

## Week 4 - Technician Class Question Pool

**Effective July 1, 2014**

Technician Chapter 4, Propagation, Antennas and Feedlines

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

T3A01 (D)

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?

- A. Change the batteries in your radio to a different type
- B. Turn on the CTCSS tone
- C. Ask the other operator to adjust his squelch control
- D. Try moving a few feet or changing the direction of your antenna if possible, as reflections may be causing multi-path distortion

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T3A02 (B)

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

- A. VHF signals lose power faster over distance
- B. The shorter wavelength allows them to more easily penetrate the structure of buildings
- C. This is incorrect; VHF works better than UHF inside buildings
- D. UHF antennas are more efficient than VHF antennas

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T3A03 (C)

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

- A. Right-hand circular
- B. Left-hand circular
- C. Horizontal
- D. Vertical

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T3A04 (B)

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?

- A. The modulation sidebands might become inverted
- B. Signals could be significantly weaker
- C. Signals have an echo effect on voices
- D. Nothing significant will happen

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T3A05 (B)

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?

- A. Change from vertical to horizontal polarization
- B. Try to find a path that reflects signals to the repeater
- C. Try the long path
- D. Increase the antenna SWR

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T3A06 (B)

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

- A. Flip-flopping
- B. Picket fencing
- C. Frequency shifting
- D. Pulsing

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T3A07 (A)

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

- A. Electromagnetic
- B. Electrostatic
- C. Surface acoustic
- D. Magnetostrictive

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T3A08 (C)

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

- A. Frequency shift due to Faraday rotation
- B. Interference from thunderstorms
- C. Random combining of signals arriving via different paths
- D. Intermodulation distortion

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T3A09 (B)

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

- A. Digital modes are unusable
- B. Either vertically or horizontally polarized antennas may be used for transmission or reception
- C. FM voice is unusable
- D. Both the transmitting and receiving antennas must be of the same polarization

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T3A10 (D)

What may occur if data signals propagate over multiple paths?

- A. Transmission rates can be increased by a factor equal to the number of separate paths observed
- B. Transmission rates must be decreased by a factor equal to the number of separate paths observed
- C. No significant changes will occur if the signals are transmitting using FM
- D. Error rates are likely to increase

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T3A11 (C)

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

- A. The stratosphere
- B. The troposphere
- C. The ionosphere
- D. The magnetosphere

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T3B02 (A)

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

- A. The orientation of the electric field
- B. The orientation of the magnetic field
- C. The ratio of the energy in the magnetic field to the energy in the electric field
- D. The ratio of the velocity to the wavelength

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T3B03 (C)

What are the two components of a radio wave?

- A. AC and DC
- B. Voltage and current
- C. Electric and magnetic fields
- D. Ionizing and non-ionizing radiation

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

T3C01 (C)

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

- A. They are too weak to go very far
- B. FCC regulations prohibit them from going more than 50 miles
- C. UHF signals are usually not reflected by the ionosphere
- D. They collide with trees and shrubbery and fade out

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T3C02 (D)

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

- A. Signals are being reflected from outer space
- B. Signals are arriving by sub-surface ducting
- C. Signals are being reflected by lightning storms in your area
- D. Signals are being refracted from a sporadic E layer

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T3C03 (B)

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

- A. Signals from distances of 10,000 or more miles are common
- B. The signals exhibit rapid fluctuations of strength and often sound distorted
- C. These types of signals occur only during winter nighttime hours
- D. These types of signals are generally strongest when your antenna is aimed west

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T3C04 (B)

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?

- A. Backscatter
- B. Sporadic E
- C. D layer absorption
- D. Gray-line propagation

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T3C05 (A)

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

- A. Knife-edge diffraction
- B. Faraday rotation
- C. Quantum tunneling
- D. Doppler shift

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T3C06 (A)

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

- A. Tropospheric scatter
- B. D layer refraction
- C. F2 layer refraction
- D. Faraday rotation

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T3C07 (B)

What band is best suited for communicating via meteor scatter?

- A. 10 meters
- B. 6 meters
- C. 2 meters
- D. 70 cm

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T3C08 (D)

What causes tropospheric ducting?

- A. Discharges of lightning during electrical storms
- B. Sunspots and solar flares
- C. Updrafts from hurricanes and tornadoes
- D. Temperature inversions in the atmosphere

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T3C09 (A)

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

- A. From dawn to shortly after sunset during periods of high sunspot activity
- B. From shortly after sunset to dawn during periods of high sunspot activity
- C. From dawn to shortly after sunset during periods of low sunspot activity
- D. From shortly after sunset to dawn during periods of low sunspot activity

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T3C10 (A)

What is the radio horizon?

