

Technician Class Question Pool (Element 2 – TEC)  
Effective 2014.07.01 – 2018.06.30

**SUBELEMENT T1 - FCC Rules, descriptions and definitions for the Amateur Radio Service, operator and station license responsibilities - [6 Exam Questions - 6 Groups]**

**T1A - Amateur Radio Service: purpose and permissible use of the Amateur Radio Service; operator/primary station license grant; where FCC rules are codified; basis and purpose of FCC rules; meanings of basic terms used in FCC rules; interference; spectrum management**

Which of the following is a purpose of the Amateur Radio Service as stated in the FCC rules and regulations?

**Advancing skills in the technical and communication phases of the radio art**

Which agency regulates and enforces the rules for the Amateur Radio Service in the United States?

**The FCC**

Which part of the FCC regulations contains the rules governing the Amateur Radio Service?

**Part 97**

Which of the following meets the FCC definition of harmful interference?

**That which seriously degrades, obstructs, or repeatedly interrupts a radio communication service operating in accordance with the Radio Regulations**

Which of the following is a purpose of the Amateur Radio Service rules and regulations as defined by the FCC?

**Enhancing international goodwill**

Which of the following services are protected from interference by amateur signals under all circumstances?

**Radionavigation Service**

What is the FCC Part 97 definition of telemetry?

**A one-way transmission of measurements at a distance from the measuring instrument**

Which of the following entities recommends transmit/receive channels and other parameters for auxiliary and repeater stations?

**Frequency Coordinator**

Who selects a Frequency Coordinator?

**Amateur operators in a local or regional area whose stations are eligible to be auxiliary or repeater stations**

What is the FCC Part 97 definition of an amateur station?

**A station in the Amateur Radio Service consisting of the apparatus necessary for carrying on radio communications**

When is willful interference to other amateur radio stations permitted?

**At no time**

Which of the following is a permissible use of the Amateur Radio Service?

**Allowing a person to conduct radio experiments and to communicate with other licensed hams around the world**

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What is the FCC Part 97 definition of telecommand?

**A one-way transmission to initiate, modify or terminate functions of a device at a distance**

What must you do if you are operating on the 23 cm band and learn that you are interfering with a radiolocation station outside the United States?

**Stop operating or take steps to eliminate the harmful interference**

**T1B - Authorized frequencies: frequency allocations; ITU regions; emission modes; restricted sub-bands; spectrum sharing; transmissions near band edges**

What is the ITU?

**A United Nations agency for information and communication technology issues**

Why are the frequency assignments for some U.S. Territories different from those in the 50 U.S. States?

**Some U. S. Territories are located in ITU regions other than region 2**

Which frequency is within the 6 meter band?

**52.525 MHz**

Which amateur band are you using when your station is transmitting on 146.52 MHz?

**2 meter band**

Which 70 cm frequency is authorized to a Technician Class license holder operating in ITU Region 2?

**443.350 MHz**

Which 23 cm frequency is authorized to a Technician Class licensee?

**1296 MHz**

What amateur band are you using if you are transmitting on 223.50 MHz?

**1.25 meter band**

Which of the following is a result of the fact that the amateur service is secondary in some portions of the 70 cm band?

**U.S. amateurs may find non-amateur stations in the bands, and must avoid interfering with them**

Why should you not set your transmit frequency to be exactly at the edge of an amateur band or sub-band?

- To allow for calibration error in the transmitter frequency display
- So that modulation sidebands do not extend beyond the band edge
- To allow for transmitter frequency drift
- **All of these choices are correct**

Which of the bands above 30 MHz that are available to Technician Class operators have mode-restricted sub-bands?

**The 6 meter, 2 meter, and 1.25 meter bands**

What emission modes are permitted in the mode-restricted sub-bands at 50.0 to 50.1 MHz and 144.0 to 144.1 MHz?

**CW only**

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Why are frequency assignments for U.S. stations operating maritime mobile not the same everywhere in the world?

**Amateur frequency assignments can vary among the three ITU regions**

Which emission may be used between 219 and 220 MHz?

**Data**

**T1C - Operator licensing: operator classes; sequential, special event, and vanity call sign systems; international communications; reciprocal operation; station license and licensee; places where the amateur service is regulated by the FCC; name and address on FCC license database; license term; renewal; grace period**

Which type of call sign has a single letter in both its prefix and suffix?

**Special event**

Which of the following is a valid US amateur radio station call sign?

**W3ABC**

What types of international communications are permitted by an FCC-licensed amateur station?

**Communications incidental to the purposes of the amateur service and remarks of a personal character**

When are you allowed to operate your amateur station in a foreign country?

**When the foreign country authorizes it**

Which of the following is a vanity call sign which a technician class amateur operator might select if available?

**K1XXX**

From which of the following locations may an FCC-licensed amateur station transmit, in addition to places where the FCC regulates communications?

**From any vessel or craft located in international waters and documented or registered in the United States**

What may result when correspondence from the FCC is returned as undeliverable because the grantee failed to provide the correct mailing address?

**Revocation of the station license or suspension of the operator license**

What is the normal term for an FCC-issued primary station/operator amateur radio license grant?

**Ten years**

What is the grace period following the expiration of an amateur license within which the license may be renewed?

**Two years**

How soon after passing the examination for your first amateur radio license may you operate a transmitter on an amateur service frequency?

**As soon as your operator/station license grant appears in the FCC's license database**

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If your license has expired and is still within the allowable grace period, may you continue to operate a transmitter on amateur service frequencies?

**No, transmitting is not allowed until the FCC license database shows that the license has been renewed**

Who may select a desired call sign under the vanity call sign rules?

**Any licensed amateur**

For which licenses classes are new licenses currently available from the FCC?

**Technician, General, Amateur Extra**

Who may select a vanity call sign for a club station?

**Only the person named as trustee on the club station license grant**

**T1D - Authorized and prohibited transmission: communications with other countries; music; exchange of information with other services; indecent language; compensation for use of station; retransmission of other amateur signals; codes and ciphers; sale of equipment; unidentified transmissions; broadcasting**

With which countries are FCC-licensed amateur stations prohibited from exchanging communications?

**Any country whose administration has notified the ITU that it objects to such communications**

On which of the following occasions may an FCC-licensed amateur station exchange messages with a U.S. military station?

**During an Armed Forces Day Communications Test**

When is the transmission of codes or ciphers that hide the meaning of a message allowed by an amateur station?

**Only when transmitting control commands to space stations or radio control craft**

What is the only time an amateur station is authorized to transmit music?

**When incidental to an authorized retransmission of manned spacecraft communications**

When may amateur radio operators use their stations to notify other amateurs of the availability of equipment for sale or trade?

**When the equipment is normally used in an amateur station and such activity is not conducted on a regular basis**

What, if any, are the restrictions concerning transmission of language that may be considered indecent or obscene?

**Any such language is prohibited**

What types of amateur stations can automatically retransmit the signals of other amateur stations?

**Auxiliary, repeater, or space stations**

In which of the following circumstances may the control operator of an amateur station receive compensation for operating the station?

**When the communication is incidental to classroom instruction at an educational institution**

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Under which of the following circumstances are amateur stations authorized to transmit signals related to broadcasting, program production, or news gathering, assuming no other means is available?

