8-24-91

3AD-2-2.1 How can the range of a voltmeter be extended?
A. By adding resistance in series with the circuit under test
B. By adding resistance in parallel with the circuit under test
C. By adding resistance in series with the meter
D. By adding resistance in parallel with the meter

3AD-3-1.1 How is an ammeter typically connected to a circuit under test?
A. In series with the circuit
B. In parallel with the circuit
C. In quadrature with the circuit
D. In phase with the circuit

3AD-3-2.1 How can the range of an ammeter be extended?
A. By adding resistance in series with the circuit under test
B. By adding resistance in parallel with the circuit under test
C. By adding resistance in series with the meter
D. By adding resistance in parallel with the meter

3AD-4.1 What is a *multimeter*?
A. An instrument capable of reading SWR and power
B. An instrument capable of reading resistance, capacitance and inductance
C. An instrument capable of reading resistance and reactance
D. An instrument capable of reading voltage, current and resistance

Pg 117+19 Q13

3AD-5-1.1 Where in the antenna transmission line should a peak-reading wattmeter be attached to determine the transmitter output power?
A. At the transmitter output
B. At the antenna feed point
C. One-half wavelength from the antenna feed point
D. One-quarter wavelength from the transmitter output

3AD-5-1.2 For the most accurate readings of transmitter output power, where should the RF wattmeter be inserted?
A. The wattmeter should be inserted and the output measured one-quarter wavelength from the antenna feed point
B. The wattmeter should be inserted and the output measured one-half wavelength from the antenna feed point
C. The wattmeter should be inserted and the output power measured at the transmitter antenna jack
D. The wattmeter should be inserted and the output power measured at the Transmatch output

Pg 7

3AD-5-1.3 At what line impedance are RF wattmeters usually designed to operate?
A. 25 ohms
B. 50 ohms
C. 100 ohms
D. 300 ohms

3AD-5-1.4 What is a *directional wattmeter*?
A. An instrument that measures forward or reflected power
B. An instrument that measures the directional pattern of an antenna
C. An instrument that measures the energy consumed by the transmitter
D. An instrument that measures thermal heating in a load resistor

Pg 7 Q15

3AD-5-2.1 If a directional RF wattmeter indicates 90 watts forward power and 10 watts reflected power, what is the actual transmitter output power?
A. 10 watts
B. 80 watts
C. 90 watts
D. 100 watts

Pg 1

3AD-5-2.2 If a directional RF wattmeter indicates 96 watts forward power and 4 watts reflected power, what is the actual transmitter output power?
A. 80 watts
B. 88 watts
C. 92 watts
D. 100 watts

Pg 1

3AD-6.1 What is a *marker generator*?
A. A high-stability oscillator that generates a series of reference signals at known frequency intervals
B. A low-stability oscillator that "sweeps" through a band of frequencies
C. An oscillator often used in aircraft to determine the craft's location relative to the inner and outer markers at airports
D. A high-stability oscillator whose output frequency and amplitude can be varied over a wide range

3AD-6.2 What type of circuit is used to inject a frequency calibration signal into a communications receiver?
A. A product detector
B. A receiver incremental tuning circuit
C. A balanced modulator
D. A crystal calibrator

3AD-6.3 How is a *marker generator* used?
A. To calibrate the tuning dial on a receiver
B. To calibrate the volume control on a receiver
C. To test the amplitude linearity of an SSB transmitter
D. To test the frequency deviation of an FM transmitter

3AD-7.1 What piece of test equipment produces a stable, low-level signal that can be set to a specific frequency?
A. A wavemeter
B. A reflectometer
C. A signal generator
D. A balanced modulator

3AD-7.2 What is an *RF signal generator* commonly used for?
A. Measuring RF signal amplitude
B. Aligning receiver tuned circuits
C. Adjusting the transmitter impedance-matching network
D. Measuring transmission line impedance

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3AD-8-1.1 What is a *reflectometer*?
A. An instrument used to measure signals reflected from the ionosphere
B. An instrument used to measure radiation resistance
C. An instrument used to measure transmission-line impedance
D. An instrument used to measure standing wave ratio

3AD-8-1.2 What is the device that can indicate an impedance mismatch in an antenna system?
A. A field-strength meter
B. A set of lecher wires
C. A wavemeter
D. A reflectometer

3AD-8-2.1 For best accuracy when adjusting the impedance match between an antenna and feed line, where should the match-indicating device be inserted?
A. At the antenna feed point
B. At the transmitter
C. At the midpoint of the feed line
D. Anywhere along the feed line

3AD-8-2.2 Where should a reflectometer be inserted into a long antenna transmission line in order to obtain the most valid standing wave ratio indication?
A. At any quarter-wavelength interval along the transmission line
B. At the receiver end
C. At the antenna end
D. At any even half-wavelength interval along the transmission line

3AD-9.1 When adjusting a transmitter filter circuit, what device is connected to the transmitter output?
A. A multimeter
B. A set of Litz wires
C. A receiver
D. A dummy antenna

Pgs 2+8 Q14

3AD-9.2 What is a *dummy antenna*?
A. An isotropic radiator
B. A nonradiating load for a transmitter
C. An antenna used as a reference for gain measurements
D. The image of an antenna, located below ground

Pg 8

3AD-9.3 Of what materials may a dummy antenna be made?
A. A wire-wound resistor
B. A diode and resistor combination
C. A noninductive resistor
D. A coil and capacitor combination

3AD-9.4 What station accessory is used in place of an antenna during transmitter tests so that no signal is radiated?
A. A Transmatch
B. A dummy antenna
C. A low-pass filter
D. A decoupling resistor

Pg 2

3AD-9.5 What is the purpose of a *dummy load*?
A. To allow off-the-air transmitter testing
B. To reduce output power for QRP operation
C. To give comparative signal reports
D. To allow Transmatch tuning without causing interference

Pg 2

3AD-9.6 How many watts should a dummy load for use with a 100-watt single-sideband phone transmitter be able to dissipate?
A. A minimum of 100 watts continuous
B. A minimum of 141 watts continuous
C. A minimum of 175 watts continuous
D. A minimum of 200 watts continuous

3AD-10.1 What is an *S-meter*?
A. A meter used to measure sideband suppression
B. A meter used to measure spurious emissions from a transmitter
C. A meter used to measure relative signal strength in a receiver
D. A meter used to measure solar flux

3AD-10.2 A meter that is used to measure relative signal strength in a receiver is known as what?
A. An S-meter
B. An RST-meter
C. A signal deviation meter
D. An SSB meter

3AD-11-1.1 Large amounts of RF energy may cause damage to body tissue, depending on the wavelength of the signal, the energy density of the RF field, and other factors. How does RF energy effect body tissue?
A. It causes radiation poisoning
B. It heats the tissue
C. It cools the tissue
D. It produces genetic changes in the tissue

3AD-11-1.2 Which body organ is most susceptible to damage from the heating effects of radio frequency radiation?
A. Eyes
B. Hands
C. Heart
D. Liver

Pg 11

3AD-11-2.1 Scientists have devoted a great deal of effort to determine safe RF exposure limits. What organization has established an RF protection guide?
A. The Institute of Electrical and Electronics Engineers
B. The American Radio Relay League
C. The Environmental Protection Agency
D. The American National Standards Institute

Pgs 2+19

3AD-11-2.2 What is the purpose of the ANSI RF protection guide?
A. It protects you from unscrupulous radio dealers
B. It sets RF exposure limits under certain circumstances
C. It sets transmitter power limits
D. It sets antenna height requirements

Pg 1 Q 12

3AD-11-2.3 The American National Standards Institute RF protection guide sets RF exposure limits under certain circumstances. In what frequency range is the maximum exposure level the most stringent (lowest)?
A. 3 to 30 MHz
B. 30 to 300 MHz
C. 300 to 3000 MHz
D. Above 1.5 GHz

10

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3AD-11-2.4 The American National Standards Institute RF protection guide sets RF exposure limits under certain circumstances. Why is the maximum exposure level the most stringent (lowest) in the ranges between 30 MHz and 300 MHz?
A. There are fewer transmitters operating in this frequency range
B. There are more transmitters operating in this frequency range
C. Most transmissions in this frequency range are for an extended time
D. Human body lengths are close to whole-body resonance in that range

3AD-11-2.5 The American National Standards Institute RF protection guide sets RF exposure limits under certain circumstances. What is the maximum safe power output to the antenna terminal of a hand-held VHF or UHF radio, as set by this RF protection guide?
A. 125 milliwatts
B. 7 watts
C. 10 watts
D. 25 watts

3AD-11-3.1 After you make internal tuning adjustments to your VHF power amplifier, what should you do before you turn the amplifier on?
Pg 11
A. Remove all amplifier shielding to ensure maximum cooling
B. Connect a noise bridge to eliminate any interference
C. Be certain all amplifier shielding is fastened in place
D. Be certain no antenna is attached so that you will not cause any interference

SUBELEMENT 3AE—Electrical Principles (3 Exam Questions)

3AE-1-1.1 What is meant by the term *resistance*?
A. The opposition to the flow of current in an electric circuit containing inductors
B. The opposition to the flow of current in an electric circuit containing capacitance
C. The opposition to the flow of current in an electric circuit containing reactance
D. The opposition to the flow of current in an electric circuit that does not contain reactance

3AE-1-2.1 What is an *ohm*?
Pg 3
A. The basic unit of resistance
B. The basic unit of capacitance
C. The basic unit of inductance
D. The basic unit of admittance

3AE-1-2.2 What is the unit measurement of resistance?
Pg 3
A. Volt
B. Ampere
C. Joule
D. Ohm

3AE-1-3.1 Two equal-value resistors are connected in series. How does the total resistance of this combination compare with the value of either resistor by itself?
A. The total resistance is half the value of either resistor
B. The total resistance is twice the value of either resistor
C. The total resistance is the same as the value of either resistor
D. The total resistance is the square of the value of either resistor

