

Chapter 5.5 – Quiz 1 – HF Station Installation

G4C01 - Which of the following might be useful in reducing RF interference to audio frequency circuits?

- A. Bypass inductor
- B. Bypass capacitor
- C. Forward-biased diode
- D. Reverse-biased diode

G4C02 - Which of the following could be a cause of interference covering a wide range of frequencies?

- 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. Arcing at a poor electrical connection
- D. Using a balun to feed an unbalanced antenna

G4C03 - What sound is heard from an audio device experiencing RF interference from a single sideband phone transmitter?

- A. A steady hum whenever the transmitter is on the air
- B. On-and-off humming or clicking
- C. Distorted speech
- D. Clearly audible speech

G4C04 - What sound is heard from an audio device experiencing RF interference from a CW transmitter?

- A. On-and-off humming or clicking
- B. A CW signal at a nearly pure audio frequency
- C. A chirpy CW signal
- D. Severely distorted audio

G4C05 - What is a possible cause of high voltages that produce RF burns?

- A. Flat braid rather than round wire has been used for the ground wire
- B. Insulated wire has been used for the ground wire
- C. The ground rod is resonant
- D. The ground wire has high impedance on that frequency

G4C06 - What is a possible effect of a resonant ground connection?

- A. Overheating of ground straps
- B. Corrosion of the ground rod
- C. High RF voltages on the enclosures of station equipment
- D. A ground loop

G4C08 - Which of the following would reduce RF interference caused by common-mode current on an audio cable?

- A. Place a ferrite choke on the cable
- B. Connect the center conductor to the shield of all cables to short circuit the RFI signal
- C. Ground the center conductor of the audio cable causing the interference
- D. Add an additional insulating jacket to the cable

G4C09 - How can the effects of ground loops be minimized?

- A. Connect all ground conductors in series
- B. Connect the AC neutral conductor to the ground wire
- C. Avoid using lock washers and star washers when making ground connections
- D. Bond equipment enclosures together

G4C10 - What could be a symptom caused by a ground loop in your station's audio connections?

- A. You receive reports of "hum" on your station's transmitted signal
- B. The SWR reading for one or more antennas is suddenly very high
- C. An item of station equipment starts to draw excessive amounts of current
- D. You receive reports of harmonic interference from your station

G4C11 - What technique helps to minimize RF "hot spots" in an amateur station?

- A. Building all equipment in a metal enclosure
- B. Using surge suppressor power outlets
- C. Bonding all equipment enclosures together
- D. Placing low-pass filters on all feed lines

G4C12 - Why must all metal enclosures of station equipment be grounded?

- A. It prevents a blown fuse in the event of an internal short circuit
- B. It prevents signal overload
- C. It ensures that the neutral wire is grounded
- D. It ensures that hazardous voltages cannot appear on the chassis

G4E03 - Which of the following direct, fused power connections would be the best for a 100-watt HF mobile installation?

- A. To the battery using heavy-gauge wire
- B. To the alternator or generator using heavy-gauge wire
- C. To the battery using insulated heavy duty balanced transmission line
- D. To the alternator or generator using insulated heavy duty balanced transmission line

G4E04 - Why should DC power for a 100-watt HF transceiver not be supplied by a vehicle's auxiliary power socket?

- A. The socket is not wired with an RF-shielded power cable
- B. The socket's wiring may be inadequate for the current drawn by the transceiver
- C. The DC polarity of the socket is reversed from the polarity of modern HF transceivers
- D. Drawing more than 50 watts from this socket could cause the engine to overheat

G4E05 - Which of the following most limits an HF mobile installation?

- A. "Picket fencing"
- B. The wire gauge of the DC power line to the transceiver
- C. Efficiency of the electrically short antenna
- D. FCC rules limiting mobile output power on the 75-meter band

G4E07 - Which of the following may cause receive interference to an HF transceiver installed in a vehicle?

- A. The battery charging system
- B. The fuel delivery system
- C. The control computers
- D. All these choices are correct

G6B10 - How does a ferrite bead or core reduce common-mode RF current on the shield of a coaxial cable?

- A. By creating an impedance in the current's path
- B. It converts common-mode current to differential mode current
- C. By creating an out-of-phase current to cancel the common-mode current
- D. Ferrites expel magnetic fields

G8B05 - Which intermodulation products are closest to the original signal frequencies?

- A. Second harmonics
- B. Even-order
- C. Odd-order
- D. Intercept point

G8B12 - What process combines two signals in a non-linear circuit to produce unwanted spurious outputs?

- A. Intermodulation
- B. Heterodyning
- C. Detection
- D. Rolloff

G8B13 - Which of the following is an odd-order intermodulation product of frequencies F1 and F2?

- A. $5F_1 - 3F_2$
- B. $3F_1 - F_2$
- C. $2F_1 - F_2$
- D. All these choices are correct

(End of Quiz 1)

G2E08 - In what segment of the 20-meter band are most digital mode operations commonly 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. Between 14.070 MHz and 14.100 MHz

G8A01 - How is direct binary FSK modulation generated?