**Only where such communications directly relate to the immediate safety of human life or protection of property**

What is the meaning of the term "broadcasting" in the FCC rules for the amateur services?

**Transmissions intended for reception by the general public**

When may an amateur station transmit without identifying?

**When transmitting signals to control a model craft**

Under which of the following circumstances may an amateur radio station engage in broadcasting?

**When transmitting code practice, information bulletins, or transmissions necessary to provide emergency communications**

**T1E - Control operator and control types: control operator required; eligibility; designation of control operator; privileges and duties; control point; local, automatic and remote control; location of control operator**

When is an amateur station permitted to transmit without a control operator?

**Never**

Who may a station licensee designate to be the control operator of an amateur station?

**Only a person for whom an amateur operator/primary station license grant appears in the FCC database or who is authorized for alien reciprocal operation**

Who must designate the station control operator?

**The station licensee**

What determines the transmitting privileges of an amateur station?

**The class of operator license held by the control operator**

What is an amateur station control point?

**The location at which the control operator function is performed**

Under what type of control do APRS network digipeaters operate?

**Automatic**

When the control operator is not the station licensee, who is responsible for the proper operation of the station?

**The control operator and the station licensee are equally responsible**

Which of the following is an example of automatic control?

**Repeater operation**

What type of control is being used when the control operator is at the control point?

**Local control**

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Which of the following is an example of remote control as defined in Part 97?

**Operating the station over the Internet**

Who does the FCC presume to be the control operator of an amateur station, unless documentation to the contrary is in the station records?

**The station licensee**

When, under normal circumstances, may a Technician Class licensee be the control operator of a station operating in an exclusive Extra Class operator segment of the amateur bands?

**At no time**

**T1F - Station identification; repeaters; third party communications; club stations; FCC inspection**

What type of identification is being used when identifying a station on the air as Race Headquarters?

**Tactical call sign**

When using tactical identifiers such as "Race Headquarters" during a community service net operation, how often must your station transmit the station's FCC-assigned call sign?

**At the end of each communication and every ten minutes during a communication**

When is an amateur station required to transmit its assigned call sign?

**At least every 10 minutes during and at the end of a communication**

Which of the following is an acceptable language to use for station identification when operating in a phone sub-band?

**The English language**

What method of call sign identification is required for a station transmitting phone signals?

**Send the call sign using CW or phone emission**

Which of the following formats of a self-assigned indicator is acceptable when identifying using a phone transmission?

- KL7CC stroke W3
- KL7CC slant W3
- KL7CC slash W3
- **All of these choices are correct**

Which of the following restrictions apply when a non-licensed person is allowed to speak to a foreign station using a station under the control of a Technician Class control operator?

**The foreign station must be one with which the U.S. has a third party agreement**

Which indicator is required by the FCC to be transmitted after a station call sign?

**/KT, /AE or /AG when using new license privileges earned by CSCE while waiting for an upgrade to a previously issued license to appear in the FCC license database**

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What type of amateur station simultaneously retransmits the signal of another amateur station on a different channel or channels?

**Repeater station**

Who is accountable should a repeater inadvertently retransmit communications that violate the FCC rules?

**The control operator of the originating station**

To which foreign stations do the FCC rules authorize the transmission of non-emergency third party communications?

**Any station whose government permits such communications**

How many persons are required to be members of a club for a club station license to be issued by the FCC?

**At least 4**

When must the station licensee make the station and its records available for FCC inspection?

**At any time upon request by an FCC representative**

**SUBELEMENT T2 - Operating Procedures [3 Exam Questions - 3 Groups]**

**T2A - Station operation: choosing an operating frequency; calling another station; test transmissions; procedural signs; use of minimum power; choosing an operating frequency; band plans; calling frequencies; repeater offsets**

What is the most common repeater frequency offset in the 2 meter band?

**Plus or minus 600 kHz**

What is the national calling frequency for FM simplex operations in the 70 cm band?

**446.000 MHz**

What is a common repeater frequency offset in the 70 cm band?

**Plus or minus 5 MHz**

What is an appropriate way to call another station on a repeater if you know the other station's call sign?

**Say the station's call sign then identify with your call sign**

How should you respond to a station calling CQ?

**Transmit the other station's call sign followed by your call sign**

What must an amateur operator do when making on-air transmissions to test equipment or antennas?

**Properly identify the transmitting station**

Which of the following is true when making a test transmission?

**Station identification is required at least every ten minutes during the test and at the end of the test**

What is the meaning of the procedural signal "CQ"?

**Calling any station**

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What brief statement is often transmitted in place of "CQ" to indicate that you are listening on a repeater?

**Your call sign**

What is a band plan, beyond the privileges established by the FCC?

**A voluntary guideline for using different modes or activities within an amateur band**

Which of the following is an FCC rule regarding power levels used in the amateur bands, under normal, non-distress circumstances?

**While not exceeding the maximum power permitted on a given band, use the minimum power necessary to carry out the desired communication**

Which of the following is a guideline to use when choosing an operating frequency for calling CQ?

- Listen first to be sure that no one else is using the frequency
- Ask if the frequency is in use
- Make sure you are in your assigned band
- **All of these choices are correct**

**T2B – VHF/UHF operating practices: SSB phone; FM repeater; simplex; splits and shifts; CTCSS; DTMF; tone squelch; carrier squelch; phonetics; operational problem resolution; Q signals**

What is the term used to describe an amateur station that is transmitting and receiving on the same frequency?

**Simplex communication**

What is the term used to describe the use of a sub-audible tone transmitted with normal voice audio to open the squelch of a receiver?

**CTCSS**

Which of the following describes the muting of receiver audio controlled solely by the presence or absence of an RF signal?

**Carrier squelch**

Which of the following common problems might cause you to be able to hear but not access a repeater even when transmitting with the proper offset?

- The repeater receiver may require an audio tone burst for access
- The repeater receiver may require a CTCSS tone for access
- The repeater receiver may require a DCS tone sequence for access
- **All of these choices are correct**

What determines the amount of deviation of an FM (as opposed to PM) signal?

**The amplitude of the modulating signal**

What happens when the deviation of an FM transmitter is increased?

**Its signal occupies more bandwidth**

What could cause your FM signal to interfere with stations on nearby frequencies?

**Microphone gain too high, causing over-deviation**



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Which of the following applies when two stations transmitting on the same frequency interfere with each other?

**Common courtesy should prevail, but no one has absolute right to an amateur frequency**

Which of the following methods is encouraged by the FCC when identifying your station when using phone?

**Use of a phonetic alphabet**

Which Q signal indicates that you are receiving interference from other stations?

**QRM**

Which Q signal indicates that you are changing frequency?

**QSY**

Under what circumstances should you consider communicating via simplex rather than a repeater?

**When the stations can communicate directly without using a repeater**

Which of the following is true of the use of SSB phone in amateur bands above 50 MHz?

**It is permitted in at least some portion of all the amateur bands above 50 MHz**

**T2C – Public service: emergency and non-emergency operations; applicability of FCC rules; RACES and ARES; net and traffic procedures; emergency restrictions**

When do the FCC rules NOT apply to the operation of an amateur station?

