Technician Licensing Class

Antennas

Presented by

Amateur Radio Technician Class
Element 2 Course Presentation

ELEMENT 2 SUB-ELEMENTS
(Groupings)

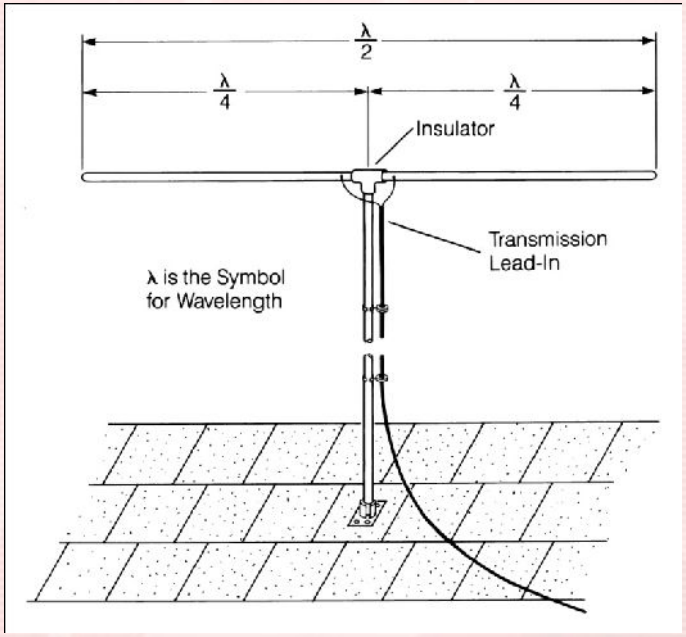
- **About Ham Radio**
- **Call Signs**
- **Control**
- **Mind the Rules**
- **Tech Frequencies**
- **Your First Radio**
- **Going On The Air!**
- **Repeaters**
- **Emergency!**
- **Weak Signal Propagation**

Amateur Radio Technician Class
Element 2 Course Presentation

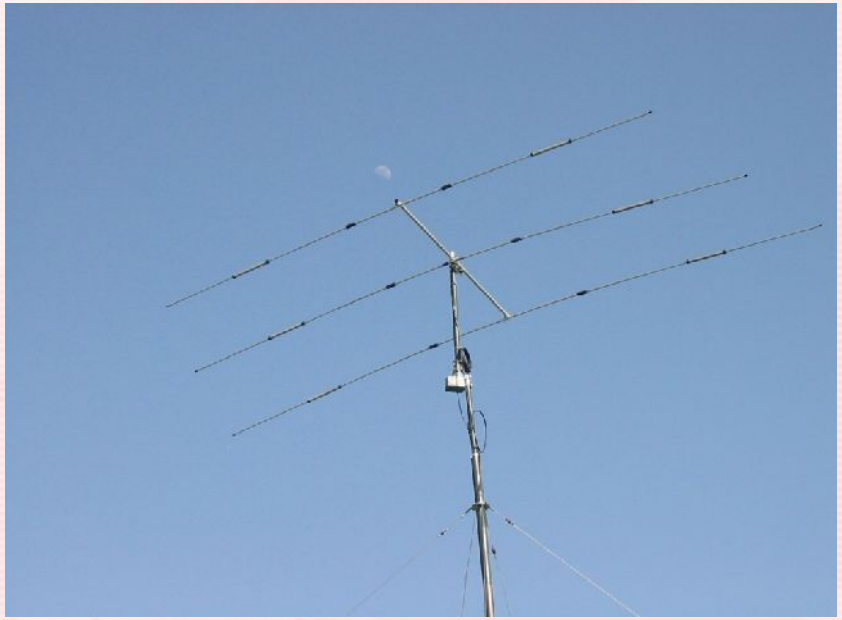
- **ELEMENT 2 SUB-ELEMENTS (Groupings)**
  - **Talk to Outer Space!**
  - **Your Computer Goes Ham Digital!**
  - **Multi-Mode Radio Excitement**
  - **Run Some Interference Protection**
  - **Electrons – Go With the Flow!**
  - **It's the Law, per Mr. Ohm!**
  - **Go Picture These!**
  - **Antennas**
  - **Feed Me with Some Good Coax!**
  - **Safety First!**