3AE-1-3.2 How does the total resistance of a string of series-connected resistors compare to the values of the individual resistors?
A. The total resistance is the square of the sum of all the individual resistor values
B. The total resistance is the square root of the sum of the individual resistor values
C. The total resistance is the sum of the squares of the individual resistor values
D. The total resistance is the sum of all the individual resistance values

3AE-1-4.1 Two equal-value resistors are connected in parallel. How does the total resistance of this combination compare with the value of either resistor by itself?
A. The total resistance is twice the value of either resistor
B. The total resistance is half the value of either resistor
C. The total resistance is the square of the value of either resistor
D. The total resistance is the same as the value of either resistor

3AE-1-4.2 How does the total resistance of a string of parallel-connected resistors compare to the values of the individual resistors?
A. The total resistance is the square of the sum of the resistor values
B. The total resistance is more than the highest-value resistor in the combination
C. The total resistance is less than the smallest-value resistor in the combination
D. The total resistance is the same as the highest-value resistor in the combination

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3AE-2.1 What is *Ohm's Law*?
A. A mathematical relationship between resistance, voltage and power in a circuit
B. A mathematical relationship between current, resistance and power in a circuit
C. A mathematical relationship between current, voltage and power in a circuit
D. A mathematical relationship between resistance, current and applied voltage in a circuit

Pg 8 Page 20

3AE-2.2 How is the current in a DC circuit calculated when the voltage and resistance are known?
A. I = E / R
B. P = I × E
C. I = R × E
D. I = E × R

3AE-2.3 What is the input resistance of a load when a 12-volt battery supplies 0.25 amperes to it?
A. 0.02 ohms
B. 3 ohms
C. 48 ohms
D. 480 ohms

3AE-2.4 The product of the current and what force gives the electrical power in a circuit?
A. Magnetomotive force
B. Centripetal force
C. Electrochemical force
D. Electromotive force

3AE-2.5 What is the input resistance of a load when a 12-volt battery supplies 0.15 amperes to it?
A. 8 ohms
B. 80 ohms
C. 100 ohms
D. 800 ohms

3AE-2.6 When 120 volts is measured across a 4700-ohm resistor, approximately how much current is flowing through it?
A. 39 amperes
B. 3.9 amperes
C. 0.26 ampere
D. 0.026 ampere

3AE-2.7 When 120 volts is measured across a 47000-ohm resistor, approximately how much current is flowing through it?
A. 392 A
B. 39.2 A
C. 26 mA
D. 2.6 mA

3AE-2.8 When 12 volts is measured across a 4700-ohm resistor, approximately how much current is flowing through it?
A. 2.6 mA
B. 26 mA
C. 39.2 A
D. 392 A

3AE-2.9 When 12 volts is measured across a 47000-ohm resistor, approximately how much current is flowing through it?
A. 255 μA
B. 255 mA
C. 3917 mA
D. 3917 A

3AE-3-1.1 What is the term used to describe the ability of a component to store energy in a magnetic field?
A. Admittance
B. Capacitance
C. Inductance
D. Resistance

Pg 2

3AE-3-2.1 What is the basic unit of inductance?
A. Coulomb
B. Farad
C. Henry
D. Ohm

3AE-3-2.2 What is a *henry*?
A. The basic unit of admittance
B. The basic unit of capacitance
C. The basic unit of inductance
D. The basic unit of resistance

3AE-3-2.3 What is a *microhenry*?
A. A basic unit of inductance equal to 10^{-12} henrys
B. A basic unit of inductance equal to 10^{-6} henrys
C. A basic unit of inductance equal to 10^{-3} henrys
D. A basic unit of inductance equal to 10^{6} henrys

3AE-3-2.4 What is a *millihenry*?
A. A basic unit of inductance equal to 10^{-12} henrys
B. A basic unit of inductance equal to 10^{-6} henrys
C. A basic unit of inductance equal to 10^{-3} henrys
D. A basic unit of inductance equal to 10^{6} henrys

3AE-3-3.1 Two equal-value inductors are connected in series. How does the total inductance of this combination compare with the value of either inductor by itself?
A. The total inductance is half the value of either inductor
B. The total inductance is twice the value of either inductor
C. The total inductance is equal to the value of either inductor
D. No comparison can be made without knowing the exact inductances

3AE-3-3.2 How does the total inductance of a string of series-connected inductors compare to the values of the individual inductors?
A. The total inductance is equal to the average of all the individual inductances
B. The total inductance is equal to less than the value of the smallest inductance
C. The total inductance is equal to the sum of all the individual inductances
D. No comparison can be made without knowing the exact inductances

3AE-3-4.1 Two equal-value inductors are connected in parallel. How does the total inductance of this combination compare with the value of either inductor by itself?
A. The total inductance is half the value of either inductor
B. The total inductance is twice the value of either inductor
C. The total inductance is equal to the square of either inductance
D. No comparison can be made without knowing the exact inductances

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3AE-3-4.2 How does the total inductance of a string of parallel-connected inductors compare to the values of the individual inductors?
A. The total inductance is equal to the sum of the inductances in the combination
B. The total inductance is less than the smallest inductance value in the combination
C. The total inductance is equal to the average of the inductances in the combination
D. No comparison can be made without knowing the exact inductances

3AE-4-1.1 What is the term used to describe the ability of a component to store energy in an electric field?
A. Capacitance
B. Inductance
C. Resistance
D. Tolerance

Pg 21 & 20

3AE-4-2.1 What is the basic unit of capacitance?
A. Farad
B. Ohm
C. Volt
D. Ampere

Pg 21 & 20

3AE-4-2.2 What is a *microfarad*?
A. A basic unit of capacitance equal to 10^{-12} farads
B. A basic unit of capacitance equal to 10^{-6} farads
C. A basic unit of capacitance equal to 10^{-2} farads
D. A basic unit of capacitance equal to 10^{6} farads

Pg 21 & 20

3AE-4-2.3 What is a *picofarad*?
A. A basic unit of capacitance equal to 10^{-12} farads
B. A basic unit of capacitance equal to 10^{-6} farads
C. A basic unit of capacitance equal to 10^{-2} farads
D. A basic unit of capacitance equal to 10^{6} farads

3AE-4-2.4 What is a *farad*?
A. The basic unit of resistance
B. The basic unit of capacitance
C. The basic unit of inductance
D. The basic unit of admittance

Pg 21 & 20

3AE-4-3.1 Two equal-value capacitors are connected in series. How does the total capacitance of this combination compare with the value of either capacitor by itself?
A. The total capacitance is twice the value of either capacitor
B. The total capacitance is equal to the value of either capacitor
C. The total capacitance is half the value of either capacitor
D. No comparison can be made without knowing the exact capacitances

3AE-4-3.2 How does the total capacitance of a string of series-connected capacitors compare to the values of the individual capacitors?
A. The total capacitance is equal to the sum of the capacitances in the combination
B. The total capacitance is less than the smallest value of capacitance
C. The total capacitance is equal to the average of the capacitances in the combination
D. No comparison can be made without knowing the exact capacitances

3AE-4-4.1 Two equal-value capacitors are connected in parallel. How does the total capacitance of this combination compare with the value of either capacitor by itself?
A. The total capacitance is twice the value of either capacitor
B. The total capacitance is half the value of either capacitor
C. The total capacitance is equal to the value of either capacitor
D. No comparison can be made without knowing the exact capacitances

3AE-4-4.2 How does the total capacitance of a string of parallel-connected capacitors compare to the values of the individual capacitors?
A. The total capacitance is equal to the sum of the capacitances in the combination
B. The total capacitance is less than the smallest value of capacitance in the combination
C. The total capacitance is equal to the average of the capacitances in the combination
D. No comparison can be made without knowing the exact capacitances

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SUBELEMENT 3AF—Circuit Components
(2 Exam Questions)

3AF-1-1.1 What are the four common types of resistor construction?
A. Carbon-film, metal-film, micro-film and wire-film
B. Carbon-composition, carbon-film, metal-film and wire-wound
C. Carbon-composition, carbon-film, electrolytic and metal-film
D. Carbon-film, ferrite, carbon-composition and metal-film

3AF-1-2.1 What is the primary function of a resistor?
A. To store an electric charge
B. To store a magnetic field
C. To match a high-impedance source to a low-impedance load
D. To limit the current in an electric circuit

Pg 8 2+20

3AF-1-2.2 What is a *variable resistor*?
A. A resistor that changes value when an AC voltage is applied to it
B. A device that can transform a variable voltage into a constant voltage
C. A resistor with a slide or contact that makes the resistance adjustable
D. A resistor that changes value when it is heated

3AF-1-3.1 What do the first three color bands on a resistor indicate?
A. The value of the resistor in ohms
B. The resistance tolerance in percent
C. The power rating in watts
D. The value of the resistor in henrys

3AF-1-3.2 How can a carbon resistor's electrical tolerance rating be found?
A. By using a wavemeter
B. By using the resistor's color code
C. By using Thevenin's theorem for resistors
D. By using the Baudot code

3AF-1-3.3 What does the fourth color band on a resistor indicate?
A. The value of the resistor in ohms
B. The resistance tolerance in percent
C. The power rating in watts
D. The resistor composition

Pg 2, 8 + 20

3AF-1-3.4 When the color bands on a group of resistors indicate that they all have the same resistance, what further information about each resistor is needed in order to select those that have nearly equal value?
A. The working voltage rating of each resistor
B. The composition of each resistor
C. The tolerance of each resistor
D. The current rating of each resistor

3AF-1-4.1 Why do resistors generate heat?
A. They convert electrical energy to heat energy
B. They exhibit reactance
C. Because of skin effect
D. To produce thermionic emission

3AF-1-4.2 Why would a large size resistor be substituted for a smaller one of the same resistance?
A. To obtain better response
B. To obtain a higher current gain
C. To increase power dissipation capability
D. To produce a greater parallel impedance

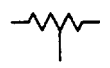
3AF-1-5.1 What is the symbol used to represent a fixed resistor on schematic diagrams?