**Never, FCC rules always apply**

What is one way to recharge a 12-volt lead-acid station battery if the commercial power is out?

**Connect the battery in parallel with a vehicle's battery and run the engine**

What should be done to insure that voice message traffic containing proper names and unusual words are copied correctly by the receiving station?

**Such words and terms should be spelled out using a standard phonetic alphabet**

What do RACES and ARES have in common?

**Both organizations may provide communications during emergencies**

Which of the following describes the Radio Amateur Civil Emergency Service (RACES)?

- A radio service using amateur frequencies for emergency management or civil defense communications
- A radio service using amateur stations for emergency management or civil defense communications
- An emergency service using amateur operators certified by a civil defense organization as being enrolled in that organization
- **All of these choices are correct**

Which of the following is an accepted practice to get the immediate attention of a net control station when reporting an emergency?

**Begin your transmission by saying "Priority" or "Emergency" followed by your call sign**

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Which of the following is an accepted practice for an amateur operator who has checked into an emergency traffic net?

**Remain on frequency without transmitting until asked to do so by the net control station**

Which of the following is a characteristic of good emergency traffic handling?

**Passing messages exactly as received**

Are amateur station control operators ever permitted to operate outside the frequency privileges of their license class?

**Yes, but only if necessary in situations involving the immediate safety of human life or protection of property**

What is the preamble in a formal traffic message?

**The information needed to track the message as it passes through the amateur radio traffic handling system**

What is meant by the term "check" in reference to a formal traffic message?

**The check is a count of the number of words or word equivalents in the text portion of the message**

What is the Amateur Radio Emergency Service (ARES)?

**Licensed amateurs who have voluntarily registered their qualifications and equipment for communications duty in the public service**

**SUBELEMENT T3 - Radio wave characteristics: properties of radio waves; propagation modes - [3 Exam Questions - 3 Groups]**

**T3A - Radio wave characteristics: how a radio signal travels; fading; multipath; wavelength vs. penetration; antenna orientation**

What should you do if another operator reports that your station's 2 meter signals were strong just a moment ago, but now they are weak or distorted?

**Try moving a few feet or changing the direction of your antenna if possible, as reflections may be causing multi-path distortion**

Why are UHF signals often more effective from inside buildings than VHF signals?

**The shorter wavelength allows them to more easily penetrate the structure of buildings**

What antenna polarization is normally used for long-distance weak-signal CW and SSB contacts using the VHF and UHF bands?

**Horizontal**

What can happen if the antennas at opposite ends of a VHF or UHF line of sight radio link are not using the same polarization?

**Signals could be significantly weaker**

When using a directional antenna, how might your station be able to access a distant repeater if buildings or obstructions are blocking the direct line of sight path?

**Try to find a path that reflects signals to the repeater**

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What term is commonly used to describe the rapid fluttering sound sometimes heard from mobile stations that are moving while transmitting?

**Picket fencing**

What type of wave carries radio signals between transmitting and receiving stations?

**Electromagnetic**

Which of the following is a likely cause of irregular fading of signals received by ionospheric reflection?

**Random combining of signals arriving via different paths**

Which of the following results from the fact that skip signals refracted from the ionosphere are elliptically polarized?

**Either vertically or horizontally polarized antennas may be used for transmission or reception**

What may occur if data signals propagate over multiple paths?

**Error rates are likely to increase**

Which part of the atmosphere enables the propagation of radio signals around the world?

**The ionosphere**

**T3B - Radio and electromagnetic wave properties: the electromagnetic spectrum; wavelength vs. frequency; velocity of electromagnetic waves; calculating wavelength**

What is the name for the distance a radio wave travels during one complete cycle?

**Wavelength**

What property of a radio wave is used to describe its polarization?

**The orientation of the electric field**

T3B03 (C)

What are the two components of a radio wave?

**Electric and magnetic fields**

How fast does a radio wave travel through free space?

**At the speed of light**

How does the wavelength of a radio wave relate to its frequency?

**The wavelength gets shorter as the frequency increases**

What is the formula for converting frequency to approximate wavelength in meters?

**Wavelength in meters equals 300 divided by frequency in megahertz**

What property of radio waves is often used to identify the different frequency bands?

**The approximate wavelength**

What are the frequency limits of the VHF spectrum?

**30 to 300 MHz**

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What are the frequency limits of the UHF spectrum?

**300 to 3000 MHz**

What frequency range is referred to as HF?

**3 to 30 MHz**

What is the approximate velocity of a radio wave as it travels through free space?

**300,000,000 meters per second**

**T3C - Propagation modes: line of sight; sporadic E; meteor and auroral scatter and reflections; tropospheric ducting; F layer skip; radio horizon**

Why are direct (not via a repeater) UHF signals rarely heard from stations outside your local coverage area?

**UHF signals are usually not reflected by the ionosphere**

Which of the following might be happening when VHF signals are being received from long distances?

**Signals are being refracted from a sporadic E layer**

What is a characteristic of VHF signals received via auroral reflection?

**The signals exhibit rapid fluctuations of strength and often sound distorted**

Which of the following propagation types is most commonly associated with occasional strong over-the-horizon signals on the 10, 6, and 2 meter bands?

**Sporadic E**

Which of the following effects might cause radio signals to be heard despite obstructions between the transmitting and receiving stations?

**Knife-edge diffraction**

What mode is responsible for allowing over-the-horizon VHF and UHF communications to ranges of approximately 300 miles on a regular basis?

**Tropospheric scatter**

What band is best suited for communicating via meteor scatter?

**6 meters**

What causes tropospheric ducting?

**Temperature inversions in the atmosphere**

What is generally the best time for long-distance 10 meter band propagation via the F layer?

**From dawn to shortly after sunset during periods of high sunspot activity**

What is the radio horizon?

**The distance over which two stations can communicate by direct path**

Why do VHF and UHF radio signals usually travel somewhat farther than the visual line of sight distance between two stations?

**The Earth seems less curved to radio waves than to light**

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Which of the following bands may provide long distance communications during the peak of the sunspot cycle?

**Six or ten meters**

**SUBELEMENT T4 - Amateur radio practices and station set up - [2 Exam Questions - 2 Groups]**

**T4A - Station setup: connecting microphones; reducing unwanted emissions; power source; connecting a computer; RF grounding; connecting digital equipment; connecting an SWR meter**

Which of the following is true concerning the microphone connectors on amateur transceivers?

**Some connectors include push-to-talk and voltages for powering the microphone**

How might a computer be used as part of an amateur radio station?

- For logging contacts and contact information
- For sending and/or receiving CW
- For generating and decoding digital signals
- **All of these choices are correct**

Which is a good reason to use a regulated power supply for communications equipment?

**It prevents voltage fluctuations from reaching sensitive circuits**

Where must a filter be installed to reduce harmonic emissions from your station?

**Between the transmitter and the antenna**

Where should an in-line SWR meter be connected to monitor the standing wave ratio of the station antenna system?

**In series with the feed line, between the transmitter and antenna**

Which of the following would be connected between a transceiver and computer in a packet radio station?

**Terminal node controller**

How is a computer's sound card used when conducting digital communications using a computer?

**The sound card provides audio to the microphone input and converts received audio to digital form**

Which type of conductor is best to use for RF grounding?

