

TECHNICIAN CLASS STUDY GUIDE

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Class Overview Schedule

8:30 – 8:40 Introduction
8:40 – 9:30 Sub Elements 1 & 2
9:30 – 10:00 Practice Test 1
10:00 – 10:15 BREAK
10:15 – 11:30 Sub Elements 3,4 & 5
11:30 – 12:00 Practice Test 2
12:00 – 1:00 LUNCH
1:00 – 2:00 Sub Elements 6, 7 & 8
2:00 – 2:30 Practice Test 3
2:30 – 2:45 BREAK
2:45 – 3:45 Sub Elements 9 & 10
3:45 – 4:15 Practice Test 4
4:15 – 4:30 Course wrap up
4:30 – 5:00 Test Registration
5:00 Test Begins

Teach to the test vs learn in-depth

Practice Tests
Repeating and Memorize
Emergency Communicator vs hobby
Very few formulas to learn; Many repeating types of questions

Multiple Choice Test Taking Strategies for the Technician Test

1. Always answer all questions. There is no penalty for guessing so take an educated guess.
2. Take your time to do your best work because this test is not timed.
3. Read the question slowly before you look at the answer so you don't "misread" the question.
4. Read the question carefully looking for key words in both the question and possible answers.
5. After reading the question try to up with the answer in your head before looking at the possible answers, this way the choices given on the test won't throw you off or trick you.
6. Read all the choices before choosing your answer. Sometimes the correct response may be in a different position than it was on your practice test, i.e. correct answer moved from "A" to "D"
7. Use the process of elimination to remove any possible answers that are clearly incorrect to narrow down the possible correct responses for you to analyze.
8. Don't keep on changing your answer, usually your first choice is the right one, unless you miss-read the question.
9. In "All of the above" and "None of the above" choices, if you are certain one of the statements is true don't choose "None of the above" or one of the statements are false don't choose "All of the above".
10. In a question with an "All of the above" choice, if you see at least two correct statements exist, then "All of the above" is probably the answer.
11. Be especially careful of questions and answers that include the words "never" and "always" & other absolute words. Try substituting a qualified term for the absolute one, like *frequently* for *always*; or *typical* for every to see if you can eliminate it
12. A positive choice is more likely to be true than a negative one.
13. Usually the correct answer is the choice with the most information.
14. Look for information in one question that will help you answer another question.

15. Eliminate answer options that grammatically don't fit with the stem of the question.
16. Answers that have words that are totally unfamiliar to you probably are incorrect.
17. Favor answers that contain qualifiers that result in longer, more inclusive statements that provide a more complete response to the question.
18. If two answer options are opposite each other, chances are one of them is correct
19. Skip over questions that are confusing or difficult for you but be sure to return to them later. Your subconscious mind will continue to think about these while you are answering other questions.
20. Be sure you mark the answer sheet carefully so you don't skip questions or put answers in the wrong place.

Test Structure

394 multiple choice questions for a 35 multiple choice question exam. (4) choices per question

Must answer **26 questions correctly** in order to **pass the test**

- T1 – F.C.C. Rules, Station License Responsibilities (4 groups, **4 questions**)
- T2 – Control Operator Duties (4 groups, **4 questions**)
- T3 – Operating Practices (4 groups, **4 questions**)
- T4 – Radio and Electronic Fundamentals (5 groups, **5 questions**)
- T5 – Station Setup and Operation (4 groups, **4 questions**)
- T6 – Communications Modes and Methods (3 groups, **3 questions**)
- T7 – Special Operations (2 groups, **2 questions**)
- T8 – Emergency and Public Service Communications (3 groups, **3 questions**)
- T9 – Radio Waves, Propagation, and Antennas (3 groups, **3 questions**)
- T0 – Electrical and RF Safety (3 groups, **3 questions**)

T1 – F.C.C. Rules, Station License Responsibilities (4 groups, 4 questions)

Amateur Radio Station...carries on radio communications with necessary apparatus.