HO #3

A.
B.
C.
D.

3AF-1-5.2 What is the symbol used to represent a variable resistor on schematic diagrams.

HO #3

A.
B.
C.
D. 

3AF-2-1.1 What is an inductor *core*?
A. The point at which an inductor is tapped to produce resonance
B. A tight coil of wire used in a transformer
C. An insulating material placed between the plates of an inductor
D. The central portion of a coil; may be made from air, iron, brass or other material

3AF-2-1.2 What are the component parts of a coil?
A. The wire in the winding and the core material
B. Two conductive plates and an insulating material
C. Two or more layers of silicon material
D. A donut-shaped iron core and a layer of insulating tape

Pg 8

3AF-2-1.3 Describe an *inductor*.
A. A semiconductor in a conducting shield
B. Two parallel conducting plates
C. A straight wire conductor mounted inside a Faraday shield
D. A coil of conducting wire

Pg 8

3AF-2-1.4 For radio frequency power applications, which type of inductor has the least amount of loss?
A. Magnetic wire
B. Iron core
C. Air core
D. Slug tuned

3AF-2-2.1 What is an *inductor*?
A. An electronic component that stores energy in an electric field
B. An electronic component that converts a high voltage to a lower voltage
C. An electronic component that opposes DC while allowing AC to pass
D. An electronic component that stores energy in a magnetic field

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3AF-2-2.2 What are the electrical properties of an inductor?

Q18 Pg 2

A. An inductor stores a charge electrostatically and opposes a change in voltage
B. An inductor stores a charge electrochemically and opposes a change in current
C. An inductor stores a charge electromagnetically and opposes a change in current
D. An inductor stores a charge electromechanically and opposes a change in voltage

3AF-2-3.1 What factors determine the amount of inductance in a *coil*?

A. The type of material used in the core, the diameter of the core and whether the coil is mounted horizontally or vertically
B. The diameter of the core, the number of turns of wire used to wind the coil and the type of metal used in the wire
C. The type of material used in the core, the number of turns used to wind the core and the frequency of the current through the coil
D. The type of material used in the core, the diameter of the core, the length of the coil and the number of turns of wire used to wind the coil

3AF-2-3.2 What can be done to raise the inductance of a 5-microhenry air-core coil to a 5-millihenry coil with the same physical dimensions?

A. The coil can be wound on a non-conducting tube
B. The coil can be wound on an iron core
C. Both ends of the coil can be brought around to form the shape of a donut, or toroid
D. The coil can be made of a heavier-gauge wire

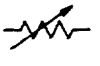
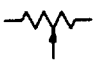
3AF-2-3.3 As an iron core is inserted in a coil, what happens to the inductance?

A. It increases
B. It decreases
C. It stays the same
D. It becomes voltage-dependent

3AF-2-3.4 As a brass core is inserted in a coil, what happens to the inductance?

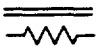
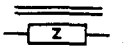
A. It increases
B. It decreases
C. It stays the same
D. It becomes voltage-dependent

3AF-2-4.1 What is the symbol used to represent an adjustable inductor on schematic diagrams?

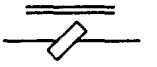
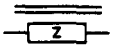
A.
B.
C. 
D. 

3AF-2-4.2 What is the symbol used to represent an iron-core inductor on schematic diagrams?

HO#3

A. 
B.
C.
D. 

3AF-2-4.3 What is the symbol used to represent an inductor wound over a toroidal core on schematic diagrams?

A. 
B.
C.
D. 

3AF-3-1.1 What is a capacitor *dielectric*?

Pg 2 Q19

A. The insulating material used for the plates
B. The conducting material used between the plates
C. The ferrite material that the plates are mounted on
D. The insulating material between the plates

3AF-3-1.2 What are the component parts of a capacitor?

Pg 2 + 8

A. Two or more conductive plates with an insulating material between them
B. The wire used in the winding and the core material
C. Two or more layers of silicon material
D. Two insulating plates with a conductive material between them

3AF-3-1.3 What is an *electrolytic capacitor*?

A. A capacitor whose plates are formed on a thin ceramic layer
B. A capacitor whose plates are separated by a thin strip of mica insulation
C. A capacitor whose dielectric is formed on one set of plates through electrochemical action
D. A capacitor whose value varies with applied voltage

3AF-3-1.4 What is a *paper capacitor*?

A. A capacitor whose plates are formed on a thin ceramic layer
B. A capacitor whose plates are separated by a thin strip of mica insulation
C. A capacitor whose plates are separated by a layer of paper
D. A capacitor whose dielectric is formed on one set of plates through electrochemical action

3AF-3-2.1 What is a *capacitor*?

Pg 2+8

A. An electronic component that stores energy in a magnetic field
B. An electronic component that stores energy in an electric field
C. An electronic component that converts a high voltage to a lower voltage
D. An electronic component that converts power into heat

3AF-3-2.2 What are the electrical properties of a capacitor?
A. A capacitor stores a charge electrochemically and opposes a change in current
B. A capacitor stores a charge electromagnetically and opposes a change in current
C. A capacitor stores a charge electromechanically and opposes a change in voltage
D. A capacitor stores a charge electrostatically and opposes a change in voltage

3AF-3-2.3 What factors must be considered when selecting a capacitor for a circuit?
A. Type of capacitor, capacitance and voltage rating
B. Type of capacitor, capacitance and the kilowatt-hour rating
C. The amount of capacitance, the temperature coefficient and the KVA rating
D. The type of capacitor, the microscopy coefficient and the temperature coefficient

3AF-3-2.4 How are the characteristics of a capacitor usually *specified?*
A. In volts and amperes
B. In microfarads and volts
C. In ohms and watts
D. In millihenrys and amperes

Pg 2,8 & 20

3AF-3-3.1 What factors determine the amount of capacitance in a *capacitor?*
A. The dielectric constant of the material between the plates, the area of one side of one plate, the separation between the plates and the number of plates
B. The dielectric constant of the material between the plates, the number of plates and the diameter of the leads connected to the plates
C. The number of plates, the spacing between the plates and whether the dielectric material is N type or P type
D. The dielectric constant of the material between the plates, the surface area of one side of one plate, the number of plates and the type of material used for the protective coating

3AF-3-3.2 As the plate area of a capacitor is increased, what happens to its capacitance?
A. Decreases
B. Increases
C. Stays the same
D. Becomes voltage dependent

3AF-3-3.3 As the plate spacing of a capacitor is increased, what happens to its capacitance?
A. Increases
B. Stays the same
C. Becomes voltage dependent
D. Decreases

3AF-3-4.1 What is the symbol used to represent an electrolytic capacitor on schematic diagrams?

A.
B.
C.
D.

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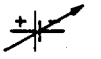
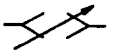
3AF-3-4.2 What is the symbol used to represent a variable capacitor on schematic diagrams?

A.
B. 
C.
D. 

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SUBELEMENT 3AG—Practical Circuits
(1 Exam Question)

3AG-1-1.1 Which frequencies are attenuated by a low-pass filter?
A. Those above its cut-off frequency
B. Those within its cut-off frequency
C. Those within 50 kHz on either side of its cut-off frequency
D. Those below its cut-off frequency

Pg 5 & 8

3AG-1-1.2 What circuit passes electrical energy below a certain frequency and blocks electrical energy above that frequency?
A. A band-pass filter
B. A high-pass filter
C. An input filter
D. A low-pass filter

Pg 5 & 8

3AG-1-2.1 Why does virtually every modern transmitter have a built-in low-pass filter connected to its output?
A. To attenuate frequencies below its cutoff point
B. To attenuate low frequency interference to other amateurs
C. To attenuate excess harmonic radiation
D. To attenuate excess fundamental radiation

3AG-1-2.2 You believe that excess harmonic radiation from your transmitter is causing interference to your television receiver. What is one possible solution for this problem?
A. Install a low-pass filter on the television receiver
B. Install a low-pass filter at the transmitter output
C. Install a high-pass filter on the transmitter output
D. Install a band-pass filter on the television receiver

Pg 10

3AG-2-1.1 What circuit passes electrical energy above a certain frequency and attenuates electrical energy below that frequency?
A. A band-pass filter
B. A high-pass filter
C. An input filter
D. A low-pass filter

Pg 5 & 8

3AG-2-2.1 Where is the proper place to install a high-pass *filter?*
A. At the antenna terminals of a television receiver
B. Between a transmitter and a Transmatch
C. Between a Transmatch and the transmission line
D. On a transmitting antenna

Pg 10

3AG-2-2.2 Your Amateur Radio transmissions cause interference to your television receiver even though you have installed a low-pass filter at the transmitter output. What is one possible solution for this problem?
A. Install a high-pass filter at the transmitter terminals
B. Install a high-pass filter at the television antenna terminals
C. Install a low-pass filter at the television antenna terminals also
D. Install a band-pass filter at the television antenna terminals

Pg 10

3AG-3-1.1 What circuit attenuates electrical energy above a certain frequency and below a lower frequency?
A. A band-pass filter
B. A high-pass filter
C. An input filter
D. A low-pass filter

Pg 5, 8 & 20

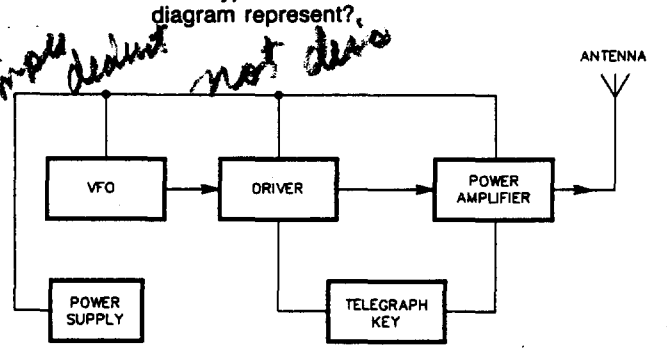
3AG-3-1.2 What general range of RF energy does a band-pass filter reject?
A. All frequencies above a specified frequency
B. All frequencies below a specified frequency
C. All frequencies above the upper limit of the band in question
D. All frequencies above a specified frequency and below a lower specified frequency

3AG-3-2.1 The IF stage of a communications receiver uses a filter with a peak response at the intermediate frequency. What term describes this filter response?
A. A band-pass filter
B. A high-pass filter
C. An input filter
D. A low-pass filter

3AG-4-1.1 What circuit is likely to be found in all types of receivers?
A. An audio filter
B. A beat frequency oscillator
C. A detector
D. An RF amplifier

3AG-4-1.2 What type of transmitter does this block diagram represent?