- A. The distance over which two stations can communicate by direct path
- B. The distance from the ground to a horizontally mounted antenna
- C. The farthest point you can see when standing at the base of your antenna tower
- D. The shortest distance between two points on the Earth's surface

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T3C11 (C)

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

- A. Radio signals move somewhat faster than the speed of light
- B. Radio waves are not blocked by dust particles
- C. The Earth seems less curved to radio waves than to light
- D. Radio waves are blocked by dust particles

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T3C12 (A)

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

- A. Six or ten meters
- B. 23 centimeters
- C. 70 centimeters or 1.25 meters
- D. All of these choices are correct

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T4A05 (A)

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

- A. In series with the feed line, between the transmitter and antenna
- B. In series with the station's ground
- C. In parallel with the push-to-talk line and the antenna
- D. In series with the power supply cable, as close as possible to the radio

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T5B09 (B)

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

- A. 2 dB
- B. 3 dB
- C. 5 dB
- D. 10 dB

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T5B10 (C)

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

- A. -1 dB
- B. -3 dB
- C. -6 dB
- D. -9 dB

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T5B11 (A)

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

- A. 10 dB
- B. 12 dB
- C. 18 dB
- D. 28 dB

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T5C07 (C)

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

- A. Gravity waves
- B. Sound waves
- C. Radio waves
- D. Pressure waves

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T7C02 (B)

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

- A. A VTVM
- B. An antenna analyzer
- C. A Q meter
- D. A frequency counter

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T7C03 (A)

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

- A. A measure of how well a load is matched to a transmission line
- B. The ratio of high to low impedance in a feed line
- C. The transmitter efficiency ratio
- D. An indication of the quality of your station's ground connection

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T7C04 (C)

What reading on an SWR meter indicates a perfect impedance match between the antenna and the feed line?

- A. 2 to 1
- B. 1 to 3
- C. 1 to 1
- D. 10 to 1

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T7C05 (A)

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

- A. 2 to 1
- B. 1 to 2
- C. 6 to 1
- D. 10 to 1

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T7C06 (D)

What does an SWR reading of 4:1 indicate?

- A. Loss of -4dB
- B. Good impedance match
- C. Gain of +4dB
- D. Impedance mismatch

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T7C07 (C)

What happens to power lost in a feed line?

- A. It increases the SWR
- B. It comes back into your transmitter and could cause damage
- C. It is converted into heat
- D. It can cause distortion of your signal

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T7C08 (D)

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

- A. Voltmeter
- B. Ohmmeter
- C. Iambic pentameter
- D. Directional wattmeter

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T7C09 (A)

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

- A. Moisture contamination
- B. Gamma rays
- C. The velocity factor exceeds 1.0
- D. Overloading

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T7C10 (D)

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

- A. Ultraviolet resistant jackets prevent harmonic radiation
- B. Ultraviolet light can increase losses in the cable's jacket
- C. Ultraviolet and RF signals can mix together, causing interference
- D. Ultraviolet light can damage the jacket and allow water to enter the cable

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T7C11 (C)

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

- A. It has more loss per foot
- B. It cannot be used for VHF or UHF antennas
- C. It requires special techniques to prevent water absorption
- D. It cannot be used at below freezing temperatures

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T7C12 (B)

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

- A. Carrying dc power from a vehicle battery to a mobile radio
- B. Carrying RF signals between a radio and antenna
- C. Securing masts, tubing, and other cylindrical objects on towers
- D. Connecting data signals from a TNC to a computer

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T7D08 (C)

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

- A. Acid-core solder
- B. Silver solder
- C. Rosin-core solder
- D. Aluminum solder

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T7D09 (C)

What is the characteristic appearance of a cold solder joint?

- A. Dark black spots
- B. A bright or shiny surface
- C. A grainy or dull surface
- D. A greenish tint

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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

T9A01 (C)

What is a beam antenna?

- A. An antenna built from aluminum I-beams
- B. An omnidirectional antenna invented by Clarence Beam
- C. An antenna that concentrates signals in one direction
- D. An antenna that reverses the phase of received signals

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T9A02 (B)

Which of the following is true regarding vertical antennas?

