

Technician Licensing Class

**Antennas,
feedlines**

T9A - T9B

Valid
July 1, 2018 Through June 30, 2022

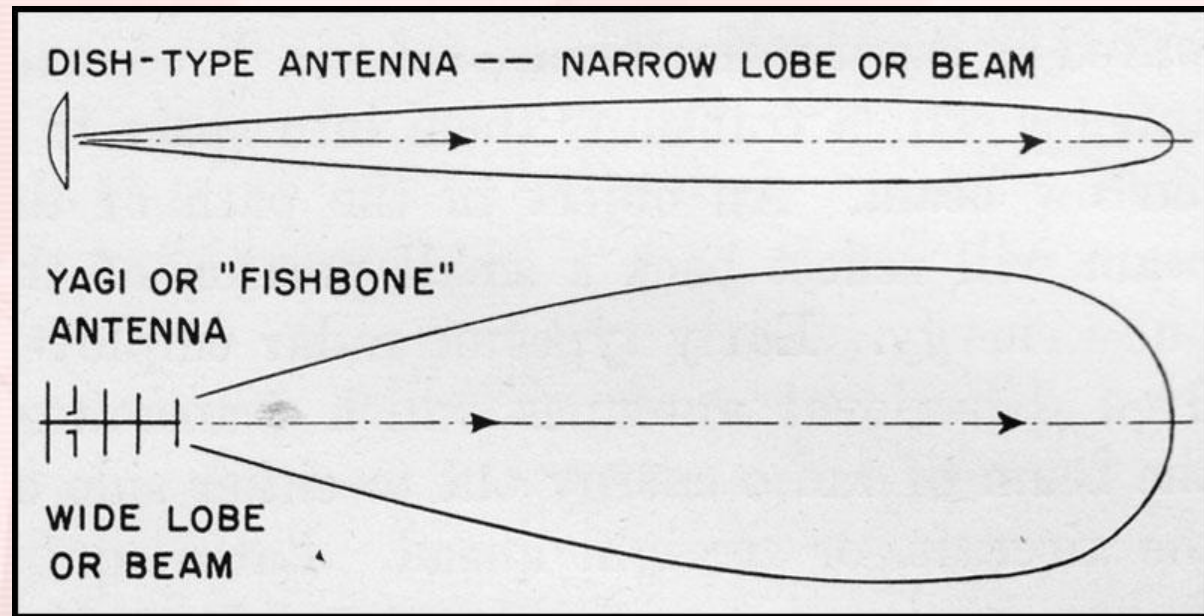
T 9 A

Topics

- Antennas:
 - vertical and horizontal polarization;
 - concept of gain;
 - common portable and mobile antennas;
 - relationships between resonant length and frequency;
 - concept of dipole antennas