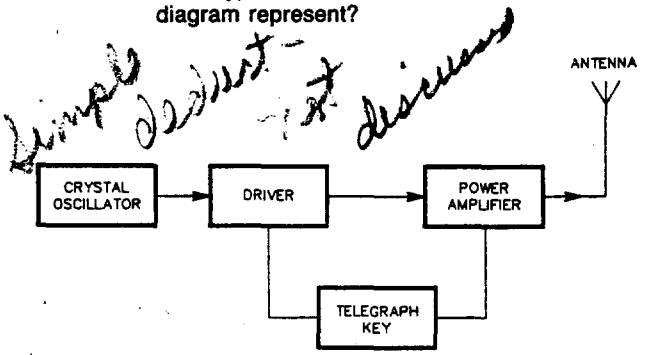
simple design not disc



A. A simple packet-radio transmitter
B. A simple crystal-controlled transmitter
C. A single-sideband transmitter
D. A VFO-controlled transmitter

3AG-4-1.3 What type of transmitter does this block diagram represent?

simple design not discussed



A. A simple packet-radio transmitter
B. A simple crystal-controlled transmitter
C. A single-sideband transmitter
D. A VFO-controlled transmitter

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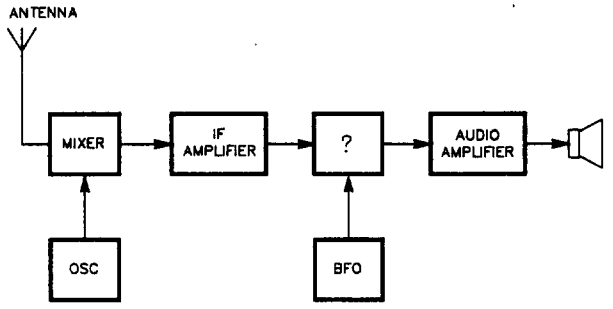
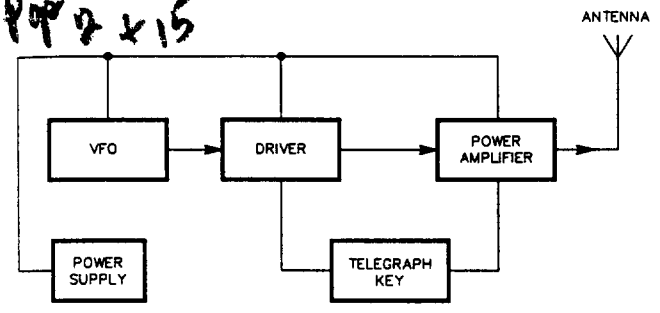
3AG-4-1.4 What is the unlabeled block (?) in this diagram?



A. An AGC circuit
B. A detector
C. A power supply
D. A VFO circuit

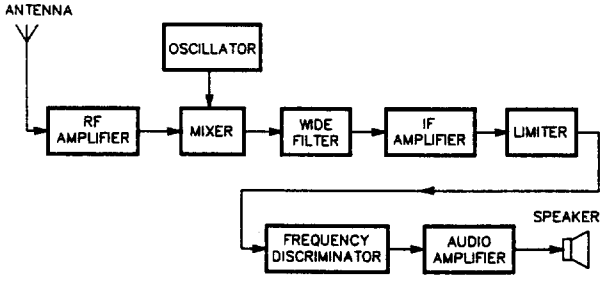
3AG-4-1.5 What type of device does this block diagram represent?

Pg 2 & 15



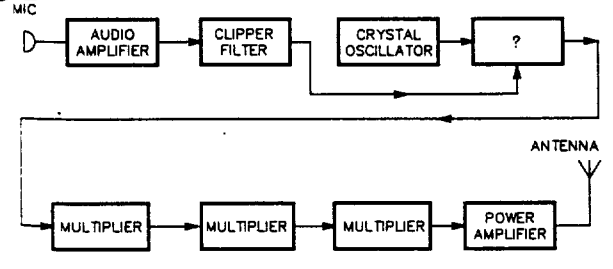
A. A double-conversion receiver
B. A variable-frequency oscillator
C. A simple superheterodyne receiver
D. A simple CW transmitter

3AG-4-2.1 What type of device does this block diagram represent?



A. A double-conversion receiver
B. A variable-frequency oscillator
C. A simple superheterodyne receiver
D. A simple FM receiver

3AG-4-2.2 What is the unlabeled block (?) in this diagram?



A. A band-pass filter
B. A crystal oscillator
C. A reactance modulator
D. A rectifier modulator

SUBELEMENT 3AH—Signals and Emissions (2 Exam Questions)

3AH-1.1 What is the meaning of the term *modulation*?
A. The process of varying some characteristic of a carrier wave for the purpose of conveying information
B. The process of recovering audio information from a received signal
C. The process of increasing the average power of a single-sideband transmission
D. The process of suppressing the carrier in a single-sideband transmitter

3AH-2-1.1 If the modulator circuit of your FM transmitter fails, what emission type would likely result?
A. An unmodulated carrier wave
B. A phase modulated carrier wave
C. An amplitude modulated carrier wave
D. A frequency modulated carrier wave

Pg 9 & 21 & 22

3AH-2-1.2 What emission does not have sidebands resulting from modulation?
A. AM phone
B. Test
C. FM phone
D. RTTY

3AH-2-2.1 What is the FCC emission designator for a Morse code telegraphy signal produced by switching the transmitter output on and off?
A. Test
B. AM phone
C. CW
D. RTTY

Pg 3

3AH-2-2.2 What is CW?
A. Morse code telegraphy using amplitude modulation
B. Morse code telegraphy using frequency modulation
C. Morse code telegraphy using phase modulation
D. Morse code telegraphy using pulse modulation

Pg 3

3AH-2-3.1 What is RTTY?
A. Amplitude-keyed telegraphy
B. Frequency-shift-keyed telegraphy
C. Frequency-modulated telephony
D. Phase-modulated telephony

3AH-2-3.2 What is the emission designation for telegraphy by frequency shift keying without the use of a modulating tone?
A. RTTY
B. MCW
C. CW
D. Single-sideband phone

3AH-2-4.1 What emission type results when an on/off keyed audio tone is applied to the microphone input of an FM transmitter?
A. RTTY
B. MCW
C. CW
D. Single-sideband phone

3AH-2-4.2 What is tone-modulated international Morse code telegraphy?
A. Telephony produced by audio fed into an FM transmitter
B. Telegraphy produced by an on/off keyed audio tone fed into a CW transmitter
C. Telegraphy produced by on/off keying of the carrier amplitude
D. Telegraphy produced by an on/off keyed audio tone fed into an FM transmitter

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3AH-2-5.1 What is the emission designated as "MCW"?
A. Frequency-modulated telegraphy using audio tones
B. Frequency-modulated telephony
C. Frequency-modulated facsimile using audio tones
D. Phase-modulated television

3AH-2-5.2 In an ITU emission designator like A1A, what does the first symbol describe?
Pg 3
A. The nature of the signal modulating the main carrier
B. The type of modulation of the main carrier
C. The speed of a radiotelegraph transmission
D. The type of the information to be transmitted

3AH-2-5.3 What emission type results when an on-off keyed audio oscillator is connected to the microphone jack of an FM phone transmitter?
A. SS
B. RTTY
C. MCW
D. Image

3AH-2-6.1 In an ITU emission designator like F3B, what does the second symbol describe?
A. The nature of the signal modulating the main carrier
B. The type of modulation of the main carrier
C. The type of information to be transmitted
D. The frequency modulation index of a carrier

3AH-2-6.2 How would you transmit packet using an FM 2-meter transceiver?
A. Use your telegraph key to interrupt the carrier wave
B. Modulate your FM transmitter with audio tones from a terminal node controller
C. Use your mike for telephony
D. Use your touch-tone (DTMF) key pad to signal in Morse code.

3AH-2-7.1 What type of emission results when speaking into the microphone of a 2-meter FM hand-held transceiver?
A. Amplitude modulated phone
B. Code telegraphy
C. An unmodulated carrier wave
D. Frequency modulated phone

3AH-2-7.2 What emission type do most 2-meter FM transmitters transmit?
A. Interrupted pure carrier wave
B. Frequency modulated phone
C. Single-sideband voice emissions
D. Amplitude modulated carrier waves

*3AH-2-8.1 What is the most important consideration when installing a 10-meter dipole inside an attic?
A. It will exhibit a low angle of radiation
B. The dipole must always be run horizontally polarized
C. It will be covered by an insulation to prevent fire and high enough to prevent being accidentally touched during transmission
D. Dipoles usually don't work in attics

*There is a problem with the answer (C) to question 3AH-2-8.1, as released by the VEC Question Pool Committee. The most important consideration is that an indoor antenna should be treated with respect because of the possibility of adverse biological effects due to near-field radiation. Another point to keep in mind is that insulated wire does *not* reduce or eliminate the risk of RF burns. Finally, a dipole does not pose a fire hazard from RF, whether it uses insulated or uninsulated wire.

