

## General Class Study Group Chapter 4 Amateur Radio Practices

Five questions from this chapter will be on the test.

### Manual pages 1 to 4

G4B01

1. 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

2. 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

G4B05

3. 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

4. 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

### Manual pages 4 and 5

G4B03

5. 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

6. 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

G4B07

7. 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

8. 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

G4B10

9. 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

10. 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

11. 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

12. 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

## Manual pages 6 and 7

G4A01

13. What kind of input signal is used to test the amplitude linearity of a singlesideband 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

14. 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

15. 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

G4A11

16. 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

17. 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

**Manual pages 8 and 9**

G4A06

18 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

19. 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

20. In a properly neutralized RF amplifier, what type of feedback is used?

- A. 5%
- B. 10%
- C. Negative
- D. Positive

G4A09

21. 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

22. 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

**Manual pages 9 to 12**

G4D03

23. 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

24. 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

25. 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

G4D10

26. 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

**Manual pages 12 and 13.**

G4B09

27. 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

**Manual pages 13 and 14.**

G4A04

28. 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

29. 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

G4A13

30. 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

**Manual pages 14 and 15**

G4D01

31. 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

32. 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

G4D09

33. 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

**Manual pages 16 to 19**

G4C01

34. 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

35. 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

36. 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

37. 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

38. 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

39. 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

40. 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

41. 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

42. 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

G4C11

43. 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

44. 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

45. 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

**Manual pages 20 to 23.**

G4C10

46. 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

G4D06

47. 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

48. 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

49. 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

G4E02

50. 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

**Manual pages 23 to 25.**

G4E06

51. 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

52. 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

53. 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

54. 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

55. 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

56. 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 than 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

G4E13

57. 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

58. 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

59. 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

**Manual pages 25 and 26.**

G4E01

60. Which of the following connectors is NOT designed for RF transmission lines?

- A. PL-259
- B. DB-25
- C. Type N
- D. BNC

G4E03

61. 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

62. 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

63. 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

G4E12

64. What type of coaxial connector would be a good choice to use for 10 GHz feedline connections?

- A. Type N
- B. Type BNC
- C. Type UHF

D. Type F