T 9 A

- A beam antenna concentrates signals in one direction. T9A01



T 9 A

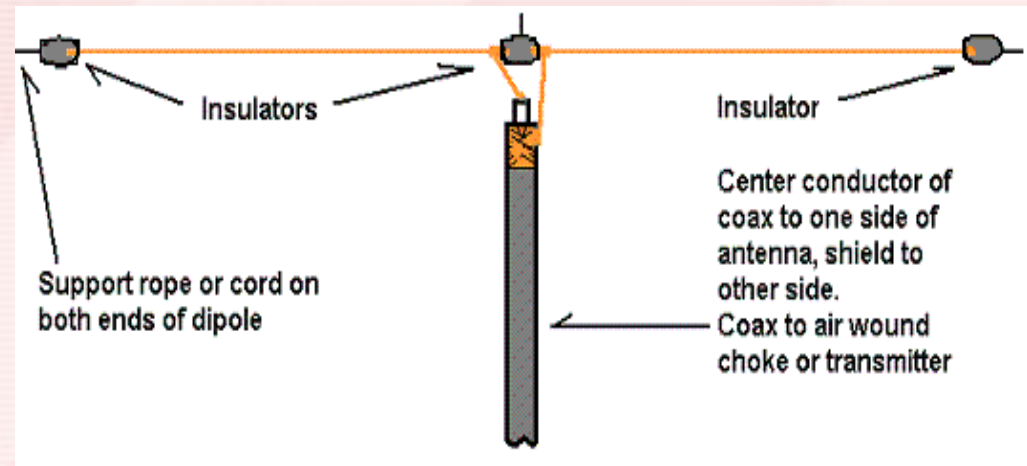
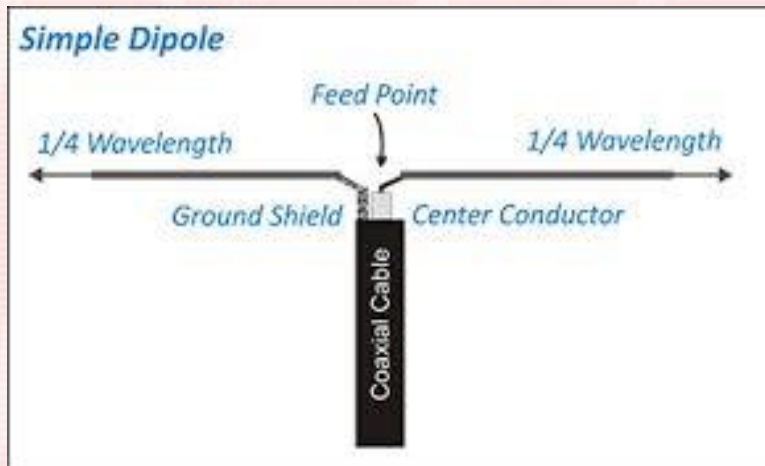
- A type of antenna loading is inserting an inductor in the radiating portion of the antenna to make it electrically longer. T9A02



T 9 A

- A simple dipole mounted so that the conductor is parallel to the Earth's surface is a horizontally polarized antenna.

T9A03

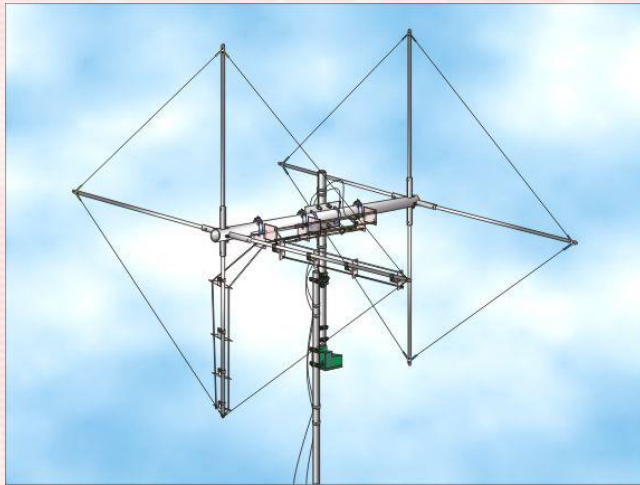


- A disadvantage of the “rubber duck” antenna supplied with most handheld transceivers does not transmit or receive as effectively as a full sized antenna. T9A04



T 9 A

- To change a dipole antenna to make it resonant on a higher frequency, shorten it. T9A05
- The quad, Yagi, and dish antennas are directional antennas. T9A06