Antennas

- T9A3 A simple dipole mounted so the conductor is parallel to the Earth's surface is a horizontally polarized antenna.
  - Polarization is referenced to the Earth’s surface
    - Horizontal or Vertical



Simple Dipole



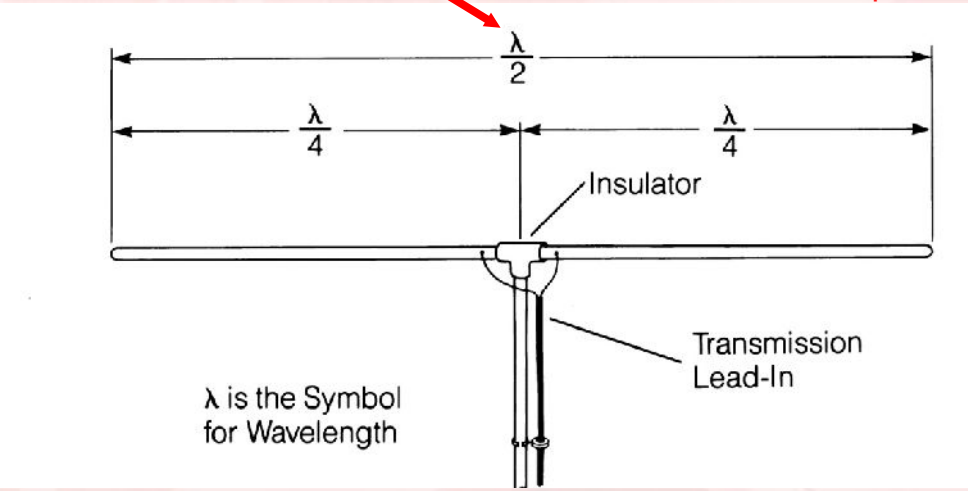
Three element beam

Antennas

- T9A10 The strongest radiation from a half-wave dipole antenna in free space is broadside to the antenna.
- T9A9 The approximate length of a 6 meter 1/2-wavelength wire dipole antenna is 112 inches.