- A. By keying an FM transmitter with a sub-audible tone
- B. By changing an oscillator's frequency directly with a digital control signal
- C. By using a transceiver's computer data interface protocol to change frequencies
- D. By reconfiguring the CW keying input to act as a tone generator

G8C11 - How are the two separate frequencies of a Frequency Shift Keyed (FSK) signal identified?

- A. Dot and dash
- B. On and off
- C. High and low
- D. Mark and space

G8C16 - Which of the following provide digital voice modes?

- A. WSPR, MFSK16, and EasyPAL
- B. FT8, FT4, and FST4
- C. Winlink, PACTOR II, and PACTOR III
- D. DMR, D-STAR, and SystemFusion

G2E06 - 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

G8A06 - Which of the following is characteristic of QPSK31?

- A. It is sideband sensitive
- B. Its encoding provides error correction
- C. Its bandwidth is approximately the same as BPSK31
- D. All these choices are correct

G8C04 - Which of the following describes Baudot code?

- A. A 7-bit code with start, stop, and parity bits
- B. A code using error detection and correction
- C. A 5-bit code with additional start and stop bits
- D. A code using SELCAL and LISTEN

G8C08 - Which of the following statements is true about PSK31?

- A. Upper case letters are sent with more power
- B. Upper case letters use longer Varicode bit sequences and thus slow down transmission
- C. Error correction is used to ensure accurate message reception
- D. Higher power is needed as compared to RTTY for similar error rates

G8C12 - Which type of code is used for sending characters in a PSK31 signal?

- A. Varicode
- B. Viterbi
- C. Volumetric
- D. Binary

End of Quiz 2

G2E02 - What is VARA?

- A. A low signal-to-noise digital mode used for EME (moonbounce)
- B. A digital protocol used with Winlink
- C. A radio direction finding system used on VHF and UHF
- D. A DX spotting system using a network of software defined radios

G2E04 - Which of the following is good practice when choosing a transmitting frequency to answer a station calling CQ using FT8?

- A. Always call on the station's frequency
- B. Call on any frequency in the waterfall except the station's frequency
- C. Find a clear frequency during the same time slot as the calling station
- D. Find a clear frequency during the alternate time slot to the calling station

G2E07 - Which of the following is required when using FT8?

- A. A special hardware modem
- B. Computer time accurate to within approximately 1 second
- C. Receiver attenuator set to -12 dB
- D. A vertically polarized antenna

G2E09 - How do you join a contact between two stations using the PACTOR protocol?

- A. Send broadcast packets containing your call sign while in MONITOR mode
- B. Transmit a steady carrier until the PACTOR protocol times out and disconnects
- C. Joining an existing contact is not possible, PACTOR connections are limited to two stations
- D. Send a NAK code

G2E11 - What is the primary purpose of an Amateur Radio Emergency Data Network (AREDN) mesh network?

- A. To provide FM repeater coverage in remote areas
- B. To provide real time propagation data by monitoring amateur radio transmissions worldwide
- C. To provide high-speed data services during an emergency or community event
- D. To provide DX spotting reports to aid contesters and DXers

G2E12 - Which of the following describes Winlink?

- A. An amateur radio wireless network to send and receive email on the internet
- B. A form of Packet Radio
- C. A wireless network capable of both VHF and HF band operation
- D. All these choices are correct

G2E13 - What is another name for a Winlink Remote Message Server?

- A. Terminal Node Controller
- B. Gateway
- C. RJ-45
- D. Printer/Server

G2E15 - Which of the following is a common location for FT8?

- A. Anywhere in the voice portion of the band
- B. Anywhere in the CW portion of the band
- C. Approximately 14.074 MHz to 14.077 MHz
- D. Approximately 14.110 MHz to 14.113 MHz

G8A09 - What type of modulation is used by FT8?

- A. 8-tone frequency shift keying
- B. Vestigial sideband
- C. Amplitude compressed AM
- D. 8-bit direct sequence spread spectrum

G8A12 - What is QPSK modulation?

- A. Modulation using quasi-parallel to serial conversion to reduce bandwidth
- B. Modulation using quadra-pole sideband keying to generate spread spectrum signals
- C. Modulation using Fast Fourier Transforms to generate frequencies at the first, second, third, and fourth harmonics of the carrier frequency to improve noise immunity
- D. Modulation in which digital data is transmitted using 0-, 90-, 180- and 270-degrees phase shift to represent pairs of bits

G8C02 - Which digital mode is used as a low-power beacon for assessing HF propagation?

- A. WSPR
- B. MFSK16
- C. PSK31
- D. SSB-SC

G8C03 - What part of a packet radio frame contains the routing and handling information?

- A. Directory
- B. Preamble
- C. Header
- D. Trailer

G8C05 - In an ARQ mode, what is meant by a NAK response to a transmitted packet?

