (C)
What are the FCC's RF-safety rules designed to control?
A. The maximum RF radiated electric field strength
B. The maximum RF radiated magnetic field strength
C. The maximum permissible human exposure to all RF radiated fields
D. The maximum RF radiated power density

G0B02 (A)
At a site with multiple transmitters, who must ensure that all FCC RF-safety regulations are met?
A. All licensees contributing more than 5% of the maximum permissible power density exposure for that transmitter are equally responsible
B. Only the licensee of the station producing the strongest RF field is responsible
C. All of the stations at the site are equally responsible, regardless of any station's contribution to the total RF field
D. Only the licensees of stations which are producing an RF field exceeding the maximum permissible exposure limit are responsible

G0B03 (A)
What effect does duty cycle have when evaluating RF exposure?
A. Low duty-cycle emissions permit greater short-term exposure levels
B. High duty-cycle emissions permit greater short-term exposure levels
C. The duty cycle is not considered when evaluating RF exposure
D. Any duty cycle may be used as long as it is less than 100 percent

G0B04 (B)
What is the threshold power used to determine if an RF environmental evaluation is required when the operation takes place in the 15-meter band?
A. 50 watts PEP
B. 100 watts PEP
C. 225 watts PEP
D. 500 watts PEP

G0B05 (B)
Why do the power levels used to determine if an RF environmental evaluation is required vary with frequency?
A. Because amateur operators may use a variety of power levels
B. Because Maximum Permissible Exposure (MPE) limits are frequency dependent
C. Because provision must be made for signal loss due to propagation
D. All of these choices are correct

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G0B06 (A)
What is the threshold power used to determine if an RF environmental evaluation is required when the operation takes place in the 10-meter band?
A. 50 watts PEP
B. 100 watts PEP
C. 225 watts PEP
D. 500 watts PEP

G0B07 (D)
What is the threshold power used to determine if an RF environmental evaluation is required for transmissions in the amateur bands with frequencies less than 10 MHz?
A. 50 watts PEP
B. 100 watts PEP
C. 225 watts PEP
D. 500 watts PEP

G0B08 (D)
What amateur frequency bands have the lowest power limits above which an RF environmental evaluation is required?
A. All bands between 17 and 30 meters
B. All bands between 10 and 15 meters
C. All bands between 40 and 160 meters
D. All bands between 1.25 and 10 meters

G0B09 (C)
What is the threshold power used to determine if an RF safety evaluation is required when the operation takes place in the 20-meter band?
A. 50 watts PEP
B. 100 watts PEP
C. 225 watts PEP
D. 500 watts PEP

G0B10 (D)
Which of the following amateur radio stations are subject to routine environmental evaluation?
A. Those stations that use gain-type antennas at HF frequencies
B. All except portable stations
C. All except those stations where no one is exposed to RF radiation
D. Those stations with transmitter output levels exceeding 500-watts PEP on the 40, 75/80 and 160 meter bands

G0C Routine Station Evaluation and Measurements (FCC Part 97 refers to RF Radiation Evaluation)

G0C01 (C)

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If the free-space far-field strength of a 10-MHz dipole antenna measures 1.0 millivolts per meter at a distance of 5 wavelengths, what will the field strength measure at a distance of 10 wavelengths?
A. 0.10 millivolts per meter
B. 0.25 millivolts per meter
C. 0.50 millivolts per meter
D. 1.0 millivolts per meter

G0C02 (B)
If the free-space far-field strength of a 28-MHz Yagi antenna measures 4.0 millivolts per meter at a distance of 5 wavelengths, what will the field strength measure at a distance of 20 wavelengths?
A. 2.0 millivolts per meter
B. 1.0 millivolts per meter
C. 0.50 millivolts per meter
D. 0.25 millivolts per meter

G0C03 (A)
If the free-space far-field strength of a 1.8-MHz dipole antenna measures 9 microvolts per meter at a distance of 4 wavelengths, what will the field strength measure at a distance of 12 wavelengths?
A. 3 microvolts per meter
B. 3.6 microvolts per meter
C. 4.8 microvolts per meter
D. 10 microvolts per meter

G0C04 (D)
If the free-space far-field power density of a 18-MHz Yagi antenna measures 10 milliwatts per square meter at a distance of 3 wavelengths, what will it measure at a distance of 6 wavelengths?
A. 11 milliwatts per square meter
B. 5.0 milliwatts per square meter
C. 3.3 milliwatts per square meter
D. 2.5 milliwatts per square meter

G0C05 (B)
If the free-space far-field power density of an antenna measures 9 milliwatts per square meter at a distance of 5 wavelengths, what will the field strength measure at a distance of 15 wavelengths?
A. 3 milliwatts per square meter
B. 1 milliwatt per square meter
C. 0.9 milliwatt per square meter
D. 0.09 milliwatt per square meter

G0C06 (A)
What factors determine the location of the boundary between the near and far fields of an

antenna?
A. Wavelength of the signal and physical size of the antenna
B. Antenna height and element material
C. Boom length and element material
D. Transmitter power and antenna gain