3AH-2-8.2 Which type of transmitter will produce a frequency modulated carrier wave?
Pg 3
A. A CW transmitter
B. An amplitude modulated transmitter
C. A single-sideband transmitter
D. A phase modulated transmitter

3AH-3.1 What is the term used to describe a constant-amplitude radio-frequency signal?
A. An RF carrier
B. An AF carrier
C. A sideband carrier
D. A subcarrier

3AH-3.2 What is another name for an unmodulated radio-frequency signal?
A. An AF carrier
B. An RF carrier
C. A sideband carrier
D. A subcarrier

3AH-4.1 What characteristic makes FM telephony especially well-suited for local VHF/UHF radio communications?
A. Good audio fidelity and intelligibility under weak-signal conditions
B. Better rejection of multipath distortion than the AM modes
C. Good audio fidelity and high signal-to-noise ratio above a certain signal amplitude threshold
D. Better carrier frequency stability than the AM modes

3AH-5.1 What emission is produced by a transmitter using a reactance modulator?
Pg 4
A. CW
B. Unmodulated carrier
C. Single-sideband, suppressed-carrier phone
D. Phase modulated phone

3AH-5.2 What other emission does phase modulation most resemble?
Pg 21 Q22
A. Amplitude modulation
B. Pulse modulation
C. Frequency modulation
D. Single-sideband modulation

3AH-6.1 Many communications receivers have several IF filters that can be selected by the operator. Why do these filters have different bandwidths?
A. Because some ham bands are wider than others
B. Because different bandwidths help increase the receiver sensitivity
C. Because different bandwidths improve S-meter readings
D. Because some emission types occupy a wider frequency range than others

3AH-6.2 List the following signals in order of increasing bandwidth (narrowest signal first): CW, FM voice, RTTY, SSB voice.
A. RTTY, CW, SSB voice, FM voice
B. CW, FM voice, RTTY, SSB voice
C. CW, RTTY, SSB voice, FM voice
D. CW, SSB voice, RTTY, FM voice

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3AH-7-1.1 To what is the deviation of an FM transmission proportional?
A. Only the frequency of the audio modulating signal
B. The frequency and the amplitude of the audio modulating signal
C. The duty cycle of the audio modulating signal
D. Only the amplitude of the audio modulating signal

3AH-7-2.1 What is the result of overdeviation in an FM transmitter?
A. Increased transmitter power consumption
B. Out-of-channel emissions (splatter)
C. Increased transmitter range
D. Inadequate carrier suppression

3AH-7-2.2 What is *splatter*?
A. Interference to adjacent signals caused by excessive transmitter keying speeds
B. Interference to adjacent signals caused by improper transmitter neutralization
C. Interference to adjacent signals caused by overmodulation of a transmitter
D. Interference to adjacent signals caused by parasitic oscillations at the antenna

SUBELEMENT 3AI—Antennas and Feed Lines (3 Exam Questions)

3AI-1-1.1 What antenna type best strengthens signals from a particular direction while attenuating those from other directions?
Pg 12
A. A beam antenna
B. An isotropic antenna
C. A monopole antenna
D. A vertical antenna

3AI-1-1.2 What is a *directional antenna*?
Pg 12
A. An antenna whose parasitic elements are all constructed to be directors
B. An antenna that radiates in direct line-of-sight propagation, but not skywave or skip propagation
C. An antenna permanently mounted so as to radiate in only one direction
D. An antenna that radiates more strongly in some directions than others

3AI-1-1.3 What is a *Yagi* antenna?
PR 4, 21 & 25
A. Half-wavelength elements stacked vertically and excited in phase
B. Quarter-wavelength elements arranged horizontally and excited out of phase
C. Half-wavelength linear driven element(s) with parasitically excited parallel linear elements
D. Quarter-wavelength, triangular loop elements

3AI-1-1.4 What is the general configuration of the radiating elements of a horizontally polarized Yagi?
A. Two or more straight, parallel elements arranged in the same horizontal plane
B. Vertically stacked square or circular loops arranged in parallel horizontal planes
C. Two or more wire loops arranged in parallel vertical planes
D. A vertical radiator arranged in the center of an effective RF ground plane

3AI-1-1.5 What type of parasitic beam antenna uses two or more straight metal-tubing elements arranged physically parallel to each other?
Pg 12 Q23
A. A delta loop antenna
B. A quad antenna
C. A Yagi antenna
D. A Zepp antenna

3AI-1-1.6 How many directly driven elements does a Yagi antenna have?
Pg 12
A. None; they are all parasitic
B. One
C. Two
D. All elements are directly driven

3AI-1-1.7 What is a *parasitic beam antenna*?
A. An antenna where the director and reflector elements receive their RF excitation by induction or radiation from the driven element
B. An antenna where wave traps are used to assure magnetic coupling among the elements
C. An antenna where all elements are driven by direct connection to the feed line
D. An antenna where the driven element receives its RF excitation by induction or radiation from the directors

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3AI-1-2.1 What is a *cubical quad antenna*?
A. Four parallel metal tubes, each approximately 1/2 electrical wavelength long
B. Two or more parallel four-sided wire loops, each approximately one electrical wavelength long
C. A vertical conductor 1/4 electrical wavelength high, fed at the bottom
D. A center-fed wire 1/2 electrical wavelength long

3AI-1-2.2 What kind of antenna array is composed of a square full-wave closed loop driven element with parallel parasitic element(s)?
A. Delta loop
B. Cubical quad
C. Dual rhombic
D. Stacked Yagi

3AI-1-2.3 Approximately how long is one side of the driven element of a cubical quad antenna?
A. 2 electrical wavelengths
B. 1 electrical wavelength
C. 1/2 electrical wavelength
D. 1/4 electrical wavelength

3AI-1-2.4 Approximately how long is the wire in the driven element of a cubical quad antenna?
A. 1/4 electrical wavelength
B. 1/2 electrical wavelength
C. 1 electrical wavelength
D. 2 electrical wavelengths

3AI-1-3.1 What is a *delta loop antenna*?
A. A variation of the cubical quad antenna, with triangular elements
B. A large copper ring, used in direction finding
C. An antenna system composed of three vertical antennas, arranged in a triangular shape
D. An antenna made from several coils of wire on an insulating form

3AI-2-1.1 To what does the term *horizontal* as applied to wave polarization refer?
A. The magnetic lines of force in the radio wave are parallel to the earth's surface
B. The electric lines of force in the radio wave are parallel to the earth's surface
C. The electric lines of force in the radio wave are perpendicular to the earth's surface
D. The radio wave will leave the antenna and radiate horizontally to the destination

3AI-2-1.2 What electromagnetic wave polarization does a cubical quad antenna have when the feed point is in the center of a horizontal side?
A. Circular
B. Helical
C. Horizontal
D. Vertical

3AI-2-1.3 What electromagnetic wave polarization does a cubical quad antenna have when all sides are at 45 degrees to the earth's surface and the feed point is at the bottom corner?
A. Circular
B. Helical
C. Horizontal
D. Vertical

3AI-2-2.1 What is the polarization of electromagnetic waves radiated from a half-wavelength antenna perpendicular to the earth's surface?
A. Circularly polarized waves
B. Horizontally polarized waves
C. Parabolically polarized waves
D. Vertically polarized waves

3AI-2-2.2 What is the electromagnetic wave polarization of most man-made electrical noise radiation in the HF-VHF spectrum?
A. Horizontal
B. Left-hand circular
C. Right-hand circular
D. Vertical

3AI-2-2.3 To what does the term *vertical* as applied to wave polarization refer?
A. The electric lines of force in the radio wave are parallel to the earth's surface
B. The magnetic lines of force in the radio wave are perpendicular to the earth's surface
C. The electric lines of force in the radio wave are perpendicular to the earth's surface
D. The radio wave will leave the antenna and radiate vertically into the ionosphere

Pop 8 x 31 21

3AI-2-2.4 What electromagnetic wave polarization does a cubical quad antenna have when the feed point is in the center of a vertical side?
A. Circular
B. Helical
C. Horizontal
D. Vertical

3AI-2-2.5 What electromagnetic wave polarization does a cubical quad antenna have when all sides are at 45 degrees to the earth's surface and the feed point is at a side corner?
A. Circular
B. Helical
C. Horizontal
D. Vertical

3AI-3-1.1 What is meant by the term *standing wave ratio*?
A. The ratio of maximum to minimum inductances on a feed line
B. The ratio of maximum to minimum resistances on a feed line
C. The ratio of maximum to minimum impedances on a feed line
D. The ratio of maximum to minimum voltages on a feed line

3AI-3-1.2 What is *standing wave ratio* a measure of?
A. The ratio of maximum to minimum voltage on a feed line
B. The ratio of maximum to minimum reactance on a feed line
C. The ratio of maximum to minimum resistance on a feed line
D. The ratio of maximum to minimum sidebands on a feed line

3AI-3-2.1 What is meant by the term *forward power*?
A. The power traveling from the transmitter to the antenna
B. The power radiated from the front of a directional antenna
C. The power produced during the positive half of the RF cycle
D. The power used to drive a linear amplifier

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3AI-3-2.2 What is meant by the term *reflected power*?
A. The power radiated from the back of a directional antenna
B. The power returned to the transmitter from the antenna
C. The power produced during the negative half of the RF cycle
D. Power reflected to the transmitter site by buildings and trees

3AI-3-3.1 What happens to the power loss in an unbalanced feed line as the standing wave ratio increases?
A. It is unpredictable
B. It becomes nonexistent
C. It decreases
D. It increases