Amateur Operator ... person named in FCC (Federal Communications Commission) ULS database

Basic purposes ... voluntary noncommercial service, particularly during emergencies

Three classes of new licenses may be earned by examination currently: Technician, General, Extra NO MORSE CODE = CW (continuous wave) REQUIRED FOR ANY LICENSE CLASS

All US Amateur License call signs begin with Letters: **A K N or W** Numbers: 0 thru 9; assigned by district of applicant;

Call Signs Issued sequentially: Beginning letter; 2nd letter, one digit number, followed by up to three letters Call sign district number is where first license is issued; All call signs unique..only one person has that sign. Call signs

divided into two parts, call sign prefix= Letter(s) plus number; callsign suffix= Letter(s) following number

Volunteer Examiner (VE) accredited by VEC to administer License exams

FCC makes and enforces rules, issues Amateur Licenses

CSCE valid for 365 days

Harmful interference disturbs other communications

License issued for Ten year term ... two year grace period. Renew on line /no cost. (unless a vanity call)

3 higher class Volunteer Examiners required to administer Technician or General class exams

2 purposes of ARS to increase number of trained operators and improve international goodwill

ITU (International Telecommunication Union) Regions assist management of frequency allocations ... U.S. in Region 2

Reciprocal operating agreement allows operation in foreign countries

FCC uses Sequential Call Sign System

Vanity Call sign could be used to obtain a call sign containing your initials allows person

Obtain a club call sign by applying to a club call sign administrator

Any licensed amateur can apply for a special event call sign

You can operate your amateur station in a foreign country when a reciprocal agreement between the countries exists

Technician voice transmission bands = 6-meter band (52.525 MHz); 2-meter band (146.520 MHz); 1.25-meter band (223.350 MHz); 70-centimeter (443.350 MHz); 33-centimeter (920.000 MHz); 23-centimeter (1296.000 MHz NOTE **As**

As the frequency goes up, the wavelength goes down

Control an amateur station ... name in FCC database or be an alien with reciprocal agreement to operate in U.S.

U.S. license allows transmissions ... FCC regulated or reciprocal agreements

U.S. amateurs communicate with foreign countries unless prohibited by either governments

With authorization by FCC ... communications with other radio services may be permitted

Communications on regular basis furnished by other radio services are *not* permitted

Amateur bands as secondary basis may *not* cause harmful interference to primary users by rules
FCC grants amateur radio license
FCC issues operator/station licenses in the Amateur Radio Service
Anyone except a representative of a foreign government can become an amateur licensee in the U.S.
No age requirements for amateur radio license
Transmissions after passing the required exam and as soon as your license grant appears in the FCC ULS database
Responsibility as a station licensee: ensure your station is operated in accordance with the FCC rules
Station licensee mailing address must be current, correct name and address, revocation of license possible if returned as undeliverable
Vanity call signs thru vanity call sign program ... renewal on Internet, fee required
Transmitting is not permitted if license not valid ... renewed and appears on the FCC ULS database
Grace period is 2 years without re-examination ... no transmitting permitted during this time frame

T2 – Control Operator Duties (4 groups, 4 questions)