quad



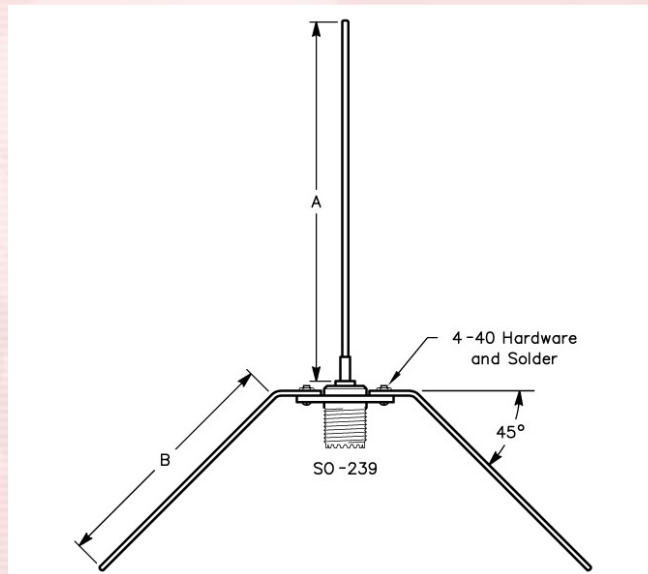
Yagi



dish

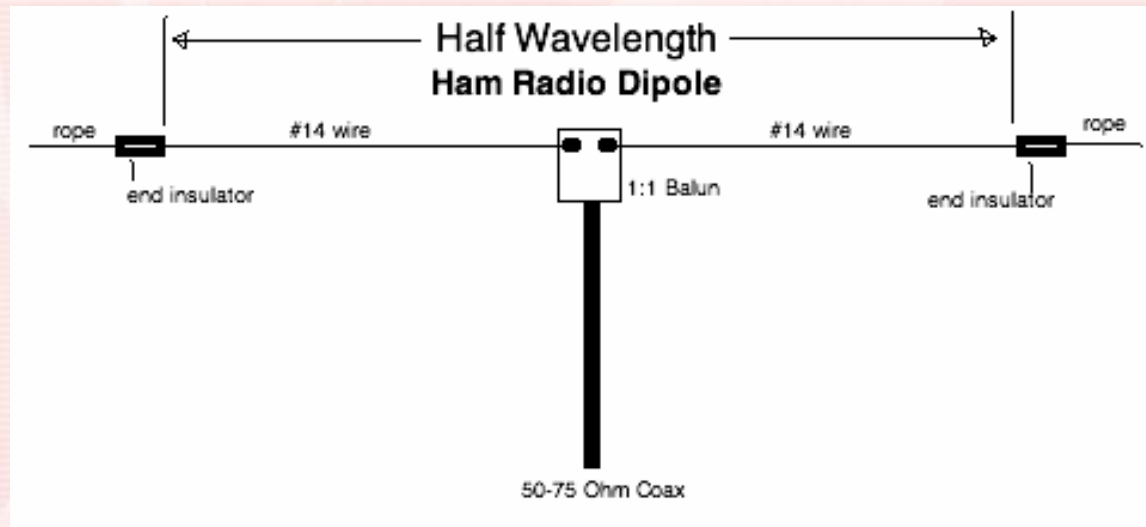
T 9 A

- A disadvantage of using a handheld VHF transceiver, with its integral antenna, inside a vehicle is that signals might not propagate well due to the shielding effect of the vehicle. T9A07
- The approximate length, in inches, of a quarter-wave vertical antenna for 146 MHz is 19". T9A08