3AI-3-3.2 What type of feed line is best suited to operating at a high standing wave ratio?
A. Coaxial cable
B. Flat ribbon "twin lead"
C. Parallel open-wire line
D. Twisted pair

3AI-3-3.3 What happens to RF energy not delivered to the antenna by a lossy coaxial cable?
A. It is radiated by the feed line
B. It is returned to the transmitter's chassis ground
C. Some of it is dissipated as heat in the conductors and dielectric
D. It is canceled because of the voltage ratio of forward power to reflected power in the feed line

3AI-4-1.1 What is a *balanced line*?
A. Feed line with one conductor connected to ground
B. Feed line with both conductors connected to ground to balance out harmonics
C. Feed line with the outer conductor connected to ground at even intervals
D. Feed line with neither conductor connected to ground

Pg 4

3AI-4-1.2 What is an *unbalanced line*?
A. Feed line with neither conductor connected to ground
B. Feed line with both conductors connected to ground to suppress harmonics
C. Feed line with one conductor connected to ground
D. Feed line with the outer conductor connected to ground at uneven intervals

3AI-4-2.1 What is a *balanced antenna*?
A. A symmetrical antenna with one side of the feed point connected to ground
B. An antenna (or a driven element in an array) that is symmetrical about the feed point
C. A symmetrical antenna with both sides of the feed point connected to ground, to balance out harmonics
D. An antenna designed to be mounted in the center

Pg 4
Q24

3AI-4-2.2 What is an *unbalanced antenna*?
A. An antenna (or a driven element in an array) that is not symmetrical about the feed point
B. A symmetrical antenna, having neither half connected to ground
C. An antenna (or a driven element in an array) that is symmetrical about the feed point
D. A symmetrical antenna with both halves coupled to ground at uneven intervals

Pg 4
4+9

3AI-4-3.1 What device can be installed on a balanced antenna so that it can be fed through a coaxial cable?
A. A balun
B. A loading coil
C. A triaxial transformer
D. A wavetrap

Pg 4

3AI-4-3.2 What is a *balun*?
A. A device that can be used to convert an antenna designed to be fed at the center so that it may be fed at one end
B. A device that may be installed on a balanced antenna so that it may be fed with unbalanced feed line
C. A device that can be installed on an antenna to produce horizontally polarized or vertically polarized waves
D. A device used to allow an antenna to operate on more than one band

Pg 8

3AI-5-1.1 List the following types of feed line in order of increasing attenuation per 100 feet of line (list the line with the lowest attenuation first): RG-8, RG-58, RG-174 and open-wire line.
A. RG-174, RG-58, RG-8, open-wire line
B. RG-8, open-wire line, RG-58, RG-174
C. open-wire line, RG-8, RG-58, RG-174
D. open-wire line, RG-174, RG-58, RG-8

3AI-5-1.2 You have installed a tower 150 feet from your radio shack, and have a 6-meter Yagi antenna on top. Which of the following feed lines should you choose to feed this antenna: RG-8, RG-58, RG-59 or RG-174?
A. RG-8
B. RG-58
C. RG-59
D. RG-174

3AI-5-2.1 You have a 200-foot coil of RG-58 coaxial cable attached to your antenna, but the antenna is only 50 feet from your radio. To minimize feed-line loss, what should you do with the excess cable?
A. Cut off the excess cable to an even number of wavelengths long
B. Cut off the excess cable to an odd number of wavelengths long
C. Cut off the excess cable
D. Roll the excess cable into a coil a tenth of a wavelength in diameter

3AI-5-2.2 How does feed-line length affect signal loss?
A. The length has no effect on signal loss
B. As length increases, signal loss increases
C. As length decreases, signal loss increases
D. The length is inversely proportional to signal loss

9

3AI-5-3.1 What is the general relationship between frequencies passing through a feed line and the losses in the feed line?
A. Loss is independent of frequency
B. Loss increases with increasing frequency
C. Loss decreases with increasing frequency
D. There is no predictable relationship

3AI-5-3.2 As the operating frequency decreases, what happens to conductor losses in a feed line?
A. The losses decrease
B. The losses increase
C. The losses remain the same
D. The losses become infinite

3AI-5-3.3 As the operating frequency increases, what happens to conductor losses in a feed line?
A. The losses decrease
B. The losses increase
C. The losses remain the same
D. The losses decrease to zero

3AI-6-1.1 You are using open-wire feed line in your amateur station. Why should you ensure that no one can come in contact with the feed line while you are transmitting?
A. Because contact with the feed line while transmitting will cause a short circuit, probably damaging your transmitter
B. Because the wire is so small they may break it
C. Because contact with the feed line while transmitting will cause parasitic radiation
D. Because high RF voltages can be present on open-wire feed line

Common Sense

3AI-6-2.1 How can you minimize exposure to radio frequency energy from your transmitting antennas?
A. Use vertical polarization
B. Use horizontal polarization
C. Mount the antennas where no one can come near them
D. Mount the antenna close to the ground

Pg 4+9 Q25

3

ELEMENT 3A ANSWER KEY

SUBELEMENT 3AA

Numbers in this section refer to pages in *Now You're Talking!*

3AA-1.1	A	2-19
3AA-1.2	B	2-19
3AA-2.1		(withdrawn)
3AA-2.2	C	2-20
3AA-2.3	B	2-20
3AA-2.4	A	2-20
3AA-2.5	B	2-20
3AA-3.1	A	2-20
3AA-3.2	A	2-20
3AA-3.3	A	2-20
3AA-4.1	B	2-19
3AA-4.2	A	2-20
3AA-4.3	A	2-25
3AA-5.1	D	2-21
3AA-5.2	C	2-21
3AA-6-1.1	C	2-20
3AA-6-1.2	D	2-20
3AA-6-2.1	C	2-20
3AA-6-3.1	D	2-20
3AA-6-4.1	B	2-20
3AA-7-1.1	C	2-20
3AA-7-1.2	B	2-20
3AA-7-1.3	D	2-20
3AA-7-2.1	C	2-20
3AA-7-2.2	C	2-20
3AA-7-3.1	A	2-20
3AA-7-3.2	D	2-20
3AA-7-3.3	D	2-20
3AA-8-1.1	B	2-24
3AA-8-2.1	B	2-24
3AA-8-3.1	C	2-24
3AA-9-1.1	A	2-22
3AA-9-2.1	A	2-22
3AA-10.1	A	2-22
3AA-10.2	C	2-22
3AA-10.3	D	2-22
3AA-10.4	B	2-22
3AA-11-1.1	A	2-21
3AA-11-1.2	B	2-21
3AA-11-1.3	A	2-21
3AA-11-2.1	D	2-21
3AA-11-2.2	A	2-21
3AA-11-2.3	C	2-21
3AA-11-2.4	A	2-21
3AA-12.1	A	2-23
3AA-12.2	C	2-24
3AA-12.3	B	2-24
3AA-12.4	D	2-24
3AA-12.5	C	2-24
3AA-13.1	B	2-22
3AA-13.2	D	2-22
3AA-13.3	D	2-22
3AA-13.4	C	2-22
3AA-14.1	D	2-23
3AA-14.2	C	2-23
3AA-14.3	D	2-24
3AA-15.1	A	2-24
3AA-15.2	C	2-24
3AA-15.3	D	2-24
3AA-15.4	B	2-24
3AA-16.1	B	2-24
3AA-16.2	D	2-24
3AA-16.3	C	2-24
3AA-17.1	A	2-21

SUBELEMENT 3AB

3AB-1.1	A	9-14
3AB-1.2	C	9-14
3AB-1.3	D	9-14
3AB-2-1.1	B	9-19
3AB-2-1.2	C	9-19
3AB-2-1.3	A	9-19
3AB-2-1.4	D	9-19
3AB-2-1.5	B	9-18
3AB-2-1.6	B	9-19
3AB-2-1.7	D	9-19
3AB-2-2.1	C	9-19
3AB-2-2.2	C	2-24
3AB-2-3.1	D	9-18
3AB-2-3.2	B	9-18
3AB-2-3.3	A	9-18
3AB-2-3.4	C	9-18
3AB-2-4.1	D	2-21
3AB-3.1	A	2-24
3AB-3.2	B	9-12
3AB-3.3	C	9-9
3AB-4.1	A	2-21
3AB-4.2	D	2-21
3AB-5-1.1	C	2-22
3AB-5-1.2	B	2-22
3AB-5-2.1	D	2-22
3AB-6-1.1	A	2-22
3AB-6-1.2	B	2-22
3AB-6-2.1	D	2-22
3AB-6-3.1	B	2-22
3AB-6-3.2	C	2-22

SUBELEMENT 3AC

3AC-1-1.1	A	9-3
3AC-1-1.2	D	9-3
3AC-1-1.3	C	9-41
3AC-1-2.1	A	9-41
3AC-1-2.2	B	9-41
3AC-1-3.1	B	9-41
3AC-1-4.1	D	9-42
3AC-1-4.2	B	9-42
3AC-1-4.3	C	9-42
3AC-2.1	D	9-41
3AC-2.2	B	9-41
3AC-2.3	A	9-41
3AC-2.4	B	9-41
3AC-3.1	D	9-42
3AC-3.2	C	9-42
3AC-3.3	A	9-42
3AC-3.4	B	9-42
3AC-4.1	D	9-44
3AC-4.2	C	9-44
3AC-4.3	A	9-44
3AC-5.1	C	9-45
3AC-5.2	C	9-45
3AC-6.1	A	9-46
3AC-6.2	B	9-46
3AC-7.1	C	9-46
3AC-7.2	A	9-46
3AC-7.3	D	9-46
3AC-7.4	A	9-46
3AC-7.5	B	9-46
3AC-7.6	D	9-46