Amateurs never transmit to general public
Do not transmit music; except as incidental to rebroadcast from space shuttle
NEVER knowingly transmit false or deceptive information
Indecent and obscene language prohibited
Broadcasting means transmission intended for reception of general public, direct or relayed
Calling employer for customer's directions on auto-patch prohibited considered commercial so its prohibited
Transmit unidentified communications only when sent *from* space station or *to* control model craft
At least 4 persons are required for a club license
Codes or ciphers hiding meaning of message ... *to* space station or radio control craft
Occasional basis: equipment for sale or trade
Compensation only in accordance with FCC Part 97 rules governing Amateur Radio
Space station or control of model craft permits unidentified communications
Learn ITU Phonetic Alphabet used in Amateur Radio (same as US military, aircraft, different from police-fire)
Transmit your callsign to identify yourself
If you don't Station ID is considered unidentified communications or signals and is illegal
ID every ten minutes and at end for normal communications (excludes special events call sign ID)
Each station must ID with its own call sign at end of communications
Longest period of time without ID is ten minutes
You must identify your station in English when speaking to another station not using English
Special Event Call Sign: normal time for ID plus your callsign once an hour
Self-assigned indicators must not conflict with an indicator specified by FCC rules or with a prefix assigned to another country
Correct ID: when visiting a station, their call sign first followed by your call, if you hold higher class license and using a frequency not authorized to their class of license
Earned operating privileges by exam upgrade,
"/AG" means Authorized General;
"/AE" means Authorized Extra
Repeater ID standards for identification are any of the following:
By phone (Digital voice): By video (Slow Scan TV): By Morse code (Not to exceed 20wpm)
Each station must have a Control operator responsible for any transmissions from the station in compliance with FCC rules
Only one amateur operator/primary station licensee held by one person at a time
Control operator of a repeater: minimum license of Technician Class
Amateur station control operator needed when station is transmitting
Control operator function performed at control point of an amateur station
Automatically controlled station does not require control operator at the control point
Three types of stations control permitted: Local; Remote; Automatic
Local when transmitting using a handheld radio
Remote when not at location, but can still make changes to the transmitter
Automatic control used on repeater; control operator not present
Transmit from another amateur's station, both are responsible
Control operator license determines operating privileges...higher vs lower
Operate amateur station aboard aircraft or ship with approval of captain not using ship or aircraft equipment
Class of license of control operator determines all operating privileges

Unlicensed persons, family or not, not permitted to be control operator
Third party communications: two amateurs send message for someone else
Conducting business via amateur radio is prohibited, even on autopatch
FCC can inspect your station records at any time upon request
Disconnect power and mic cables for added station security against unauthorized use (transmissions)
Operator of club station permitted to accept compensation if transmitting information for 40 hours per week

T3 – Operating Practices (4 groups, 4 questions)

Listen first, before transmitting

Looking for any station...call CQ not used on repeaters but HF; say your call sign “monitoring or listening”

CQ means: Calling any station On repeater, callsign instead of CQ

Calling another station; Say Their callsign first then say your callsign

Use ITU phonetic alphabet for identifying your station because these words internationally recognized for letters

Avoid cute phrases for letters because these words are not always easily understood

Testing transmissions require identification

Unidentified transmissions are illegal

ID required every ten minutes and at end of every transmission

Special events ID same ten minutes applies in addition to once an hour your own callsign

Use of minimum power necessary to carry out the desired communications On HF and Repeater

Accountability Transmitting station is accountable if a repeater inadvertently retransmits violations of FCC rules

Band plans

Voluntary guideline, beyond divisions established by F.C.C.

Designed for efficient use of radio spectrum

Developed by amateur radio community

Repeater coordination

Recognized frequency coordination body, Sets up band plan in local area Purpose is to reduce interference and promote proper use of spectrum

Mode restricted sub-bands

6-meter ... CW, 2-meter ... CW, 1-1/4 meter CW and Data

Courtesy and respect on the air

Break into a QSO, by giving your callsign

Proper repeater practices:

Monitor/listen first keeping transmissions short, Identify legally, Use minimum transmitter power necessary

Operate within limits of your license

No station has exclusive use of a frequency

Hear a new operator having trouble, offer to help

When circumstances not covered by FCC rules:

Use General operating standard of good engineering

Use Good amateur practices (Must be applied to amateur station operation)

Avoid use of racial or ethnic slurs because it is Offensive and Reflects poor public image

Subjects not prohibited: Political discussions, Jokes and stories, Religious preferences

All of these answers are correct

Obscene language is prohibited

Because it's offensive to some, Because young children may hear, Language specifically prohibited by Rules

No official list of prohibited words

Front end overload responsibility is with the owner of the TV not the radio operator

Front-end overload is result of strong signals from nearby source

Major cause of phone interference caused by inadequate interference protection included when manufactured