T 9 A

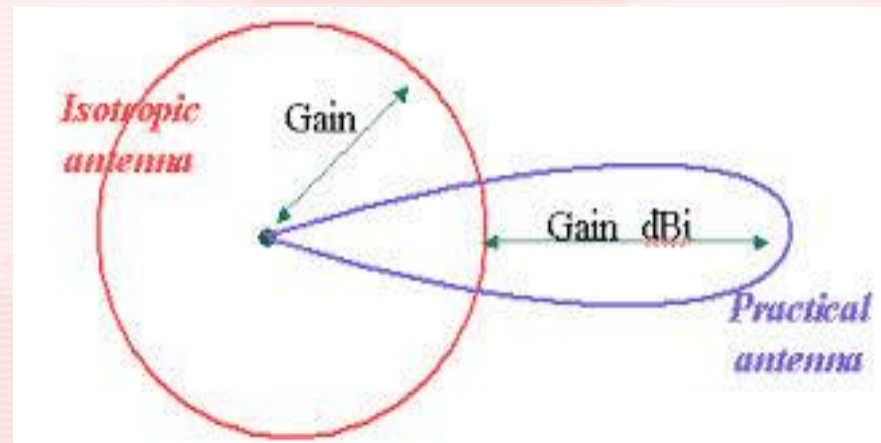
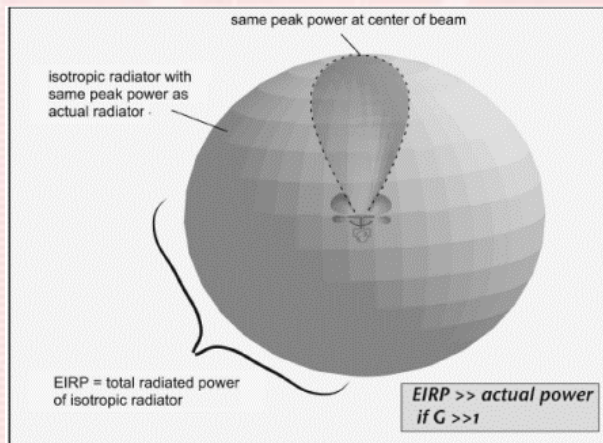
- The approximate length of a 6-meter, halfwave wire dipole antenna is 112 inches. T9A09



- The direction of radiation is strongest from a half-wave dipole antenna in free space broadside to the antenna. T9A10