**Flat strap**

Which of the following could you use to cure distorted audio caused by RF current flowing on the shield of a microphone cable?

**Ferrite choke**

What is the source of a high-pitched whine that varies with engine speed in a mobile transceiver's receive audio?

**The alternator**

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Where should the negative return connection of a mobile transceiver's power cable be connected?

**At the battery or engine block ground strap**

What could be happening if another operator reports a variable high-pitched whine on the audio from your mobile transmitter?

**Noise on the vehicle's electrical system is being transmitted along with your speech audio**

**T4B - Operating controls: tuning; use of filters; squelch function; AGC; repeater offset; memory channels**

What may happen if a transmitter is operated with the microphone gain set too high?

**The output signal might become distorted**

Which of the following can be used to enter the operating frequency on a modern transceiver?

**The keypad or VFO knob**

What is the purpose of the squelch control on a transceiver?

**To mute receiver output noise when no signal is being received**

What is a way to enable quick access to a favorite frequency on your transceiver?

**Store the frequency in a memory channel**

Which of the following would reduce ignition interference to a receiver?

**Turn on the noise blanker**

Which of the following controls could be used if the voice pitch of a single-sideband signal seems too high or low?

**The receiver RIT or clarifier**

What does the term "RIT" mean?

**Receiver Incremental Tuning**

What is the advantage of having multiple receive bandwidth choices on a multimode transceiver?

**Permits noise or interference reduction by selecting a bandwidth matching the mode**

Which of the following is an appropriate receive filter bandwidth to select in order to minimize noise and interference for SSB reception?

**2400 Hz**

Which of the following is an appropriate receive filter bandwidth to select in order to minimize noise and interference for CW reception?

**500 Hz**

Which of the following describes the common meaning of the term "repeater offset"?

**The difference between the repeater's transmit and receive frequencies**

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What is the function of automatic gain control or AGC?

**To keep received audio relatively constant**

**SUBELEMENT T5 – Electrical principles: math for electronics; electronic principles; Ohm's Law – [4 Exam Questions – 4 Groups]**

**T5A – Electrical principles, units, and terms: current and voltage; conductors and insulators; alternating and direct current**

Electrical current is measured in which of the following units?

**Amperes**

Electrical power is measured in which of the following units?

**Watts**

What is the name for the flow of electrons in an electric circuit?

**Current**

What is the name for a current that flows only in one direction?

**Direct current**

What is the electrical term for the electromotive force (EMF) that causes electron flow?

**Voltage**

How much voltage does a mobile transceiver usually require?

**About 12 volts**

Which of the following is a good electrical conductor?

**Copper**

Which of the following is a good electrical insulator?

**Glass**

What is the name for a current that reverses direction on a regular basis?

**Alternating current**

Which term describes the rate at which electrical energy is used?

**Power**

What is the basic unit of electromotive force?

**The volt**

What term describes the number of times per second that an alternating current reverses direction?

**Frequency**

**T5B – Math for electronics: conversion of electrical units; decibels; the metric system**

How many milliamperes is 1.5 amperes?

**1,500 milliamperes**

What is another way to specify a radio signal frequency of 1,500,000 hertz?

**1500 kHz**

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How many volts are equal to one kilovolt?

**One thousand volts**

How many volts are equal to one microvolt?

**One one-millionth of a volt**

Which of the following is equivalent to 500 milliwatts?

**0.5 watts**

If an ammeter calibrated in amperes is used to measure a 3000-milliampere current, what reading would it show?

**3 amperes**

If a frequency readout calibrated in megahertz shows a reading of 3.525 MHz, what would it show if it were calibrated in kilohertz?

**3525 kHz**

How many microfarads are 1,000,000 picofarads?

**1 microfarad**

What is the approximate amount of change, measured in decibels (dB), of a power increase from 5 watts to 10 watts?

**3 dB**

What is the approximate amount of change, measured in decibels (dB), of a power decrease from 12 watts to 3 watts?

**-6 dB**

What is the approximate amount of change, measured in decibels (dB), of a power increase from 20 watts to 200 watts?

**10 dB**

Which of the following frequencies is equal to 28,400 kHz?

**28.400 MHz**

If a frequency readout shows a reading of 2425 MHz, what frequency is that in GHz?

**2.425 GHz**

**T5C - Electronic principles: capacitance; inductance; current flow in circuits; alternating current; definition of RF; DC power calculations; impedance**

What is the ability to store energy in an electric field called?

**Capacitance**

What is the basic unit of capacitance?

**The farad**

What is the ability to store energy in a magnetic field called?

**Inductance**

What is the basic unit of inductance?

**The henry**



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What is the unit of frequency?

**Hertz**

What does the abbreviation "RF" refer to?

**Radio frequency signals of all types**

What is a usual name for electromagnetic waves that travel through space?

**Radio waves**

What is the formula used to calculate electrical power in a DC circuit?

**Power (P) equals voltage (E) multiplied by current (I)**

How much power is being used in a circuit when the applied voltage is 13.8 volts DC and the current is 10 amperes?

**138 watts**

How much power is being used in a circuit when the applied voltage is 12 volts DC and the current is 2.5 amperes?

**30 watts**

How many amperes are flowing in a circuit when the applied voltage is 12 volts DC and the load is 120 watts?

**10 amperes**

What is meant by the term impedance?

**It is a measure of the opposition to AC current flow in a circuit**

What are the units of impedance?

**Ohms**

**T5D – Ohm's Law: formulas and usage**

What formula is used to calculate current in a circuit?

**Current (I) equals voltage (E) divided by resistance (R)**

What formula is used to calculate voltage in a circuit?

**Voltage (E) equals current (I) multiplied by resistance (R)**

What formula is used to calculate resistance in a circuit?

**Resistance (R) equals voltage (E) divided by current (I)**

What is the resistance of a circuit in which a current of 3 amperes flows through a resistor connected to 90 volts?

**30 ohms**

What is the resistance in a circuit for which the applied voltage is 12 volts and the current flow is 1.5 amperes?

**8 ohms**

What is the resistance of a circuit that draws 4 amperes from a 12-volt source?

**3 ohms**

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What is the current flow in a circuit with an applied voltage of 120 volts and a resistance of 80 ohms?

**1.5 amperes**

What is the current flowing through a 100-ohm resistor connected across 200 volts?

**2 amperes**

What is the current flowing through a 24-ohm resistor connected across 240 volts?

**10 amperes**

What is the voltage across a 2-ohm resistor if a current of 0.5 amperes flows through it?

**1 volt**

What is the voltage across a 10-ohm resistor if a current of 1 ampere flows through it?

**10 volts**

What is the voltage across a 10-ohm resistor if a current of 2 amperes flows through it?

**20 volts**

**SUBELEMENT T6 – Electrical components: semiconductors; circuit diagrams; component functions – [4 Exam Questions – 4 Groups]**

**T6A – Electrical components: fixed and variable resistors; capacitors and inductors; fuses; switches; batteries**

What electrical component is used to oppose the flow of current in a DC circuit?

**Resistor**

What type of component is often used as an adjustable volume control?

**Potentiometer**

What electrical parameter is controlled by a potentiometer?

**Resistance**

What electrical component stores energy in an electric field?