SUBELEMENT 3AD

3AD-1-1.1	C	8-13
3AD-1-1.2	D	8-13
3AD-1-1.3	B	8-13
3AD-1-1.4	B	8-13
3AD-1-2.1	A	8-14
3AD-1-2.2	A	8-14
3AD-1-2.3	A	8-14
3AD-1-3.1	C	8-14
3AD-2-1.1	B	8-15
3AD-2-2.1	C	8-15
3AD-3-1.1	A	8-15
3AD-3-2.1	D	8-15
3AD-4.1	D	8-16
3AD-5-1.1	A	8-16
3AD-5-1.2	C	8-16
3AD-5-1.3	B	8-16
3AD-5-1.4	A	8-16
3AD-5-2.1	B	8-16
3AD-5-2.2	C	8-16
3AD-6.1	A	8-17
3AD-6.2	D	8-17
3AD-6.3	A	8-17
3AD-7.1	C	8-17
3AD-7.2	B	8-17
3AD-8-1.1	D	8-17
3AD-8-1.2	D	8-17
3AD-8-2.1	A	8-17
3AD-8-2.2	C	8-17
3AD-9.1	D	8-18

3AD-9.2	B	8-18
3AD-9-3	C	8-18
3AD-9.4	B	8-18
3AD-9.5	A	8-18
3AD-9.6	A	8-18
3AD-10.1	C	8-18
3AD-10.2	A	8-18
3AD-11-1.1	B	8-18
3AD-11-1.2	A	8-18
3AD-11-2.1	D	8-19
3AD-11-2.2	B	8-19
3AD-11-2.3	B	8-19
3AD-11-2.4	D	8-19
3AD-11-2.5	B	8-19
3AD-11-3.1	C	8-19

SUBELEMENT 3AE

3AE-1-1.1	D	3-6
3AE-1-2.1	A	3-6
3AE-1-2.2	D	3-6
3AE-1-3.1	B	3-9
3AE-1-3.2	D	3-9
3AE-1-4.1	B	3-9
3AE-1-4.2	C	3-9
3AE-2.1	D	3-8
3AE-2.2	A	3-8
3AE-2.3	C	3-8
3AE-2.4	D	3-10
3AE-2.5	B	3-8
3AE-2.6	D	3-8
3AE-2.7	D	3-8
3AE-2.8	A	3-8
3AE-2.9	A	3-8
3AE-3-1.1	C	3-15
3AE-3-2.1	C	3-16
3AE-3-2.2	C	3-16
3AE-3-2.3	B	3-16
3AE-3-2.4	C	3-16
3AE-3-3.1	B	3-16
3AE-3-3.2	C	3-16
3AE-3-4.1	A	3-16
3AE-3-4.2	B	3-16
3AE-4-1.1	A	3-16
3AE-4-2.1	A	3-16
3AE-4-2.2	B	3-16
3AE-4-2.3	A	3-16
3AE-4-2.4	B	3-16
3AE-4-3.1	C	3-17
3AE-4-3.2	B	3-17
3AE-4-4.1	A	3-17
3AE-4-4.2	A	3-17

SUBELEMENT 3AF

3AF-1-1.1	B	4-7
3AF-1-2.1	D	4-7
3AF-1-2.2	C	4-9
3AF-1-3.1	A	4-9
3AF-1-3.2	B	4-9
3AF-1-3.3	B	4-10
3AF-1-3.4	C	4-9
3AF-1-4.1	A	4-10
3AF-1-4.2	C	4-10
3AF-1-5.1	B	4-2
3AF-1-5.2	C	4-2
3AF-2-1.1	D	4-10
3AF-2-1.2	A	4-10
3AF-2-1.3	D	4-10
3AF-2-1.4	C	4-11
3AF-2-2.1	D	4-10
3AF-2-2.2	C	4-10
3AF-2-3.1	D	4-10
3AF-2-3.2	B	4-10
3AF-2-3.3	A	4-10
3AF-2-3.4	B	4-10
3AF-2-4.1	A	4-11
3AF-2-4.2	B	4-11
3AF-2-4.3	C	4-11
3AF-3-1.1	D	4-12
3AF-3-1.2	A	4-12
3AF-3-1.3	C	4-14
3AF-3-1.4	C	4-13
3AF-3-2.1	B	4-12
3AF-3-2.2	D	4-11
3AF-3-2.3	A	4-12
3AF-3-2.4	B	4-12
3AF-3-3.1	A	4-12
3AF-3-3.2	B	4-12
3AF-3-3.3	D	4-12
3AF-3-4.1	D	4-13
3AF-3-4.2	A	4-14

SUBELEMENT 3AG

3AG-1-1.1	A	5-7
3AG-1-1.2	D	5-7
3AG-1-2.1	C	5-8
3AG-1-2.2	B	5-7
3AG-2-1.1	B	5-8
3AG-2-2.1	A	5-8
3AG-2-2.2	B	5-8
3AG-3-1.1	A	5-8
3AG-3-1.2	D	5-8
3AG-3-2.1	A	5-8
3AG-4-1.1	C	5-11
3AG-4-1.2	D	5-9
3AG-4-1.3	B	5-9
3AG-4-1.4	B	5-12
3AG-4-1.5	D	5-9
3AG-4-2.1	D	5-12
3AG-4-2.2	C	5-10

SUBELEMENT 3AH

3AH-1.1	A	5-9
3AH-2-1.1	A	5-9
3AH-2-1.2	B	9-46
3AH-2-2.1	C	5-9
3AH-2-2.2	A	5-9
3AH-2-3.1	B	9-21
3AH-2-3.2	A	9-21
3AH-2-4.1	B	9-41
3AH-2-4.2	D	9-41
3AH-2-5.1	A	9-41
3AH-2-5.2	B	9-41
3AH-2-5.3	C	9-41
3AH-2-6.1	A	9-41
3AH-2-6.2	B	9-41
3AH-2-7.1	D	9-41
3AH-2-7.2	B	9-41
3AH-2-8.1	C	8-18
3AH-2-8.2	D	9-41
3AH-3.1	A	9-41
3AH-3.2	B	9-41
3AH-4.1	C	9-41
3AH-5.1	D	5-10
3AH-5.2	C	5-9
3AH-6.1	D	9-47
3AH-6.2	C	9-47
3AH-7-1.1	D	9-47
3AH-7-2.1	B	9-47
3AH-7-2.2	C	9-47

SUBELEMENT 3AI

3AI-1-1.1	A	7-19
3AI-1-1.2	D	7-19
3AI-1-1.3	C	7-19
3AI-1-1.4	A	7-24
3AI-1-1.5	C	7-19
3AI-1-1.6	B	7-19
3AI-1-1.7	A	7-25
3AI-1-2.1	B	7-27
3AI-1-2.2	B	7-27
3AI-1-2.3	D	7-27
3AI-1-2.4	C	7-27
3AI-1-3.1	A	7-28
3AI-2-1.1	B	7-24
3AI-2-1.2	C	7-27
3AI-2-1.3	C	7-27
3AI-2-2.1	D	7-25
3AI-2-2.2	D	7-25
3AI-2-2.3	C	7-24
3AI-2-2.4	D	7-27
3AI-2-2.5	D	7-27
3AI-3-1.1	D	7-5
3AI-3-1.2	A	7-5
3AI-3-2.1	A	7-6
3AI-3-2.2	B	7-6
3AI-3-3.1	D	7-23
3AI-3-3.2	C	7-23
3AI-3-3.3	C	7-23
3AI-4-1.1	D	7-5
3AI-4-1.2	C	7-5
3AI-4-2.1	B	7-5
3AI-4-2.2	A	7-5
3AI-4-3.1	A	7-5

3AI-4-3.2	B	7-5
3AI-5-1.1	C	7-24
3AI-5-1.2	A	7-24
3AI-5-2.1	C	7-24
3AI-5-2.2	B	7-24
3AI-5-3.1	B	7-24
3AI-5-3.2	A	7-24
3AI-5-3.3	B	7-24
3AI-6-1.1	D	7-10
3AI-6-2.1	C	7-21

Attachment 12

To: Federal Communications Commission
Personal Radio Branch
2025 M Street, N.W., Room 5328
Washington, DC 20554
Attn: Tom Fitz-Gibbon, Attorney

From: Dave Morse WW7K
OOC, Los Angeles Section, ARRL
15713 Romar St.
Granada Hills, CA. 91343
818-893-2817

And: Christine F. McElwain, KC6BLL
10331 Lindley Ave. #141
Northridge, CA. 91326
818-368-2123

Date: August 25, 1991

Dear Tom,

Chris had attended the retesting session for California Amateur Radio School on August 24, 1991, listed at Mar Vista, California. Unfortunately, we found inconsistencies in this retest session.

Charles Pascal and Sandra Crane taught the refresher course tailored to the test to be administered. Sandra had all three novice and technician tests in front of her as Charles Pascal taught the refresher. Sandra would make sure that Charles covered all material to be tested. Charles said "Sandy, keep all three tests there and make notes on anything I miss". Sandy said that "we just got the test's last night. They just got reviewed" to the class.

During the review sessions Sandra referred to the tests, quoted the exact wording from various questions and answers, and pointed out key words for the class to remember. Sandra had all tests to be administered in her possession prior to the VE's arrival.

The VE's arrived empty handed, with no test material in thier possession. Sandra handed the VE's a sealed package, which she started to open, but, was instructed by VE Tom Fakehany to hand the sealed package to Bob Osborn to open.

On the Novice portion of the test a diagram was needed that was not supplied in the test administered. Tom asked "Sandy, where is the diagram?, she (referring to Chris) doesn't have a diagram to one of these questions", Sandy's response was "it's in the package I'll get it". Sandy did get the material and distributed it to all in test session. This is a very clear indication that Sandra knew the contents of the test package.

Please find enclosed notes taken by Chris McElwain during the course and examination. This letter was prepared by Dave Morse and Chris McElwain with all quotes taken from Chris's notes.