Cable TV cable break can cause, TV interference & Amateur receiver interference

If you cause unintentional interference, properly ID your station and move to another frequency

You can NEVER Deliberately interfere with another station's communication

EXCEPT IN A DECLARED EMERGENCY no station has exclusive use of any frequency

RACES and ARES: Both provide communications during emergencies

F.C.C. rules apply to your station when using amateur radio at request of:

Public service officials

At scene of an emergency

Splatter or interference reports from nearby frequencies

Check frequency

Spurious emissions

Reduce on air interference for testing by using a dummy load antenna

T4 – Radio and Electronic Fundamentals (5 groups, 5 questions)

Current flowing in one direction is DC; Current that reverses direction is AC

Unit of current... amperes... Electron flow is current Symbol for Current = I

Unit of Electromotive force (pressure) is... Volt Symbol for Volt = E

Unit of power ... Watt Symbol for Watt = P

FORMULA $P = I \times E$

Unit of resistance ... Ohm Symbol for Ohm=R Opposition to current flow... Resistance

FORMULA $E = I \times R$ (Ohm's Law)

Unit of frequency ... Hertz Sixty hertz means 60 cycles per second

Radio Wave=electromagnetic wave that oscillates more than 20,000 times per second

Frequency describes number of times AC flows back and forth per second

Metal Conductors...gold, silver, copper, aluminum, mercury

Insulators...air, rubber, plastic, ceramic, paper

Car battery ... 12 volts DC

DC measured by amplitude

AC measured by Average Amplitude

Ammeter measures current

Voltmeter measures voltage

Wavelength is distance a radio wave travels during one complete cycle

Frequency increases as wavelength gets shorter INVERSELY PROPORTIONAL

FORMULA: Wavelength in meters equals 300 divided by frequency in MHz

Radio waves travel at speed of light (300,000,000 meters per second)

Bands identified by physical length (or wavelength)

2-meter band 144 to 148 MHz

6-meter band 50 to 54 MHz

70-centimeter band 420 to 450 MHz

Sound waves for the human voice=300 to 3000 Hertz

Radio waves are Electromagnetic and are 20,000 cycles per second and higher

Receiver converts radio signals to audio

Transmitter converts sound into radio waves

Transceiver is two devices in one, receiver and transmitter

Power supply converts AC to DC.

Amplifier increases power output

Lithium-ion battery offers longest life

Ni-Cad per cell voltage is 1.2 volts

Carbon-zinc battery cannot be re-charged

Keep re-chargeable batteries in good condition for emergencies

Inspect for damage, Store in cool and dry location, Given maintenance recharge every 6 months

Slowest rate of current drain gives most amount of energy

One kilovolt is one thousand volts

1500 KHz is 1,500,000 Hertz

1.5 amps is 1500 milliamperes

500 milliwatts is 0.5 watts

One microvolt is one one-millionth of a volt

T5 – Station Setup and Operation (4 groups, 4 questions)

Microphone connects to the transmitter and converts sound waves to electrical signals

Speaker connects to the receiver and converts electrical signals to sound waves

Mic/speaker too close ... feedback

Noisy area, use headphones

Regulated power supply ... voltage fluctuations

Reduce spurious emissions by installing a filter at the transmitter

Prevent RF overload ... Notch filter

Terminal Node Controller (TNC) connected between Transceiver and computer terminal in Packet Radio