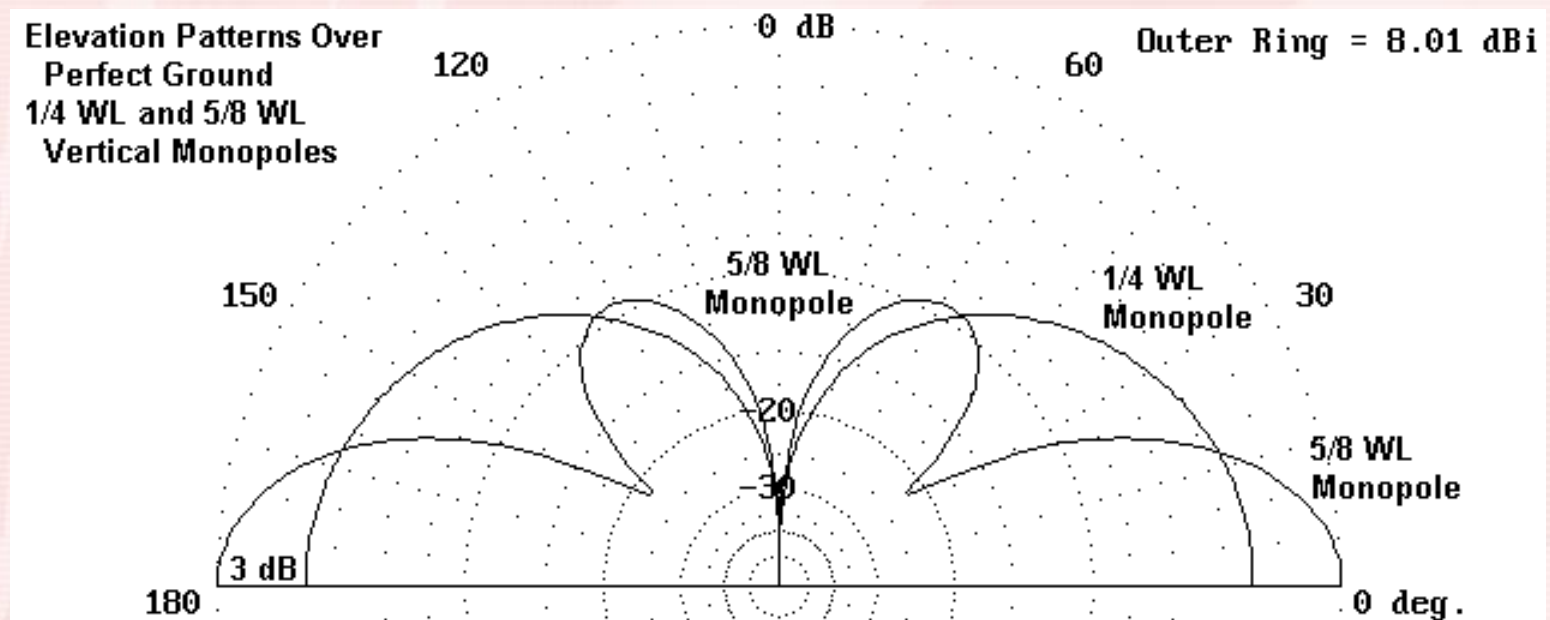
T 9 A

- The increase in signal strength in a specified direction when compared to a reference antenna is referred to as the gain of an antenna. T9A11



T 9 A

- A properly mounted 5/8 wavelength antenna for VHF or UHF mobile service offers a lower angle of radiation and more gain than a 1/4 wavelength antenna. T9A12