112 inches

Length of vertical in feet = (for half-wave dipole) $\frac{468}{f\ (MHz)}$



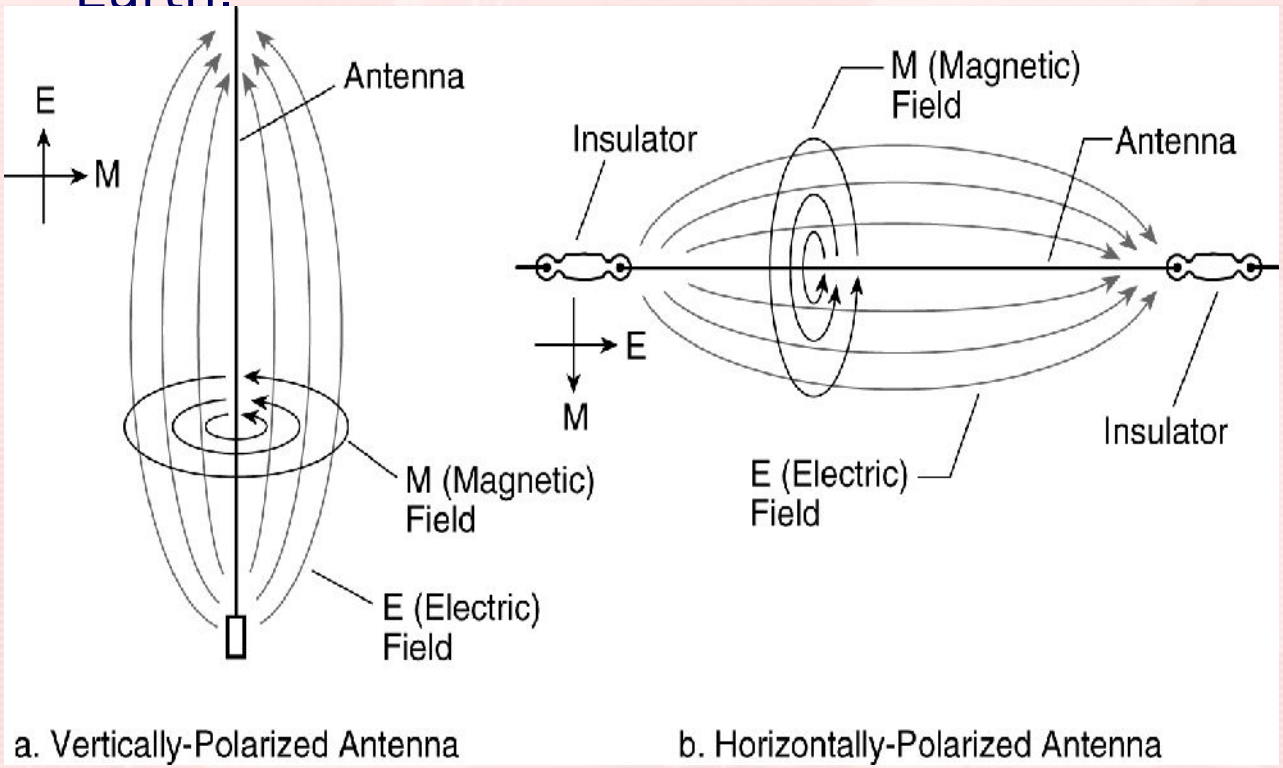
Six Meter ½ Wavelength Dipole

Feet = 468/50 = 9.36

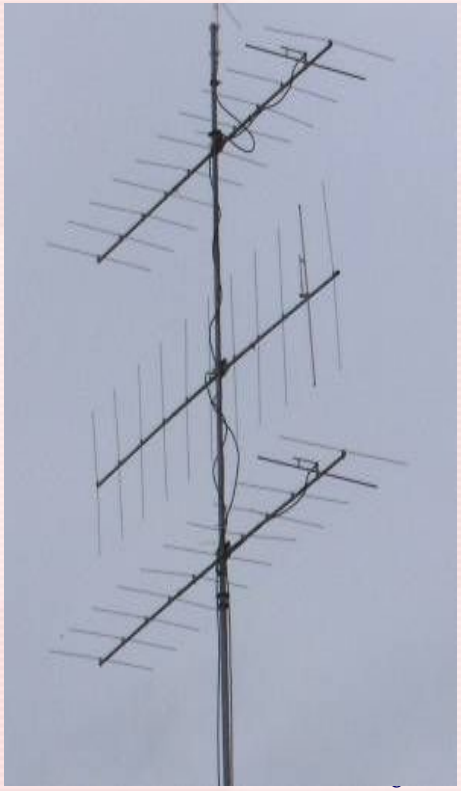
9.36 x 12 = 112.3 inches

Antennas

- T9A5 You would change a dipole antenna to make it resonant on a higher frequency by making it shorter.
- T9A2 The electric field of vertical antennas is perpendicular to the Earth.



Vertical and Horizontal Polarization



H & V Polarized Antennas

Antennas

- T9A8 The approximate length of a quarter-wavelength vertical antenna for 146 MHz is 19 inches.