Packet doesn't need a mic because you are sending data
 Computer sound card for data transmissions
 Too much mic gain will cause distortion and be unreadable
 Store in memory: PL (tones); Power level; transmit/receive frequencies ALL of the Above
 Keypad/VFO to select frequency
Squelch control used to quiet noise when no signal present
 Favorite frequency ... store in memory
 Ignition noise...turn on noise blanker
 Up/Down buttons ... easy frequency or memory selection
 Shift adjusts offset frequency between transmit and receive frequencies
 RIT ... Receiver Incremental Tuning
 Step sets tuning rate
 "F" selects alternate actions with same buttons
 Repeaters extend range of mobiles and low-power stations
 Courtesy tone ... indicates transmission is done
 Most common Offsets: minus 0.6 MHz for 2-meter band ... plus 5.0 MHz for 70-centimeter band
 DUPLEX Input/output frequencies of repeaters: receives on one, transmits on another
 SIMPLEX Transmit and receive same frequency; Use of simplex avoids tying up repeater
 Pause briefly between transmissions to listen for anyone who needs to break in
 To determine if you can use simplex, listen to repeater input frequency to see if you can hear other station
 Series of repeaters connected ... linked repeater system
 Access to repeater may be limited by owner; i.e. Closed machine is restricted use
 Local frequency coordinators ... minimize interference and make most efficient use of frequencies available
 Fundamental overload ... very strong signals from nearby source
 Doppler is NOT a cause of Radio Frequency Interference (RFI)
 Most likely cause of telephone interference from transmitter is telephone acts like a receiver receiver
 Logical first step to correct RFI is to install an RF filter on the telephone
 1st step after neighbor reports interference on his TV is to check your TV to see if it is getting interference
 Interference problems can be corrected by ferrite chokes, low & high pass filters and notch & band pass filters
 When neighbor reports interference check your station to be sure it meets standards of good amateur practice
 If Part 15 device causes interference, check your station, identify offending device & stop using offending device
 Mobile has high-pitched whine ... power wiring picking up noise from electrical system correct with noise blanker
 Single Side Band (SSB) garbled and broken up ... RF energy causing feedback through microphone circuit
 Using repeater: distorted or weak .. Off frequency; batteries low; bad location
 Digital systems automatically error correct noise and interference

T6 – Communications Modes and Methods (3 groups, 3 questions)

In amateur radio the term Phone transmission means voice transmission by radio
 Gateway is name given to Amateur Radio Station used to Connect other amateur radio stations to the Internet
 SSB a form of AM
 SSB used for weak signals and long distance contacts on VHF & UHF bands; SSB advantage over FM...less bandwidth
 FM most common on VHF/UHF repeaters, more quiet than SSB
 CW (Morse code) has narrowest bandwidth
 USB (Upper Side Band) usually used for VHF, UHF and SSB communications
 Bandwidth of SSB... 2-3 kHz
 Bandwidth of FM...5-15 kHz
 Bandwidth of Fast-scan TV on 70-centimeter... 6 MHz
 Echolink uses the Internet
 Echolink allows computer-to-radio linking for voice
 Any licensed amateur can use Echolink
 Echolink & IRLP (Internet Radio Linking Project) have VoIP (Voice Over Internet Protocol) in common
 If you hear a station from Russia on 2 a Meter Repeater it is an Internet linked (DX=distant station)
 VoIP method for data transfer by IRLP
 IRLP links two or more stations using the Internet
 Active nodes using VoIP are listed in repeater directory or on Internet
 Select IRLP node with keypad
 NTSC =Standard fast color TV...NTSC
 Packet Radio is an example of digital communications

219-220 MHz for Point-to-point digital message forwarding
PSK ... Phase Shift Keying
PSK31= low-rate data mode that works well in noisy conditions
APRS= Automatic Position Reporting System: A GPS receiver needed for APRS
Send Morse Code at a speed you can reliably receive at
Practical reason to be able to copy CW is so you can recognize repeater ID sent in Morse Code
Q signals are shortcuts used in Morse Code to save time and keystrokes; not used much on voice 2 meter band
QRM =receiving interference
QSY ... Change frequency

T7 – Special Operations (2 groups, 2 questions)