**Capacitor**

What type of electrical component consists of two or more conductive surfaces separated by an insulator?

**Capacitor**

What type of electrical component stores energy in a magnetic field?

**Inductor**

What electrical component is usually composed of a coil of wire?

**Inductor**

What electrical component is used to connect or disconnect electrical circuits?

**Switch**

**Technician Class Question Pool (Element 2 – TEC)  
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What electrical component is used to protect other circuit components from current overloads?

**Fuse**

Which of the following battery types is rechargeable?

- Nickel-metal hydride
- Lithium-ion
- Lead-acid gel-cell
- **All of these choices are correct**

Which of the following battery types is not rechargeable?

**Carbon-zinc**

**T6B – Semiconductors: basic principles and applications of solid state devices; diodes and transistors**

What class of electronic components is capable of using a voltage or current signal to control current flow?

**Transistors**

What electronic component allows current to flow in only one direction?

**Diode**

Which of these components can be used as an electronic switch or amplifier?

**Transistor**

Which of the following components can be made of three layers of semiconductor material?

**Transistor**

Which of the following electronic components can amplify signals?

**Transistor**

How is the cathode lead of a semiconductor diode usually identified?

**With a stripe**

What does the abbreviation LED stand for?

**Light Emitting Diode**

What does the abbreviation FET stand for?

**Field Effect Transistor**

What are the names of the two electrodes of a diode?

**Anode and cathode**

What are the three electrodes of a PNP or NPN transistor?

**Emitter, base, and collector**

What are the three electrodes of a field effect transistor?

**Source, gate, and drain**

What is the term that describes a transistor's ability to amplify a signal?

**Gain**

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**T6C - Circuit diagrams; schematic symbols  
See the last page for figures T1, T2 and T3.**

What is the name for standardized representations of components in an electrical wiring diagram?

**Schematic symbols**

What is component 1 in figure T1?

**Resistor**

What is component 2 in figure T1?

**Transistor**

What is component 3 in figure T1?

**Lamp**

What is component 4 in figure T1?

**Battery**

What is component 6 in figure T2?

**Capacitor**

What is component 8 in figure T2?

**Light emitting diode**

What is component 9 in figure T2?

**Variable resistor**

What is component 4 in figure T2?

**Transformer**

What is component 3 in figure T3?

**Variable inductor**

What is component 4 in figure T3?

**Antenna**

What do the symbols on an electrical circuit schematic diagram represent?

**Electrical components**

Which of the following is accurately represented in electrical circuit schematic diagrams?

**The way components are interconnected**

**T6D - Component functions: rectification; switches; indicators; power supply components; resonant circuit; shielding; power transformers; integrated circuits**

Which of the following devices or circuits changes an alternating current into a varying direct current signal?

**Rectifier**

What best describes a relay?

**A switch controlled by an electromagnet**

**Technician Class Question Pool (Element 2 – TEC)  
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What type of switch is represented by component 3 in figure T2?

**Single-pole single-throw**

Which of the following can be used to display signal strength on a numeric scale?

**Meter**

What type of circuit controls the amount of voltage from a power supply?

**Regulator**

What component is commonly used to change 120V AC house current to a lower AC voltage for other uses?

**Transformer**

Which of the following is commonly used as a visual indicator?

**LED**

Which of the following is used together with an inductor to make a tuned circuit?

**Capacitor**

What is the name of a device that combines several semiconductors and other components into one package?

**Integrated circuit**

What is the function of component 2 in Figure T1?

**Control the flow of current**

**What is a simple resonant or tuned circuit?**

An inductor and a capacitor connected in series or parallel to form a filter

Which of the following is a common reason to use shielded wire?

**To prevent coupling of unwanted signals to or from the wire**

**SUBELEMENT T7 - Station equipment: common transmitter and receiver problems; antenna measurements; troubleshooting; basic repair and testing - [4 Exam Questions - 4 Groups]**

**T7A - Station equipment: receivers; transmitters; transceivers; modulation; transverters; low power and weak signal operation; transmit and receive amplifiers**

Which term describes the ability of a receiver to detect the presence of a signal?

**Sensitivity**

What is a transceiver?

**A unit combining the functions of a transmitter and a receiver**

Which of the following is used to convert a radio signal from one frequency to another?

**Mixer**

**Technician Class Question Pool (Element 2 – TEC)  
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Which term describes the ability of a receiver to discriminate between multiple signals?

**Selectivity**

What is the name of a circuit that generates a signal of a desired frequency?

**Oscillator**

What device takes the output of a low-powered 28 MHz SSB exciter and produces a 222 MHz output signal?

**Transverter**

What is meant by term "PTT"?

**The push to talk function which switches between receive and transmit**

Which of the following describes combining speech with an RF carrier signal?–

**Modulation**

Which of the following devices is most useful for VHF weak-signal communication?

**A multi-mode VHF transceiver**

What device increases the low-power output from a handheld transceiver?

**An RF power amplifier**

Where is an RF preamplifier installed?

**Between the antenna and receiver**

**T7B – Common transmitter and receiver problems: symptoms of overload and overdrive; distortion; causes of interference; interference and consumer electronics; part 15 devices; over and under modulation; RF feedback; off frequency signals; fading and noise; problems with digital communications interfaces**

What can you do if you are told your FM handheld or mobile transceiver is over-deviating?

**Talk farther away from the microphone**

What would cause a broadcast AM or FM radio to receive an amateur radio transmission unintentionally?

**The receiver is unable to reject strong signals outside the AM or FM band**

Which of the following may be a cause of radio frequency interference?

- Fundamental overload
- Harmonics
- Spurious emissions
- **All of these choices are correct**

Which of the following is a way to reduce or eliminate interference by an amateur transmitter to a nearby telephone?

**Put a RF filter on the telephone**

How can overload of a non-amateur radio or TV receiver by an amateur signal be reduced or eliminated?

**Block the amateur signal with a filter at the antenna input of the affected receiver**

**Technician Class Question Pool (Element 2 – TEC)  
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Which of the following actions should you take if a neighbor tells you that your station's transmissions are interfering with their radio or TV reception?  
**Make sure that your station is functioning properly and that it does not cause interference to your own radio or television when it is tuned to the same channel**

Which of the following may be useful in correcting a radio frequency interference problem?

- Snap-on ferrite chokes
- Low-pass and high-pass filters
- Band-reject and band-pass filters
- **All of these choices are correct**

What should you do if something in a neighbor's home is causing harmful interference to your amateur station?

- Work with your neighbor to identify the offending device
- Politely inform your neighbor about the rules that prohibit the use of devices which cause interference
- Check your station and make sure it meets the standards of good amateur practice
- **All of these choices are correct**

What is a Part 15 device?

**An unlicensed device that may emit low powered radio signals on frequencies used by a licensed service**

What might be the problem if you receive a report that your audio signal through the repeater is distorted or unintelligible?

- Your transmitter may be slightly off frequency
- Your batteries may be running low
- You could be in a bad location
- **All of these choices are correct**

What is a symptom of RF feedback in a transmitter or transceiver?

**Reports of garbled, distorted, or unintelligible transmissions**

What might be the first step to resolve cable TV interference from your ham radio transmission?