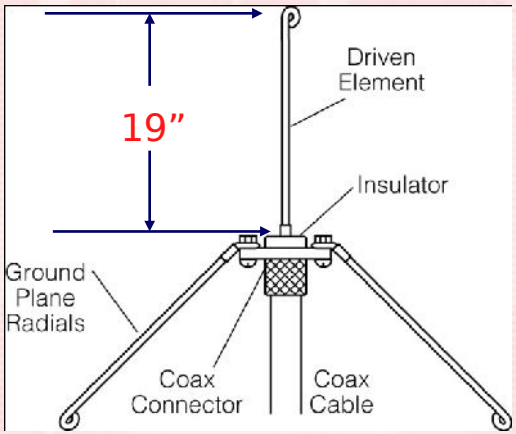
Length of vertical in feet = $\frac{234}{f\ (MHz)}$

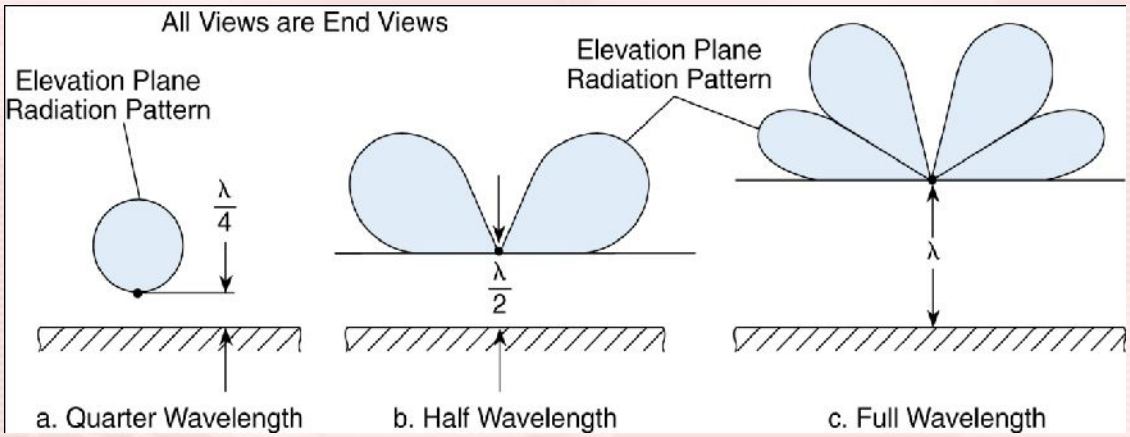
(for quarter-wave dipole)

(2-meters is 144-148 MHz)