Spare batteries good to have when away from home QTH
1500 Watt amplifier not too good an item for emergency response kit, heavy, bulky, draws high power
Use external antenna instead of rubber-duck out in field for hand held radio
Combo headset/microphone good to have for noisy areas
RDF ... Radio Direction Finding, Locates interference or jamming
Directional antenna helps find hidden transmitter in a hunt
Grid Locator: Letter/number assigned to geographic area
Contesting is contacting as many stations as possible during specific period of time
Special Event station operates temporarily in conjunction with special significant activity
Max power for Remote control models is 1 watt
Station ID affixed to the transmitter for remote control model when using amateur frequencies
Uplink frequency determines class of license for satellite use
Power for contact of satellite to use is minimum needed
Satellite communications permits talking with operators in other countries
Tech or higher can contact International Space Station
Satellite beacon contains info on satellite
Use Satellite tracking program to determine when you can access an amateur satellite
70-CM satellite sub band =435-438; portion of the band where satellite operations are permitted
Doppler shift =change in frequency due to motion thru space
AMSAT ... Amateur Satellite. Group builds/launches coordinates satellites
LEO= Low Earth Orbit

T8 – Emergency and Public Service Communications (3 groups, 3 questions)

FCC Emergency Communication Declaration contains special rules & conditions to be observed
You may communicate with other radio services when specifically authorized by the FCC or in emergencies
If you ever hear an emergency call immediately take the call or relinquish the frequency
Must avoid using frequencies dedicated to emergency communication unless you're participating in effort
Use tactical call sign for efficiency and easier coordination of public service communications
An FCC declaration of emergency required to legally restrict frequency for emergency communications only.
No station has exclusive rights to a frequency without an FCC declaration of emergency
If you hear an emergency reported assume it's real and act accordingly
Initiate emergency call Mayday, Mayday, Mayday, Any station come in please, Identify your station
Penalties for false emergency call: License revoked; Fined large sum of money; Sent to prison
Emergency communications has priority at all times in the Amateur Radio Service on all frequencies
Emergency communications have has the highest Priority at all times in the ARS Amateur Radio Service
Be prepared for emergency situations by: Check your emergency response equipment and know where it is;
Know how to run equipment if power failure Participate: Emergency Net Drills & field operations
Alternate source of power:
Car or truck battery, Bike generator, Portable solar panel
When immediate threat to human life or property ... you may transmit "SOS" or "Mayday"
In emergency: use any means at disposal to call for help on any frequency such as non amateur frequencies
RACES ... Restricted to serving: local, state, federal government emergency management agencies; register with local civil defense agency
ARES ... Supports organizations like the Red Cross, Salvation Army, and National Weather Service; must be a licensed amateur radio operator
Avoid casual conversations during public-service event because idle chatter may interfere with important traffic
FCC prohibits use of amateur radio for news reporting

Do not transmit during emergency nets unless Net Control permits to minimize disruptions
Don't transmit personal info concerning victims during emergencies
Reduce casual listeners overhearing sensitive emergency information by using non voice mode such as CW, packet
Net control must have Clear strong signal.
Net control should stop all net activity when emergency traffic breaks in.
Preamble of message=information needed to track message as it passes through traffic handling system
If Large scale emergency occurs and no NCS ... you should open net immediately for check-ins.
Originating person's name must be included with emergency messages
Check with regard to a message means the word count in the message
Emergency message guideline is message body should have 25 words or less

T9 – Radio Waves, Propagation, and Antennas (3 groups, 3 questions)