**Be sure all TV coaxial connectors are installed properly**

T7C - Antenna measurements and troubleshooting: measuring SWR; dummy loads; coaxial cables; feed line failure modes

What is the primary purpose of a dummy load?

**To prevent the radiation of signals when making tests**

Which of the following instruments can be used to determine if an antenna is resonant at the desired operating frequency?

**An antenna analyzer**

What, in general terms, is standing wave ratio (SWR)?

**A measure of how well a load is matched to a transmission line**

**Technician Class Question Pool (Element 2 – TEC)  
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What reading on an SWR meter indicates a perfect impedance match between the antenna and the feed line?

**1 to 1**

What is the approximate SWR value above which the protection circuits in most solid-state transmitters begin to reduce transmitter power?

**2 to 1**

What does an SWR reading of 4:1 indicate?

**Impedance mismatch**

What happens to power lost in a feed line?

**It is converted into heat**

What instrument other than an SWR meter could you use to determine if a feed line and antenna are properly matched?

**Directional wattmeter**

Which of the following is the most common cause for failure of coaxial cables?

**Moisture contamination**

Why should the outer jacket of coaxial cable be resistant to ultraviolet light?

**Ultraviolet light can damage the jacket and allow water to enter the cable**

What is a disadvantage of air core coaxial cable when compared to foam or solid dielectric types?

**It requires special techniques to prevent water absorption**

Which of the following is a common use of coaxial cable?

**Carrying RF signals between a radio and antenna**

What does a dummy load consist of?

**A non-inductive resistor and a heat sink**

**T7D - Basic repair and testing: soldering; using basic test instruments; connecting a voltmeter, ammeter, or ohmmeter**

Which instrument would you use to measure electric potential or electromotive force?

**A voltmeter**

What is the correct way to connect a voltmeter to a circuit?

**In parallel with the circuit**

How is an ammeter usually connected to a circuit?

**In series with the circuit**

Which instrument is used to measure electric current?

**An ammeter**

What instrument is used to measure resistance?

**An ohmmeter**

Which of the following might damage a multimeter?

**Attempting to measure voltage when using the resistance setting**



**Technician Class Question Pool (Element 2 – TEC)  
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Which of the following measurements are commonly made using a multimeter?

**Voltage and resistance**

Which of the following types of solder is best for radio and electronic use?

**Rosin-core solder**

What is the characteristic appearance of a cold solder joint?

**A grainy or dull surface**

What is probably happening when an ohmmeter, connected across an unpowered circuit, initially indicates a low resistance and then shows increasing resistance with time?

**The circuit contains a large capacitor**

Which of the following precautions should be taken when measuring circuit resistance with an ohmmeter?

**Ensure that the circuit is not powered**

Which of the following precautions should be taken when measuring high voltages with a voltmeter?

**Ensure that the voltmeter and leads are rated for use at the voltages to be measured**

**SUBELEMENT T8 – Modulation modes: amateur satellite operation; operating activities; non-voice communications – [4 Exam Questions – 4 Groups]**

**T8A – Modulation modes: bandwidth of various signals; choice of emission type**

Which of the following is a form of amplitude modulation?

**Single sideband**

What type of modulation is most commonly used for VHF packet radio transmissions?

**FM**

Which type of voice mode is most often used for long-distance (weak signal) contacts on the VHF and UHF bands?

**SSB**

Which type of modulation is most commonly used for VHF and UHF voice repeaters?

**FM**

Which of the following types of emission has the narrowest bandwidth?

**CW**

Which sideband is normally used for 10 meter HF, VHF and UHF single-sideband communications?

**Upper sideband**

What is the primary advantage of single sideband over FM for voice transmissions?

**SSB signals have narrower bandwidth**

**Technician Class Question Pool (Element 2 – TEC)  
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What is the approximate bandwidth of a single sideband voice signal?

**3 kHz**

What is the approximate bandwidth of a VHF repeater FM phone signal?

**Between 10 and 15 kHz**

What is the typical bandwidth of analog fast-scan TV transmissions on the 70 cm band?

**About 6 MHz**

What is the approximate maximum bandwidth required to transmit a CW signal?

**150 Hz**

**T8B - Amateur satellite operation; Doppler shift, basic orbits, operating protocols; control operator, transmitter power considerations; satellite tracking; digital modes**

Who may be the control operator of a station communicating through an amateur satellite or space station?

**Any amateur whose license privileges allow them to transmit on the satellite uplink frequency**

How much transmitter power should be used on the uplink frequency of an amateur satellite or space station?

**The minimum amount of power needed to complete the contact**

Which of the following are provided by satellite tracking programs?

Maps showing the real-time position of the satellite track over the earth

- The time, azimuth, and elevation of the start, maximum altitude, and end of a pass
- The apparent frequency of the satellite transmission, including effects of Doppler shift
- **All of these answers are correct**

Which amateur stations may make contact with an amateur station on the International Space Station using 2 meter and 70 cm band amateur radio frequencies?

**Any amateur holding a Technician or higher class license**

What is a satellite beacon?

**A transmission from a space station that contains information about a satellite**

Which of the following are inputs to a satellite tracking program?

**The Keplerian elements**

With regard to satellite communications, what is Doppler shift?

**An observed change in signal frequency caused by relative motion between the satellite and the earth station**

What is meant by the statement that a satellite is operating in mode U/V?

**The satellite uplink is in the 70 cm band and the downlink is in the 2 meter band**

What causes spin fading when referring to satellite signals?

**Rotation of the satellite and its antennas**

**Technician Class Question Pool (Element 2 – TEC)  
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What do the initials LEO tell you about an amateur satellite?

**The satellite is in a Low Earth Orbit**

What is a commonly used method of sending signals to and from a digital satellite?

**FM Packet**

**T8C – Operating activities: radio direction finding; radio control; contests; linking over the Internet; grid locators**

Which of the following methods is used to locate sources of noise interference or jamming?

**Radio direction finding**

Which of these items would be useful for a hidden transmitter hunt?

**A directional antenna**

What popular operating activity involves contacting as many stations as possible during a specified period of time?

**Contesting**

Which of the following is good procedure when contacting another station in a radio contest?

**Send only the minimum information needed for proper identification and the contest exchange**

What is a grid locator?

**A letter-number designator assigned to a geographic location**

How is access to an IRLP node accomplished?

**By using DTMF signals**

What is the maximum power allowed when transmitting telecommand signals to radio controlled models?

**1 watt**

What is required in place of on-air station identification when sending signals to a radio control model using amateur frequencies?

**A label indicating the licensee's name, call sign and address must be affixed to the transmitter**

How might you obtain a list of active nodes that use VoIP?

**From a repeater directory**

How do you select a specific IRLP node when using a portable transceiver?

**Use the keypad to transmit the IRLP node ID**

What name is given to an amateur radio station that is used to connect other amateur stations to the Internet?

**A gateway**

What is meant by Voice Over Internet Protocol (VoIP) as used in amateur radio?

**A method of delivering voice communications over the Internet using digital techniques**

**Technician Class Question Pool (Element 2 – TEC)  
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What is the Internet Radio Linking Project (IRLP)?

**A technique to connect amateur radio systems, such as repeaters, via the Internet using Voice Over Internet Protocol**

**T8D – Non-voice communications: image signals; digital modes; CW; packet; PSK31; APRS; error detection and correction; NTSC**

Which of the following is an example of a digital communications method?