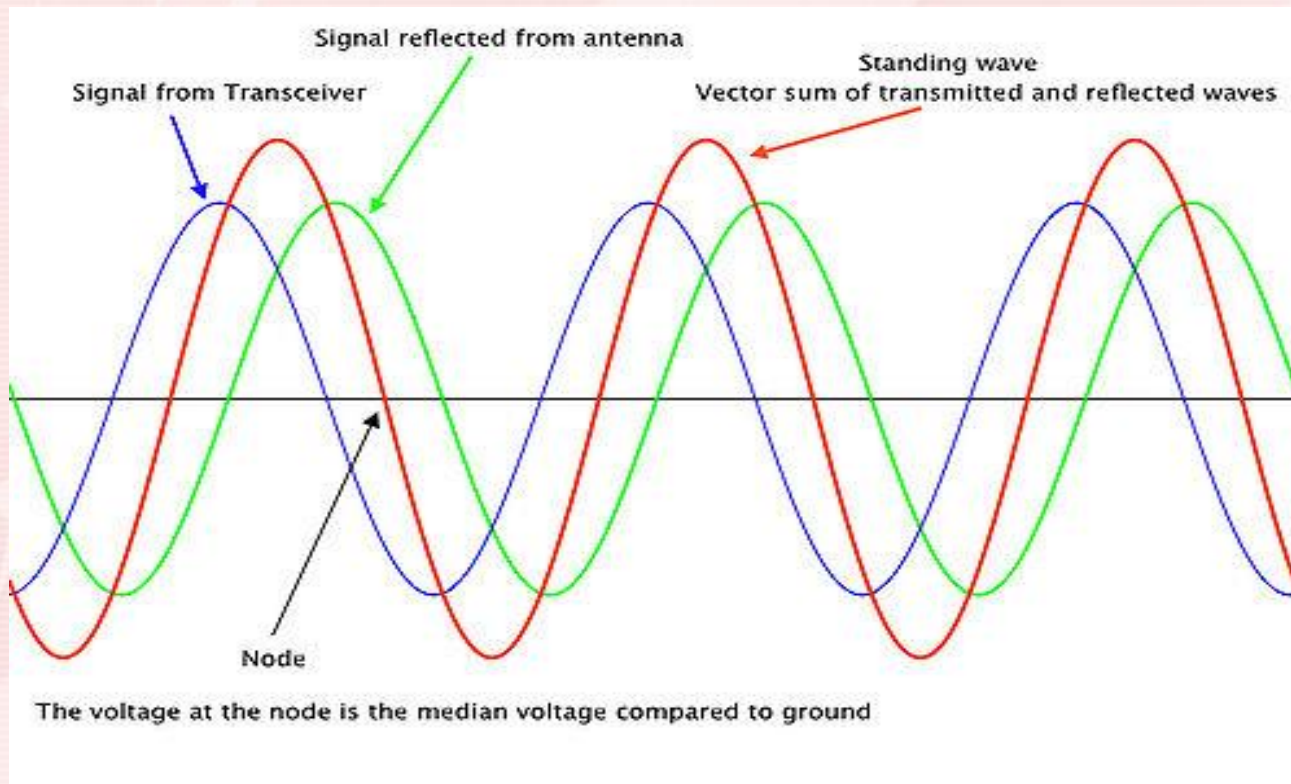
T 9 B

Topics

- Feed lines:
 - types, attenuation vs frequency, selecting;
 - SWR concepts;
 - Antenna tuners (couplers);
- RF Connectors:
 - selecting, weather
 - protection

T 9 B

- It is important to have a low SWR in an antenna system that uses coaxial cable feed line to reduce signal loss. T9B01



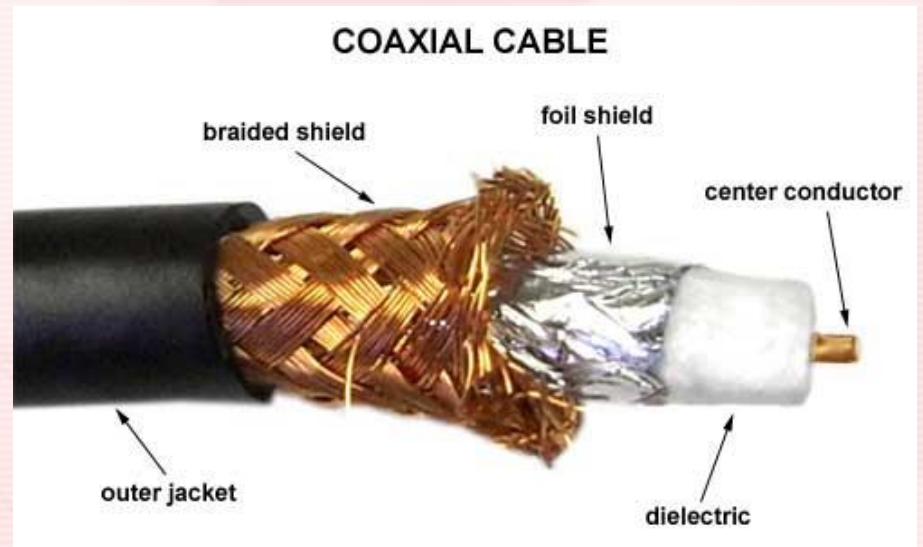
T 9 B

- Most coaxial cables used in amateur radio installations has 50 ohm impedance. T9B02



T 9 B

- Coaxial cable is the most common feed line selected for amateur radio antenna systems because it is easy to use and requires few special installation considerations. T9B03



T 9 B

- A major function of an antenna tuner (antenna coupler) is to match the antenna system impedance to the transceiver's output impedance. T9B04

Fully auto tuner



Icom AH4

Manual tuner



Palstar AT5K

T 9 B

- In general, as the frequency of a signal passing through coaxial cable is increased the losses increases. T9B05
- Type N connectors are most suitable for frequencies above 400 MHz. T9B06