Feet = 234/146 = 1.6

1.6 x 12 = 19 inches

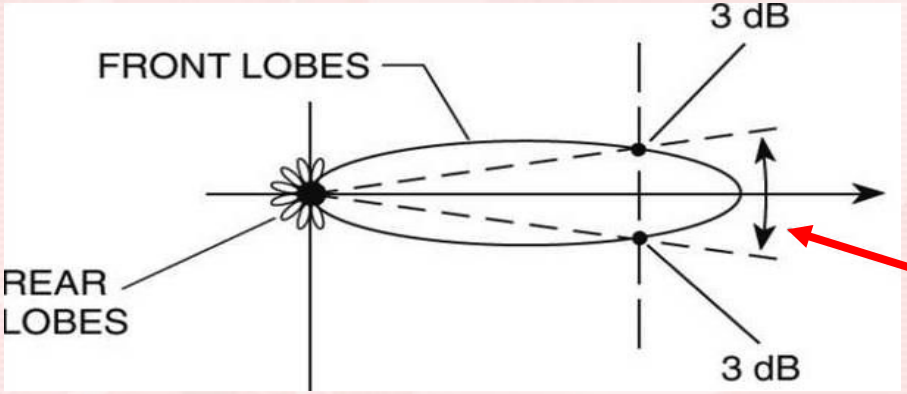




Radiation Pattern of an Antenna Changes as Height Above Ground is Varied

Antennas

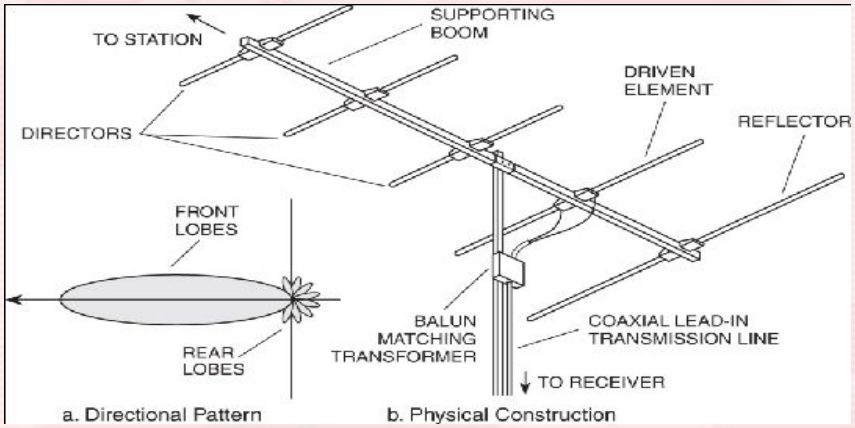
- T9A6 Directional antennas are the quad, Yagi, and dish.



Highest concentration of power

Directional Radiation Pattern of a Yagi Beam

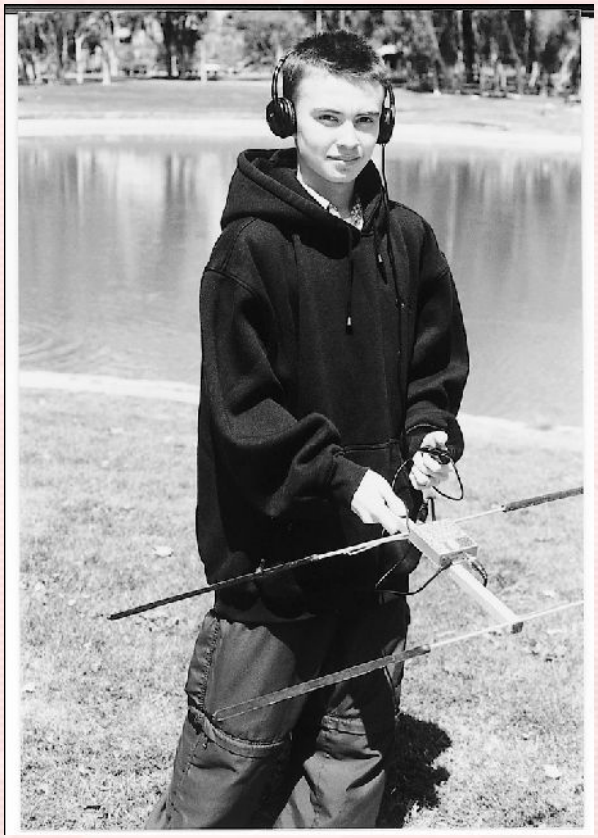
- T9A1 A beam antenna concentrates signals in one direction



A Beam Antenna – The Yagi

Antennas

- T8C1 Radio direction finding methods are used to locate sources of noise interference or jamming.



2-element Yagi DF Antenna

3-element Quad DF Antenna

Antennas

- T8C2 A directional antenna would be useful for a hidden transmitter hunt.

Hidden Transmitter Hunts are called Fox Hunting

All ages participate in a Fox Hunt

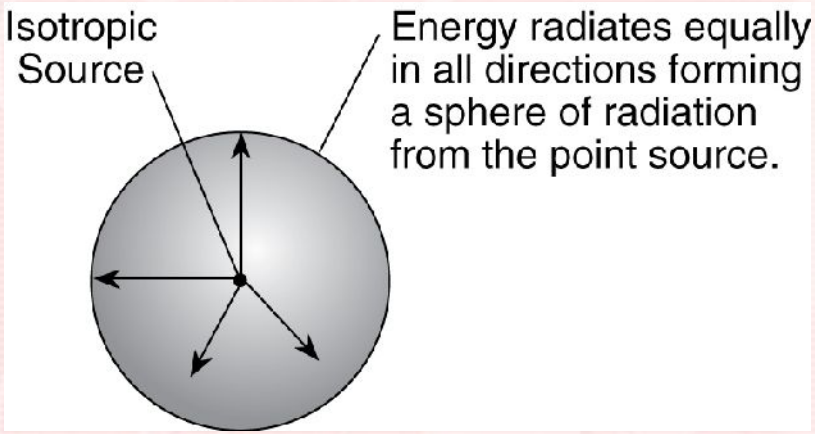
Antennas

- T3A5 When using a directional antenna, your station might be able to access a distant repeater if buildings or obstructions are blocking the direct line of sight path by finding a path that reflects signals to the repeater.