- Packet
- PSK31
- MFSK
- **All of these choices are correct**

What does the term "APRS" mean?

**Automatic Packet Reporting System**

Which of the following devices provides data to the transmitter when sending automatic position reports from a mobile amateur radio station?

**A Global Positioning System receiver**

What type of transmission is indicated by the term NTSC?

**An analog fast scan color TV signal**

Which of the following is an application of APRS (Automatic Packet Reporting System)?

**Providing real time tactical digital communications in conjunction with a map showing the locations of stations**

What does the abbreviation PSK mean?

**Phase Shift Keying**

What is PSK31?

**A low-rate data transmission mode**

Which of the following may be included in packet transmissions?

- A check sum which permits error detection
- A header which contains the call sign of the station to which the information is being sent
- Automatic repeat request in case of error
- **All of these choices are correct**

What code is used when sending CW in the amateur bands?

**International Morse**

Which of the following can be used to transmit CW in the amateur bands?

- Straight Key
- Electronic Keyer
- Computer Keyboard
- **All of these choices are correct**

Technician Class Question Pool (Element 2 – TEC)  
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What is an ARQ transmission system?

**A digital scheme whereby the receiving station detects errors and sends a request to the sending station to retransmit the information**

**SUBELEMENT T9 – Antennas and feed lines – [2 Exam Questions – 2 Groups]**

**T9A – Antennas: vertical and horizontal polarization; concept of gain; common portable and mobile antennas; relationships between antenna length and frequency**

What is a beam antenna?

**An antenna that concentrates signals in one direction**

Which of the following is true regarding vertical antennas?

**The electric field is perpendicular to the Earth**

Which of the following describes a simple dipole mounted so the conductor is parallel to the Earth's surface?

**A horizontally polarized antenna**

What is a disadvantage of the "rubber duck" antenna supplied with most handheld radio transceivers?

**It does not transmit or receive as effectively as a full-sized antenna**

How would you change a dipole antenna to make it resonant on a higher frequency?

**Shorten it**

What type of antennas are the quad, Yagi, and dish?

**Directional antennas**

What is a good reason not to use a "rubber duck" antenna inside your car?

**Signals can be significantly weaker than when it is outside of the vehicle**

What is the approximate length, in inches, of a quarter-wavelength vertical antenna for 146 MHz?

**19**

What is the approximate length, in inches, of a 6 meter 1/2-wavelength wire dipole antenna?

**112**

In which direction is the radiation strongest from a half-wave dipole antenna in free space?

**Broadside to the antenna**

What is meant by the gain of an antenna?

**The increase in signal strength in a specified direction when compared to a reference antenna**

What is a reason to use a properly mounted 5/8 wavelength antenna for VHF or UHF mobile service?

**It offers a lower angle of radiation and more gain than a 1/4 wavelength antenna and usually provides improved coverage**

**Technician Class Question Pool (Element 2 – TEC)  
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Why are VHF or UHF mobile antennas often mounted in the center of the vehicle roof?

**A roof mounted antenna normally provides the most uniform radiation pattern**

Which of the following terms describes a type of loading when referring to an antenna?

**Inserting an inductor in the radiating portion of the antenna to make it electrically longer**

**T9B – Feed lines: types of feed lines; attenuation vs. frequency; SWR concepts; matching; weather protection; choosing RF connectors and feed lines**

Why is it important to have a low SWR in an antenna system that uses coaxial cable feed line?

**To allow the efficient transfer of power and reduce losses**

What is the impedance of the most commonly used coaxial cable in typical amateur radio installations?

**50 ohms**

Why is coaxial cable used more often than any other feed line for amateur radio antenna systems?

**It is easy to use and requires few special installation considerations**

What does an antenna tuner do?

**It matches the antenna system impedance to the transceiver's output impedance**

What generally happens as the frequency of a signal passing through coaxial cable is increased?

**The loss increases**

Which of the following connectors is most suitable for frequencies above 400 MHz?

**A Type N connector**

Which of the following is true of PL-259 type coax connectors?

**They are commonly used at HF frequencies**

Why should coax connectors exposed to the weather be sealed against water intrusion?

**To prevent an increase in feed line loss**

What might cause erratic changes in SWR readings?

**A loose connection in an antenna or a feed line**

What electrical difference exists between the smaller RG-58 and larger RG-8 coaxial cables?

**RG-8 cable has less loss at a given frequency**

Which of the following types of feed line has the lowest loss at VHF and UHF?

**Air-insulated hard line**

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**SUBELEMENT T0 – Electrical safety: AC and DC power circuits; antenna installation; RF hazards – [3 Exam Questions – 3 Groups]**

**T0A – Power circuits and hazards: hazardous voltages; fuses and circuit breakers; grounding; lightning protection; battery safety; electrical code compliance**

Which of the following is a safety hazard of a 12-volt storage battery?  
**Shorting the terminals can cause burns, fire, or an explosion**

How does current flowing through the body cause a health hazard?

- By heating tissue
- It disrupts the electrical functions of cells
- It causes involuntary muscle contractions
- **All of these choices are correct**

What is connected to the green wire in a three-wire electrical AC plug?  
**Safety ground**

What is the purpose of a fuse in an electrical circuit?  
**To interrupt power in case of overload**

Why is it unwise to install a 20-ampere fuse in the place of a 5-ampere fuse?  
**Excessive current could cause a fire**

What is a good way to guard against electrical shock at your station?

- Use three-wire cords and plugs for all AC powered equipment
- Connect all AC powered station equipment to a common safety ground
- Use a circuit protected by a ground-fault interrupter
- **All of these choices are correct**

Which of these precautions should be taken when installing devices for lightning protection in a coaxial cable feed line?  
**Ground all of the protectors to a common plate which is in turn connected to an external ground**

What safety equipment should always be included in home-built equipment that is powered from 120V AC power circuits?  
**A fuse or circuit breaker in series with the AC hot conductor**

What kind of hazard is presented by a conventional 12-volt storage battery?  
**Explosive gas can collect if not properly vented**

What can happen if a lead-acid storage battery is charged or discharged too quickly?  
**The battery could overheat and give off flammable gas or explode**

What kind of hazard might exist in a power supply when it is turned off and disconnected?  
**You might receive an electric shock from the charged stored in large capacitors**

**Technician Class Question Pool (Element 2 – TEC)  
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**T0B – Antenna safety: tower safety; erecting an antenna support; overhead power lines; installing an antenna**

When should members of a tower work team wear a hard hat and safety glasses?  
**At all times when any work is being done on the tower**

What is a good precaution to observe before climbing an antenna tower?  
**Put on a climbing harness and safety glasses**

Under what circumstances is it safe to climb a tower without a helper or observer?  
**Never**

Which of the following is an important safety precaution to observe when putting up an antenna tower?  
**Look for and stay clear of any overhead electrical wires**

What is the purpose of a gin pole?  
**To lift tower sections or antennas**

What is the minimum safe distance from a power line to allow when installing an antenna?  
**So that if the antenna falls unexpectedly, no part of it can come closer than 10 feet to the power wires**

Which of the following is an important safety rule to remember when using a crank-up tower?  
**This type of tower must never be climbed unless it is in the fully retracted position**

What is considered to be a proper grounding method for a tower?  
**Separate eight-foot long ground rods for each tower leg, bonded to the tower and each other**

Why should you avoid attaching an antenna to a utility pole?  
**The antenna could contact high-voltage power wires**

Which of the following is true concerning grounding conductors used for lightning protection?  
**Sharp bends must be avoided**

Which of the following establishes grounding requirements for an amateur radio tower or antenna?  
**Local electrical codes**

Which of the following is good practice when installing ground wires on a tower for lightning protection?  
**Ensure that connections are short and direct**

**T0C – RF hazards: radiation exposure; proximity to antennas; recognized safe power levels; exposure to others; radiation types; duty cycle**

What type of radiation are VHF and UHF radio signals?  
**Non-ionizing radiation**



**Technician Class Question Pool (Element 2 – TEC)**  
**Effective 2014.07.01 – 2018.06.30**

Which of the following frequencies has the lowest value for Maximum Permissible Exposure limit?