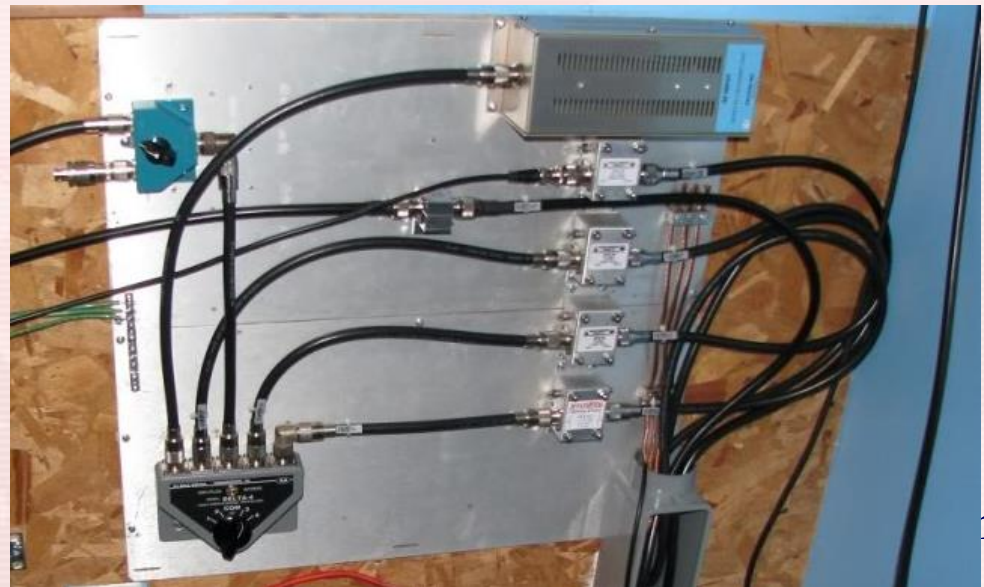
- PL-259 type coax connectors are commonly used at HF frequencies. T9B07



T 9 B

- Coax connectors exposed to the weather should be sealed against water intrusion to prevent an increase in feed line loss. T9B08
- Erratic changes in SWR readings might be caused by a loose connection in an antenna or a feed line T9B09.

**Make sure all your
coaxial
connections are
tight to help
minimize
interference and
erratic conditions.**



T 9 B

- The electrical difference existing between the smaller RG-58 and larger RG-8 coaxial cables is that the RG-8 has less loss at a given frequency. T9B10

RG-8



RG-58



- The lowest loss at VHF and UHF type of feed line is air-insulated hardline coax. T9B11

Element 2 Technician Class Question Pool

T 9 A – T 9 B

- 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

T9A02 Which of the following describes a type of antenna loading?

- 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 in the base of a mobile vertical antenna to make it more flexible
- D. Strengthening the radiating elements of a beam antenna to better resist wind damage

Which of the following describes a simple dipole oriented 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

T9A04 What is a disadvantage of the "rubber duck" antenna supplied with most handheld radio transceivers when compared to a full-sized quarter-wave antenna?

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

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 capacity hats to the ends of the radiating wires

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

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

What is a disadvantage of using a handheld VHF transceiver, with its integral antenna, inside a vehicle?

- A. Signals might not propagate will due to the shielding effect of the vehicle
- B. It might cause the transceiver to overheat
- C. The SWR might decrease, decreasing the signal strength
- D. All of these choices are correct

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

A. 112

B. 50

C. 19

D. 12

T9A09

What is the approximate length, in inches, of a half-wavelength 6 meter dipole antenna?

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

In which direction does a half-wave dipole radiate the strongest signal?

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

T9A11 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

What is an advantage of using a properly mounted $5/8$ wavelength antenna for VHF or UHF mobile service?

- A. It offers a lower radiation angle and more gain than a $1/4$ wavelength antenna
- B. It has very high angle of radiation for better communicating through a repeater
- C. It eliminates distortion caused by reflected signals
- D. It has 10-times power gain over a $1/4$ wavelength design

Why is it important to have low SWR when using coaxial cable feed line?

- A. To reduce television interference
- B. To reduce signal losses
- C. To prolong antenna life
- D. All of these choices are correct

T9B02

What is the impedance of the most coaxial cables used in amateur radio installations?

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

Why is coaxial cable the most common feed line selected 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 feedline
- C. It can handle more power than any other type of feedline
- D. It is less expensive than any other types of feedline

What is the major function of an antenna tuner (antenna coupler)?

- 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

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

- A. The characteristic impedance decreases
- B. The loss decreases
- C. The characteristic impedance increases
- D. The loss increases

T9B06

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

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

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

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

What might cause erratic changes in SWR readings?

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

What is the electrical difference between RG-58 and RG-8 coaxial cables?

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

T9B11 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