G0C07 (D)
Which of the following steps might an amateur operator take to ensure compliance with the RF safety regulations?
A. Post a copy of FCC Part 97 in the station
B. Post a copy of OET Bulletin 65 in the station
C. Nothing; amateur compliance is voluntary
D. Perform a routine RF exposure evaluation

G0C08 (C)
In the free-space far field, what is the relationship between the electric field (E field) and magnetic field (H field)?
A. The electric field strength is equal to the square of the magnetic field strength
B. The electric field strength is equal to the cube of the magnetic field strength
C. The electric and magnetic field strength has a fixed impedance relationship of 377 ohms
D. The electric field strength times the magnetic field strength equals 377 ohms

G0C09 (B)
What type of instrument can be used to accurately measure an RF field?
A. A receiver with an S meter
B. A calibrated field-strength meter with a calibrated antenna
C. A betascope with a dummy antenna calibrated at 50 ohms
D. An oscilloscope with a high-stability crystal marker generator

G0C10 (C)
If your station complies with the RF safety rules and you reduce its power output from 500 to 40 watts, how would the RF safety rules apply to your operations?
A. You would need to reevaluate your station for compliance with the RF safety rules because the power output changed
B. You would need to reevaluate your station for compliance with the RF safety rules because the transmitting parameters changed
C. You would not need to perform an RF safety evaluation, but your station would still need to be in compliance with the RF safety rules
D. The RF safety rules would no longer apply to your station because it would be operating with less than 50 watts of power

G0C11 (D)
If your station complies with the RF safety rules and you reduce its power output from 1000 to 500 watts, how would the RF safety rules apply to your operations?

A. You would need to reevaluate your station for compliance with the RF safety rules because the power output changed
B. You would need to reevaluate your station for compliance with the RF safety rules because the transmitting parameters changed
C. You would need to perform an RF safety evaluation to ensure your station would still be in compliance with the RF safety rules
D. Since your station was in compliance with RF safety rules at a higher power output, you need to do nothing more

G0D Practical RF-safety applications

G0D01 (C)
Considering RF safety, what precaution should you take if you install an indoor transmitting antenna?
A. Locate the antenna close to your operating position to minimize feed line losses
B. Position the antenna along the edge of a wall where it meets the floor or ceiling to reduce parasitic radiation
C. Locate the antenna as far away as possible from living spaces that will be occupied while you are operating
D. Position the antenna parallel to electrical power wires to take advantage of parasitic effects

G0D02 (A)
Considering RF safety, what precaution should you take whenever you make adjustments to the feed line of a directional antenna system?
A. Be sure no one can activate the transmitter
B. Disconnect the antenna-positioning mechanism
C. Point the antenna away from the sun so it doesn't concentrate solar energy on you
D. Be sure you and the antenna structure are properly grounded

G0D03 (A)
What is the best reason to place a protective fence around the base of a ground-mounted transmitting antenna?
A. To reduce the possibility of persons being exposed to levels of RF in excess of the maximum permissible exposure (MPE) limits
B. To reduce the possibility of animals damaging the antenna
C. To reduce the possibility of persons vandalizing expensive equipment
D. To improve the antenna's grounding system and thereby reduce the possibility of lightning damage

G0D04 (B)
What RF-safety precautions should you take before beginning repairs on an antenna?
A. Be sure you and the antenna structure are grounded
B. Be sure to turn off the transmitter and disconnect the feed-line
C. Inform your neighbors so they are aware of your intentions

D. Turn off the main power switch in your house

G0D05 (D)
What precaution should be taken when installing a ground-mounted antenna?
A. It should not be installed higher than you can reach
B. It should not be installed in a wet area
C. It should be painted so people or animals do not accidentally run into it
D. It should be installed so no one can be exposed to RF radiation in excess of the maximum permissible exposure (MPE) limits

G0D06 (B)
What precaution should you take before beginning repairs on a microwave feed horn or waveguide?
A. Wear tight-fitting clothes and gloves to protect your body and hands from sharp edges
B. Be sure the transmitter is turned off and the power source is disconnected
C. Wait until the weather is dry and sunny
D. Be sure propagation conditions are not favorable for troposphere ducting

G0D07 (D)
Why should directional high-gain antennas be mounted higher than nearby structures?
A. To eliminate inversion of the major and minor lobes
B. So they will not damage nearby structures with RF energy
C. So they will receive more sky waves and fewer ground waves
D. So they will not direct excessive amounts of RF energy toward people in nearby structures

G0D08 (C)
For best RF safety, where should the ends and center of a dipole antenna be located?
A. Near or over moist ground so RF energy will be radiated away from the ground
B. As close to the transmitter as possible so RF energy will be concentrated near the transmitter
C. As far away as possible to minimize RF exposure to people near the antenna
D. Close to the ground so simple adjustments can be easily made without climbing a ladder

G0D09 (B)
What should you do to reduce RF radiation exposure when operating at 1270 MHz?
A. Make sure that an RF leakage filter is installed at the antenna feed point
B. Keep the antenna away from your eyes when RF is applied
C. Make sure the standing wave ratio is low before you conduct a test
D. Never use a shielded horizontally polarized antenna