**50 MHz**

What is the maximum power level that an amateur radio station may use at VHF frequencies before an RF exposure evaluation is required?

**50 watts PEP at the antenna**

What factors affect the RF exposure of people near an amateur station antenna?

- Frequency and power level of the RF field
- Distance from the antenna to a person
- Radiation pattern of the antenna
- **All of these choices are correct**

Why do exposure limits vary with frequency?

**The human body absorbs more RF energy at some frequencies than at others**

Which of the following is an acceptable method to determine that your station complies with FCC RF exposure regulations?

- By calculation based on FCC OET Bulletin 65
- By calculation based on computer modeling
- By measurement of field strength using calibrated equipment
- **All of these choices are correct**

What could happen if a person accidentally touched your antenna while you were transmitting?

**They might receive a painful RF burn**

Which of the following actions might amateur operators take to prevent exposure to RF radiation in excess of FCC-supplied limits?

**Relocate antennas**

How can you make sure your station stays in compliance with RF safety regulations?

**By re-evaluating the station whenever an item of equipment is changed**

Why is duty cycle one of the factors used to determine safe RF radiation exposure levels?

**It affects the average exposure of people to radiation**

What is the definition of duty cycle during the averaging time for RF exposure?

**The percentage of time that a transmitter is transmitting**

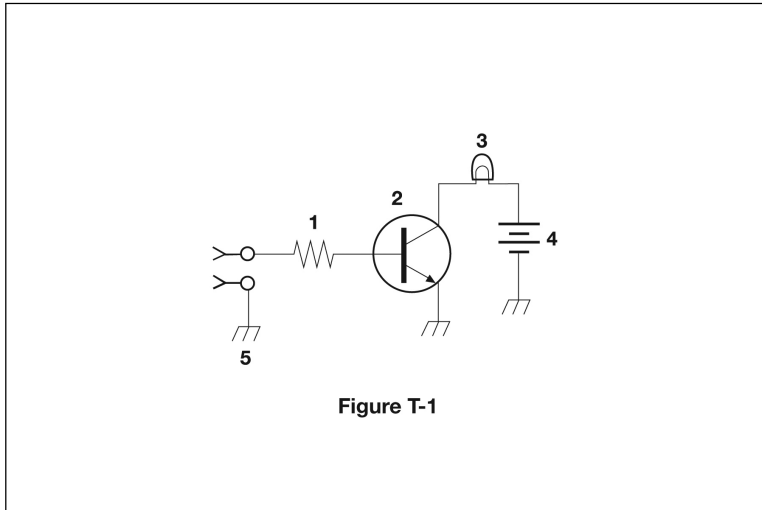
How does RF radiation differ from ionizing radiation (radioactivity)?

**A. RF radiation does not have sufficient energy to cause genetic damage**

If the averaging time for exposure is 6 minutes, how much power density is permitted if the signal is present for 3 minutes and absent for 3 minutes rather than being present for the entire 6 minutes?

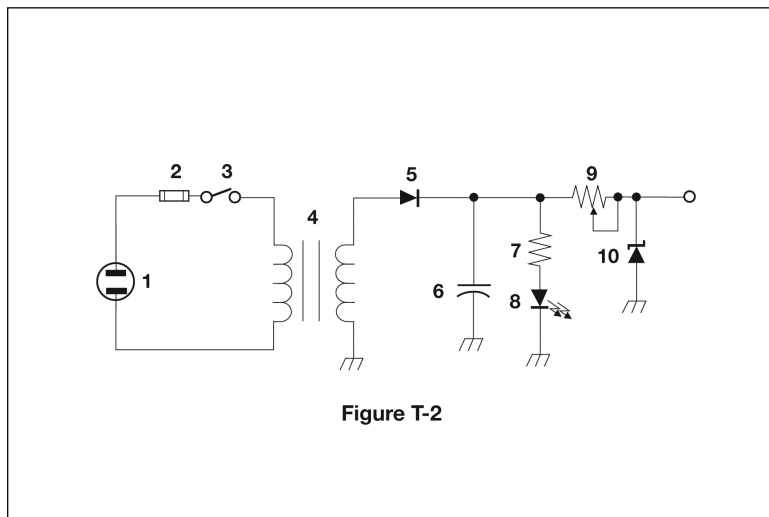
**2 times as much**

Technician Class Question Pool (Element 2 – TEC)  
Effective 2014.07.01 – 2018.06.30



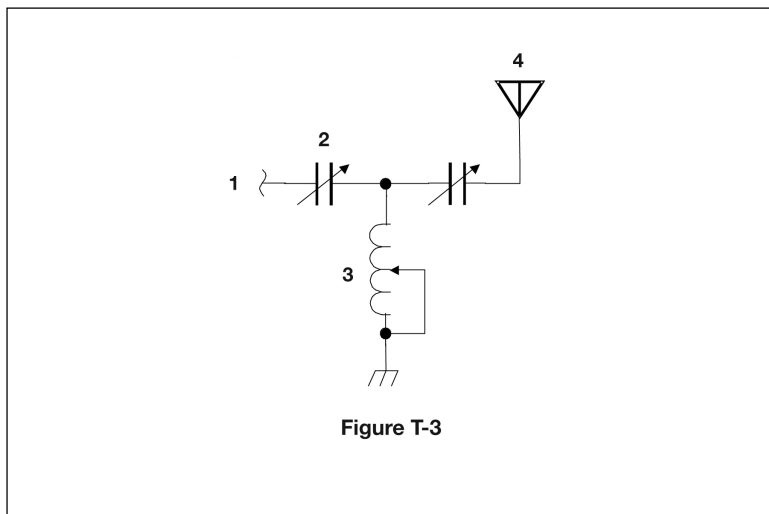
What are Electrical Components  
1, 2, 3 and 4?

- 1 = Resistor
- 2 = Transistor
- 3 = Lamp (light bulb)
- 4 = Battery



What are Electrical Components  
4, 6, 8, and 9?

- 4 = Transformer
- 6 = Capacitor (stripe = cathode)
- 8 = Light Emitting Diode (LED)
- 9 = Variable Resistor



What are Electrical Components  
3 and 4?

- 3 = Variable Inductor
- 4 = Antenna