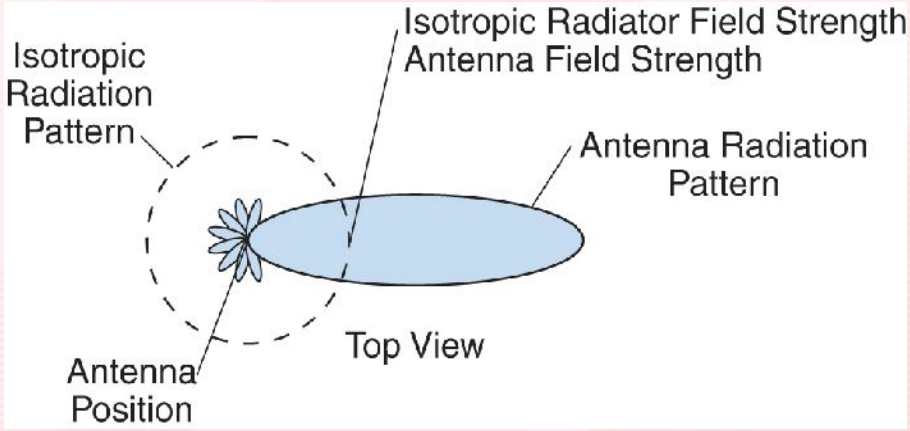
Directional Antenna used to bounce signal to reach repeater blocked by building