- A. The magnetic field is perpendicular to the Earth
- B. The electric field is perpendicular to the Earth
- C. The phase is inverted
- D. The phase is reversed

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T9A03 (B)

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

- A. A ground wave antenna
- B. A horizontally polarized antenna
- C. A rhombic antenna
- D. A vertically polarized antenna

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T9A04 (A)

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

- A. It does not transmit or receive as effectively as a full-sized antenna
- B. It transmits a circularly polarized signal
- C. If the rubber end cap is lost it will unravel very quickly
- D. All of these choices are correct

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T9A05 (C)

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

- A. Lengthen it
- B. Insert coils in series with radiating wires
- C. Shorten it
- D. Add capacitive loading to the ends of the radiating wires

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T9A06 (C)

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

- A. Non-resonant antennas
- B. Loop antennas
- C. Directional antennas
- D. Isotropic antennas

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T9A07 (A)

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

- A. Signals can be significantly weaker than when it is outside of the vehicle
- B. It might cause your radio to overheat
- C. The SWR might decrease, decreasing the signal strength
- D. All of these choices are correct

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T9A08 (C)

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

- A. 112
- B. 50
- C. 19
- D. 12

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T9A09 (C)

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

- A. 6
- B. 50
- C. 112
- D. 236

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T9A10 (C)

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

- A. Equally in all directions
- B. Off the ends of the antenna
- C. Broadside to the antenna
- D. In the direction of the feed line

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T9A11 (C)

What is meant by the gain of an antenna?

- A. The additional power that is added to the transmitter power
- B. The additional power that is lost in the antenna when transmitting on a higher frequency
- C. The increase in signal strength in a specified direction when compared to a reference antenna
- D. The increase in impedance on receive or transmit compared to a reference antenna

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T9A12 (A)

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

- A. It offers a lower angle of radiation and more gain than a 1/4 wavelength antenna and usually provides improved coverage
- B. It features a very high angle of radiation and is better for communicating via a repeater
- C. The 5/8 wavelength antenna completely eliminates distortion caused by reflected signals
- D. The 5/8 wavelength antenna offers a 10-times power gain over a 1/4 wavelength design

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T9A13 (C)

Why are VHF or UHF mobile antennas often mounted in the center of the vehicle roof?

- A. Roof mounts have the lowest possible SWR of any mounting configuration
- B. Only roof mounting can guarantee a vertically polarized signal
- C. A roof mounted antenna normally provides the most uniform radiation pattern
- D. Roof mounted antennas are always the easiest to install

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T9A14 (A)

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

- A. Inserting an inductor in the radiating portion of the antenna to make it electrically longer
- B. Inserting a resistor in the radiating portion of the antenna to make it resonant
- C. Installing a spring at the base of the antenna to absorb the effects of collisions with other objects
- D. Making the antenna heavier so it will resist wind effects when in motion

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

T9B01 (B)

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

- A. To reduce television interference
- B. To allow the efficient transfer of power and reduce losses
- C. To prolong antenna life
- D. All of these choices are correct

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T9B02 (B)

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

- A. 8 ohms
- B. 50 ohms
- C. 600 ohms
- D. 12 ohms

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T9B03 (A)

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

- A. It is easy to use and requires few special installation considerations
- B. It has less loss than any other type of feed line
- C. It can handle more power than any other type of feed line
- D. It is less expensive than any other types of feed line

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T9B04 (A)

What does an antenna tuner do?

- A. It matches the antenna system impedance to the transceiver's output impedance
- B. It helps a receiver automatically tune in weak stations
- C. It allows an antenna to be used on both transmit and receive
- D. It automatically selects the proper antenna for the frequency band being used

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T9B05 (D)

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

- A. The apparent SWR increases
- B. The reflected power increases
- C. The characteristic impedance increases
- D. The loss increases

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T9B06 (B)

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

- A. A UHF (PL-259/SO-239) connector
- B. A Type N connector
- C. An RS-213 connector
- D. A DB-25 connector

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T9B07 (C)

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

- A. They are preferred for microwave operation
- B. They are water tight
- C. They are commonly used at HF frequencies
- D. They are a bayonet type connector

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T9B08 (A)

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

- A. To prevent an increase in feed line loss
- B. To prevent interference to telephones
- C. To keep the jacket from becoming loose
- D. All of these choices are correct

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T9B09 (B)

What might cause erratic changes in SWR readings?

- A. The transmitter is being modulated
- B. A loose connection in an antenna or a feed line
- C. The transmitter is being over-modulated
- D. Interference from other stations is distorting your signal

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T9B10 (C)

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

- A. There is no significant difference between the two types
- B. RG-58 cable has less loss at a given frequency
- C. RG-8 cable has less loss at a given frequency
- D. RG-58 cable can handle higher power levels

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T9B11 (C)

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

- A. 50-ohm flexible coax
- B. Multi-conductor unbalanced cable
- C. Air-insulated hard line
- D. 75-ohm flexible coax

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