- A. Request retransmission of the packet
- B. Packet was received without error
- C. Receiving station connected and ready for transmissions
- D. Entire file received correctly

G8C07 - Which of the following narrow-band digital modes can receive signals with very low signal-to-noise ratios?

- A. MSK144
- B. FT8
- C. AMTOR
- D. MFSK32

G8C09 - Which is true of mesh network microwave nodes?

- A. Having more nodes increases signal strengths

- B. If one node fails, a packet may still reach its target station via an alternate node
- C. Links between two nodes in a network may have different frequencies and bandwidths
- D. More nodes reduce overall microwave out of band interference

G8C10 - How does forward error correction (FEC) allow the receiver to correct data errors?

- A. By controlling transmitter output power for optimum signal strength
- B. By using the Varicode character set
- C. By transmitting redundant information with the data
- D. By using a parity bit with each character

G8C15 - What does an FT8 signal report of +3 mean?

- A. The signal is 3 times the noise level of an equivalent SSB signal
- B. The signal is S3 (weak signals)
- C. The signal-to-noise ratio is equivalent to +3dB in a 2.5 kHz bandwidth
- D. The signal is 3 dB over S9

End of Quiz 3

Chapter 6.4 – Quiz 4 – Rx/Tx Digital Modes

G2E01 - Which mode is normally used when sending RTTY signals via AFSK with an SSB transmitter?

- A. USB
- B. DSB
- C. CW
- D. LSB

G2E05 - What is the standard sideband for JT65, JT9, FT4, or FT8 digital signal when using AFSK?

- A. LSB
- B. USB
- C. DSB
- D. SSB

G2E14 - What could be wrong if you cannot decode an RTTY or other FSK signal even though it is apparently tuned in properly?

- A. The mark and space frequencies may be reversed
- B. You may have selected the wrong baud rate
- C. You may be listening on the wrong sideband
- D. All these choices are correct

G4A11 - Why should the ALC system be inactive when transmitting AFSK data signals?

- A. ALC will invert the modulation of the AFSK mode
- B. The ALC action distorts the signal
- C. When using digital modes, too much ALC activity can cause the transmitter to overheat
- D. All these choices are correct

G8B08 - Why is it important to know the duty cycle of the mode you are using when transmitting?

- A. To aid in tuning your transmitter
- B. Some modes have high duty cycles that could exceed the transmitter's average power rating
- C. To allow time for the other station to break in during a transmission
- D. To prevent overmodulation

G8B10 - What is the relationship between transmitted symbol rate and bandwidth?

- A. Symbol rate and bandwidth are not related
- B. Higher symbol rates require wider bandwidth
- C. Lower symbol rates require wider bandwidth
- D. Bandwidth is half the symbol rate

G8C13 - What is indicated on a waterfall display by one or more vertical lines on either side of a data mode or RTTY signal?

- A. Long path propagation
- B. Backscatter propagation
- C. Insufficient modulation
- D. Overmodulation

(End of Quiz 4)

Chapter 6.5 – Quiz 5 – Digital Operating Procedures

G1E03 - What is required to conduct communications with a digital station operating under automatic control outside the automatic control band segments?

- A. The station initiating the contact must be under local or remote control
- B. The interrogating transmission must be made by another automatically controlled station
- C. No third-party traffic may be transmitted
- D. The control operator of the interrogating station must hold an Amateur Extra class license

G1E09 - Under what circumstances are messages that are sent via digital modes exempt from Part 97 third-party rules that apply to other modes of communication?

- A. Under no circumstances
- B. When messages are encrypted
- C. When messages are not encrypted
- D. When under automatic control

G1E11 - On what bands may automatically controlled stations transmitting RTTY or data emissions communicate with other automatically controlled digital stations?

- A. On any band segment where digital operation is permitted
- B. Anywhere in the non-phone segments of the 10-meter or shorter wavelength bands
- C. Only in the non-phone Extra Class segments of the bands
- D. Anywhere in the 6-meter or shorter wavelength bands, and in limited segments of some of the HF bands

G2E03 - What symptoms may result from other signals interfering with a PACTOR or VARA transmission?

- A. Frequent retries or timeouts
- B. Long pauses in message transmission
- C. Failure to establish a connection between stations
- D. All these choices are correct

G2E10 - Which of the following is a way to establish contact with a digital messaging system gateway station?

- A. Send an email to the system control operator
- B. Send QRL in Morse code
- C. Respond when the station broadcasts its SSID
- D. Transmit a connect message on the station's published frequency

G8C06 - What action results from a failure to exchange information due to excessive transmission attempts when using an ARQ mode?

- A. The checksum overflows
- B. The connection is dropped
- C. Packets will be routed incorrectly
- D. Encoding reverts to the default character set

G8C14 - Which of the following describes a waterfall display?

- A. Frequency is horizontal, signal strength is vertical, time is intensity
- B. Frequency is vertical, signal strength is intensity, time is horizontal

- C. Frequency is horizontal, signal strength is intensity, time is vertical
- D. Frequency is vertical, signal strength is horizontal, time is intensity

End of Quiz 5