Beams antenna concentrate signals in one direction
Vertical antenna= single element perpendicular to earth surface
Horizontal antenna = single dipole parallel to earth surface
Rubber duck antenna not as effective as full sized
Half-wave dipole shorter when frequency increases
5/8 wavelength antenna has more gain than 1/4 wavelength and concentrates energy at Lower angle of radiation
Dummy load ... no interfering radiation when testing but protects radio circuitry from over heating
Quad, Yagi, and Dish are directional antennas
Rubber duck antenna has 10-20 times reduction in signal strength inside vehicle than when outside the vehicle
Magnetic mount antenna good efficiency in mobile; easy to install and remove
146 MHz quarter-wave antenna approximately 19 inches
Half-wave 6-meter dipole 112 inches
VHF/UHF signals not usually reflected by ionosphere ... not good for long distances
If you hear VHF from long distances probably caused by sporadic E reflection in ionosphere
Hearing sudden bursts of tones or fragments of conversations caused by strong signals overloading receiver
Radio horizon point where radio signals blocked by earth's curvature
If your signals were strong then became weak or distorted move a few feet to correct possible multi path distortion
UHF Signal penetrate buildings easier than VHF signals due to shorter wavelength
When transmitting with hand held radio, keep antenna as vertical as possible
Signals with different polarizations can be as much as 100 times weaker
Directional antenna to reach distant repeater if buildings or obstructions block direct line of sight transmission
Rapid fluttering sound from mobiles stations called picket fencing
VHF & UHF radio signals travel 1/3 further than line of sight because earth seems less curved to radio waves than light
SWR ... load matching to a transmitter; 1:1 = perfect match
Loose connections can cause erratic SWR readings
SWR of 2:1 where some protection circuits reduce power
Power lost in feed line converts to heat by losses in the line
Directional wattmeter used for feed line and antenna matching
Moisture is most common cause of failure for coax
For efficient transfer of power and reduction of loss, low SWR important
Losses increase with older coax exposed to weather
Black cover offers protection against ultraviolet damage
Coax is commonly 50 ohms
Coax cable most used feed line due to ease of use and few special installation considerations

T0 – Electrical and RF Safety (3 groups, 3 questions)

Lowest voltage for shock ... 30 volts
Lowest current likely to cause death is 100 milliamperes
Green wire of 3-wire is connect to ground
Fuses interrupt power in case of overload
20 amp replacing a 5 amp could cause a fire in event of overload
Guard against electrical shock by using 3-wire plugs, Ground-fault & Common ground
Most important to tell everyone where Emergency disconnect is located.
Stored charge in large capacitors can cause shock with power supply off
If Lightning storm is expected, Disconnect antenna, Unplug power from AC Stop using equipment go to another room
Recharge 12-volt battery by connecting to car battery and run engine

12-volt battery hazards: Contains acid which causes injury if spilled; Short circuits from damaged wiring can cause fire; Explosive gas (hydrogen) can build up around battery if not properly vented
A Storage battery charged or discharged too quickly can overheat & explode
Fire prevention ... most important reason for lightning protection
A Disconnected Power Supply can still provide an electric shock from stored charge in large capacitors
Wear a Hard hat & safety glasses for protection if you are on the ground helping with an antenna tower repair
Use safety belt & safety glasses before climbing tower
Before climbing a tower, Arrange helper/observer, Inspect damage/loose hardware. No electrical storms nearby
Locate Antenna so people can't come into contact with it
Antennas near airports much consider maximum height allowed with regard to the airport
When putting up an antenna tower, stay clear of overhead electric wires
Guy wires should be Installed per manufacturer
Safe distance to power lines for antenna is no closer than 10 feet if it falls
Never climb a crank-up tower when up and extended
Stainless hardware much less likely to corrode
8 foot ground rods connect to each leg and each other and bonded to tower
VHF/UHF non-ionizing radiation
Excessive power absorbed can cause injury to body if frequency and signal strength combination right
RF exposure above 30 MHz ... 50 watts PEP at antenna
Body absorbs more RF energy at some frequencies than others Source must be considered
Factors affecting RF exposure are Frequency and power level, Distance from antenna, Radiation pattern of antenna
Determine FCC RF exposure, FCC OET Bulletin 65, Calculations on computer modeling, Field strength meter
Touch antenna during transmission ... possible RF burn
Action to prevent RF exposure, alter antenna patterns, Relocate antenna, Change station parameters, power, frequency
Change equipment ... re-evaluate RF safety regs to stay in compliance
Milliwatts sq/centimeter ... measure RF radiation exposure
Duty cycle ... amount of time transmitter is operating

RESOURCES

www.arrl.net
www.qrz.com
www.abarc.net

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