Antennas

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



Isotropic Radiator Pattern

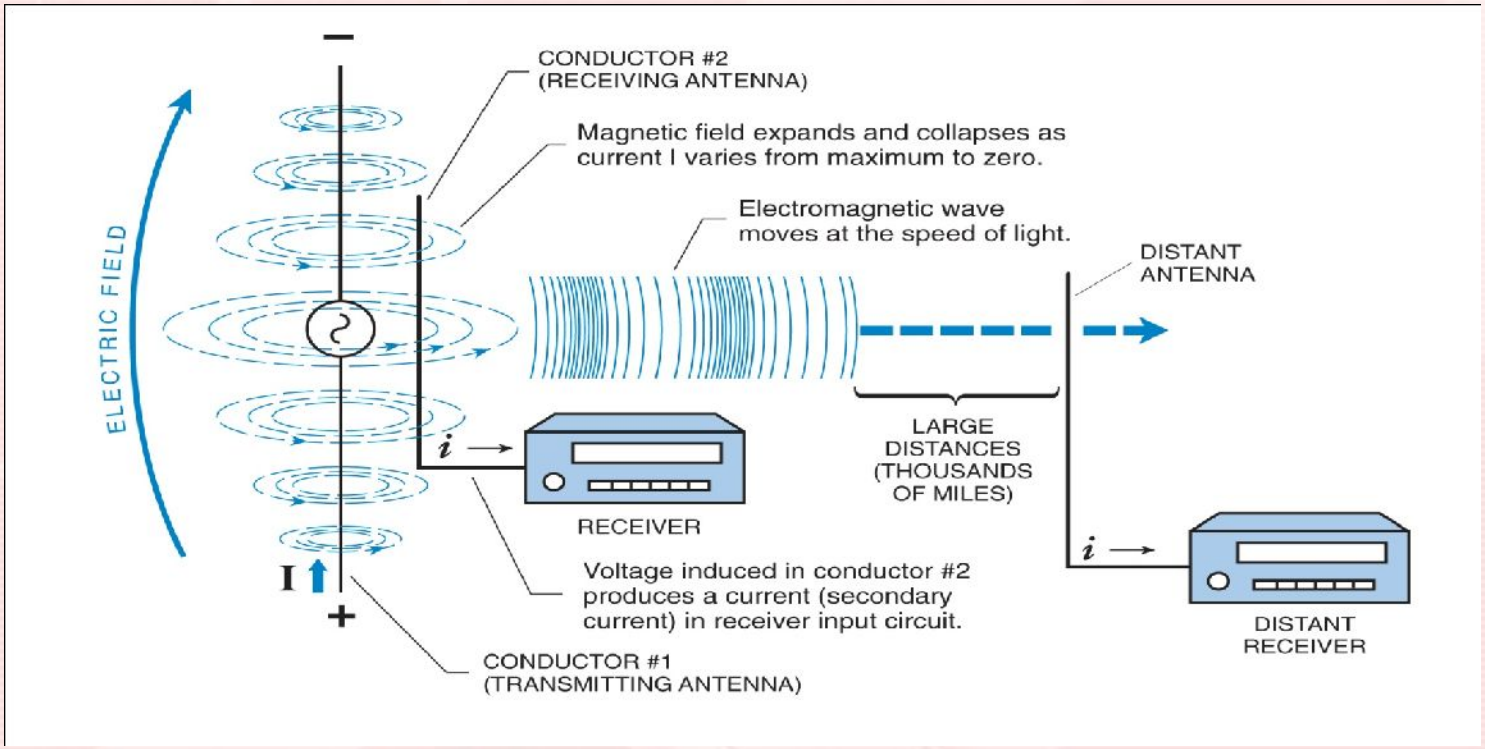


"Gain" of an antenna

- T3A3 Horizontal antenna polarization is normally used for long-distance weak-signal CW and SSB contacts using the VHF and UHF bands

Antennas

- T3A4 Signals could be significantly weaker if the antennas at opposite ends of a VHF or UHF line of sight radio link are not using the same polarization.



Transmitter to Receiver – Radio waves from transmitting antennas induce signals in receiving antennas as they pass by

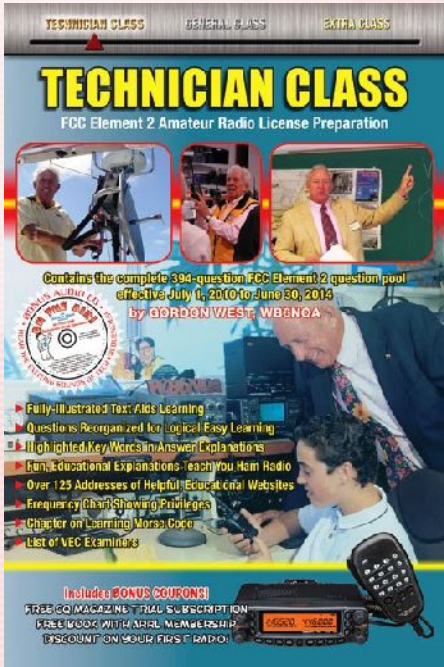
Element 2 Technician Class Question Pool

Antennas

Valid July 1, 2010

Through

June 30, 2014



T9A03 simple parallel

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

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

T9A10 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 feedline

T9A09 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

T9A05 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

T9A02 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

T9A08 What is the approximate length, in inches, of a quarter-wavelength vertical antenna for 146 MHz?

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

T9A06 What type of antennas are the quad, Yagi, and dish?

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

T9A01 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

T8C01 Which of the following methods is used to locate sources of noise interference or jamming?

A. Echolocation
B. Doppler radar
C. Radio direction finding
D. Phase locking

T8C02 Which of these items would be useful for a hidden transmitter hunt?

A. Calibrated SWR meter
B. A directional antenna
C. A calibrated noise bridge
D. All of these choices are correct

T3A05 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

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

T3A03 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

T3A04 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