G0D10 (A)
Considering RF safety, which of the following is the best reason to mount the antenna of a mobile VHF transceiver in the center of a metal roof?
A. The roof will greatly shield the driver and passengers from RF radiation
B. The antenna will be out of the driver's line of sight

C. The center of a metal roof is the sturdiest mounting place for an antenna
D. The wind resistance of the antenna will be centered between the wheels and not drag on one side or the other

G0D11 (A)
Why should you avoid using attic-mounted antennas?
A. They may expose people in the house to strong, near field RF energy
B. The attic may not have adequate thermal insulation for the antenna
C. People moving around in the house might detune the antenna
D. All of these choices are correct

G0D12 (D)
Why must you be careful when aiming EME (moonbounce) arrays toward the horizon?
A. Their high ERP may produce hazardous RF fields in uncontrolled areas
B. They could cause TVI/RFI for your neighbors
C. Reflections from nearby objects could detune the array
D. All of these choices are correct

G0E RF-safety solutions

G0E01 (B)
If you receive minor burns every time you touch your microphone while you are transmitting, which of the following statements is true?
A. You need to use a low-impedance microphone
B. You and others in your station may be exposed to more than the maximum permissible level of RF radiation
C. You need to use a surge suppressor on your station transmitter
D. All of these choices are correct

G0E02 (D)
If measurements indicate that individuals in your station are exposed to more than the maximum permissible level of radiation, which of the following corrective measures would be effective?
A. Ensure proper grounding of the equipment
B. Ensure that all equipment covers are tightly fastened
C. Use the minimum amount of transmitting power necessary
D. All of these choices are correct

G0E03 (B)
If calculations show that you and your family may be receiving more than the maximum permissible RF radiation exposure from your 20-meter indoor dipole, which of the following steps might be appropriate?
A. Use RTTY instead of CW or SSB voice emissions
B. Move the antenna to a safe outdoor environment
C. Use an antenna-matching network to reduce your transmitted SWR

D. All of these choices are correct

G0E04 (D)
Considering RF exposure, which of the following steps should you take when installing an antenna?
A. Install the antenna as high and far away from populated areas as possible
B. If the antenna is a gain antenna, point it away from populated areas
C. Minimize feed line radiation into populated areas
D. All of these choices are correct

G0E05 (D)
What might you do if an RF radiation evaluation shows that your neighbors may be receiving more than the maximum RF radiation exposure limit from your Yagi antenna when it is pointed at their house?
A. Change from horizontal polarization to vertical polarization
B. Change from horizontal polarization to circular polarization
C. Use an antenna with a higher front to rear ratio
D. Take precautions to ensure you can't point your antenna at their house

G0E06 (A)
What might you do if an RF radiation evaluation shows that your neighbors may be receiving more than the maximum RF radiation exposure limit from your quad antenna when it is pointed at their house?
A. Reduce your transmitter power to a level that reduces their exposure to a value below the maximum permissible exposure (MPE) limit
B. Change from horizontal polarization to vertical polarization
C. Use an antenna with a higher front to side ratio
D. Use an antenna with a sharper radiation lobe

G0E07 (C)
Why does a dummy antenna provide an RF safe environment for transmitter adjusting?
A. The dummy antenna carries the RF energy far away from the station before releasing it
B. The RF energy is contained in a halo around the outside of the dummy antenna
C. The RF energy is not radiated from a dummy antenna, but is converted to heat
D. The dummy antenna provides a perfect match to the antenna feed impedance

G0E08 (A)
From an RF radiation exposure point of view, which of the following materials would be the best to use for your homemade transmatch enclosure?
A. Aluminum
B. Bakelite
C. Transparent acrylic plastic
D. Any nonconductive material

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G0E09 (B)
From an RF radiation exposure point of view, what is the advantage to using a high-gain, narrow-beamwidth antenna for your VHF station?
A. High-gain antennas absorb stray radiation
B. The RF radiation can be focused in a direction away from populated areas
C. Narrow-beamwidth antennas eliminate exposure in areas directly under the antenna
D. All of these choices are correct

G0E10 (C)
From an RF radiation exposure point of view, what is the disadvantage in using a high-gain, narrow-beamwidth antenna for your VHF station?
A. High-gain antennas must be fed with coaxial cable feed-line, which radiates stray RF energy
B. The RF radiation can be better focused in a direction away from populated areas
C. Individuals in the main beam of the radiation pattern will receive a greater exposure than when a low-gain antenna is used
D. All of these choices are correct

G0E11 (C)
If your station is located in a residential area, which of the following would best help you reduce the RF exposure to your neighbors from your amateur station?
A. Use RTTY instead of CW or SSB voice emissions
B. Use top-quality coaxial cable to reduce RF losses in the feed-line
C. Install your antenna as high as possible to maximize the distance to nearby people
D. Use an antenna matching network to reduce your transmitted SWR

G0E12 (A)
What could be done to ensure greater RF safety near a ground mounted vertical antenna?
A. Construct fencing to exclude people from getting too close to the antenna
B. Avoid transmitter output power levels above 50-watts
C. Increase the gain of the antenna
D. Add a parasitic element to redirect RF energy away from uncontrolled area