It was very obvious that Sandra and Charles had taught the course to any of the three tests that could be administered for both novice and technician, not to the entire question pool. Chris was in a position to see all three tests for novice and technician in front of Sandra during the course. Sandra and Charles both made references to the tests being in front of Sandra during the course review.

It is suggested that both W5YI and FCC check Chris's notes to see they do in fact match to the test's administered. This may also be the case with the last testing session already submitted. If there is reasonable doubt, and especially if both test sessions were tailored to a portion of the pool, then it is suggested that FCC and or VEC administrative action be taken. The three VE's involved were Tom Fakehany, N6FDR, Michael Bryant, N6UBW, and Robert G. Osborn Jr., N6MSO.

Sincerely,

Dave Morse

Chris

Chris McElwain

CC: ARRL, Newington, CT.

Tom-
It was Sandy who checked my ID (one photo ID requested - used Drivers License) She briefly looked at it and announced "Yep. It's who she said she is"
When Mike Bryant asked Sandy where Tom was. She said "I don't know" someone else, I don't know who, said "I think he's upstairs." I looked at my watch. It was 4:00 & I was just starting my tech exam. It was 10 minutes before he came back.

W5YI-VEC

National Volunteer Examiner Coordinator

This certifies that: CHRISTINE F McELWAIN
NAME — STATION CALL SIGN

DATE OF ISSUE: 08/24/91

10331 Lindley #141
NUMBER AND STREET

CITY/STATE (Session Site): Mar Vista, CA

North Ridge — CA — 91326
CITY — STATE — ZIP

has SUCCESSFULLY PASSED the following elements:

☐ ~~1(A) 5 wpm~~ ☐ ~~1(B) 13 wpm~~ ☐ ~~1(C) 20 wpm~~ ☒ 2 ☒ 3(A) ☐ ~~3(B)~~ ☐ ~~4(A)~~ ☐ ~~4(B)~~

and will be given credit for this examination element when the appropriate additional examination element is (re)taken at a subsequent examination session within one year of the date of issue of this certificate.

has SUCCESSFULLY PASSED all elements for the following operator license class:

☐ ~~Novice,~~ ☒ Technician, ☐ ~~General,~~ ☐ ~~Advanced,~~ ☐ ~~Amateur Extra.~~

If you already have an FCC-issued amateur radio license, this certificate validates temporary (interim) operation with the rights and privileges of your new operator class (see Section 97.35 of the Commission's Rules) until you receive the license for your new operator class, or for a period of one year of the date of issue of this certificate, whichever comes first.

When operating on an interim basis in the telegraphy mode, you must append your call sign with /KT (Technician), /AG (General), /AA (Advanced) or /AE (Extra Class.) Use the word "Temporary" before the identifier (KT, AG, AA or AE) when operating in the voice mode.

THIS CERTIFICATE IS NOT A LICENSE PERMIT OR ANY OTHER KIND OF OPERATING AUTHORITY

W5YI - VEC
HAM IT UP!
VOLUNTEER EXAMINING

VOLUNTEER EXAMINERS

	SIGNATURE	VE-#	STATION CALL SIGN
(1.)	Michael Boyle	7059	N6UBW
(2.)	Tom E. Jakehamy	5652	N6FDR
(3.)	Robert G. Osborn Jr	9593A	N6HSO

SIGNATURE OF APPLICANT

W5YI-VEC; NATIONAL VOLUNTEER EXAMINER COORDINATOR
FREDERICK O. MAIA, W5YI
P.O. Box 565101; Dallas, Texas; 75356 - Tel: (817) 461-6443

ATTACHMENT 13

PARTIAL TRANSCRIPT OF TAPE RECORDING MADE AT SEPTEMBER 14, 1991, EXAMINATION SESSION

Michael Bryant	Now, for your Novice test, the only thing that you'll hear is the word "Novice" in CW and six V's and it goes right into the test.
Charles P. Pascal	I don't think it has six V's.
Michael Bryant	Yes, six V's.
Charles P. Pascal	No, it doesn't
Michael Bryant	O.K., you said Novice tape...There is the word Novice and the code and then you go to six V's...
Sandra V. Crane	...There's no V's... Just go Novice, then it starts...

Attachment 14

FEDERAL COMMUNICATIONS COMMISSION
P.O. Box 1020
GETTYSBURG, PA 17326

Approved OMB
3060-0003
Expires 12/31/89

APPLICATION FOR AMATEUR RADIO STATION AND/OR OPERATOR LICENSE

NO FCC FILING FEE REQUIRED (see instruction H)

ADMINISTERING VEs' REPORT		EXAMINATION ELEMENTS							
Applicant is credited for:		1(A)	1(B)	1(C)	2	3(A)	3(B)	4(A)	4(B)
A. FCC Amateur license held (97.25(a)):	Class	(NT)	(GA)		(NTGA)	(TGA)	(GA)	(A)	
B. CERTIFICATE(S) OF SUCCESSFUL COMPLETION OF AN EXAMINATION HELD (97.25(b)):		Date Issued	Date Issued	Date Issued	Date Issued	Date Issued	Date Issued	Date Issued	Date Issued
C. FCC Commercial Radiotelegraph Operator License held (97.25(c)):	Number:			Exp Date					
D. Examination elements passed that were administered at this session:		X							

E. APPLICANT is qualified for operator license class: ☐ None:

E1. ☐ NOVICE (Elements 1(A), 1(B), or 1(C) and 2)

E2. ☒ TECHNICIAN (Elements 1(A), 1(B), or 1(C), 2 and 3(A))
☐ GENERAL (Elements 1(B) or 1(C), 2, 3(A), and 3(B))
☐ ADVANCED (Elements 1(B) or 1(C), 2, 3(A), 3(B) and 4(A))
☐ AMATEUR EXTRA (Elements 1(C), 2, 3(A), 3(B), 4(A), and 4(B))

F. Name of Volunteer-Examiner Coordinator: (VEC coordinated sessions only)
W5YI

G. Examination session location: (VEC coordinated sessions only)
MARINA DEL REY, CA

H. Date of VEC coordinated examination session:
09/14/91

I. VEC Receipt Date:

SECTION I

1. IF YOU HOLD A VALID LICENSE ATTACH THE ORIGINAL LICENSE OR PHOTOCOPY ON BACK OF APPLICATION. IF THE VALID LICENSE OR CERTIFICATE OF SUCCESSFUL COMPLETION OF AN EXAMINATION WAS LOST OR DESTROYED, PLEASE EXPLAIN.

2. CHECK ONE OR MORE ITEMS, NORMALLY ALL LICENSES ARE ISSUED FOR A 10 YEAR TERM.

2A. ☐ RENEW LICENSE—NO OTHER CHANGES
2B. ☐ REINSTATE LICENSE EXPIRED LESS THAN 2 YEARS
2C. ☐ EXAMINATION FOR NEW LICENSE
2D. ☒ EXAMINATION TO UPGRADE OPERATOR CLASS
2E. ☐ CHANGE CALL SIGN (Be sure you are eligible—See Inst. 2E)
2F. ☐ CHANGE NAME (Give former name)
2G. ☐ CHANGE MAILING ADDRESS
2H. ☐ CHANGE STATION LOCATION

EXPIRATION DATE (Month, Day, Year)

FORMER LAST NAME SUFFIX (Jr., Sr., etc.)

FORMER FIRST NAME MIDDLE INITIAL

3. CALL SIGN (If you checked 2C above, skip items 3 and 4)

4. OPERATOR CLASS OF THE ATTACHED LICENSE:

5. CURRENT FIRST NAME	M.I.	LAST NAME	SUFFIX (Jr., Sr., etc.)	6. DATE OF BIRTH (Month, Day, Year)
CHRISTINE	F.	McELWAIN		09/18/44

7. CURRENT MAILING ADDRESS (Number and Street)	CITY	STATE	ZIP CODE
10331 LINDLEY AVE #141	NORTHRIDGE	CA	91326

8. CURRENT STATION LOCATION (Do not use a P.O. Box No., RFD No., or General Delivery. See Instruction 8)	CITY	STATE
SAME AS ABOVE		

9. Would a Commission grant of your application be an action which may have a significant environmental effect as defined by Section 1.1307 of the Commission's Rules? See instruction 9. If you answer yes, submit the statement as required by Sections 1.1308 and 1.1311. ☐ YES ☒ NO

10. Do you have any other amateur radio application on file with the Commission that has not been acted upon? If yes, answer items 11 and 12. X YES NO

11. PURPOSE OF OTHER APPLICATION
No code Tech.

12. DATE SUBMITTED (Month, Day, Year)
8-24-91

CERTIFICATION

I CERTIFY THAT all statements herein and attachments herewith are true, complete, and correct to the best of my knowledge and belief and are made in good faith; that I am not a representative of a foreign government; that I waive any claim to the use of any particular frequency regardless of prior use by license or otherwise; and that the station to be licensed will be inaccessible to unauthorized persons.

WILLFUL FALSE STATEMENTS MADE ON THIS FORM OR ATTACHMENTS ARE PUNISHABLE BY FINE AND IMPRISONMENT
U.S. CODE TITLE 18, SECTION 1001

13. SIGNATURE OF APPLICANT: (Must match item 5)
Christine F. McElwain

14. DATE SIGNED:
9/10/91

(OVER)

FCC Form 610

Docket No. Exhibit
Presented By
Disposition
Reporter
Date

ATTACH THE ORIGINAL LICENSE OR PHOTOCOPY HERE

SECTION II – EXAMINATION INFORMATION

SECTION II-A FOR NOVICE OPERATOR EXAMINATION ONLY. To be completed by the Administering VEs after completing the Administering VE's Report on the other side of this form.

CERTIFICATION

I CERTIFY THAT I have complied with the Administering VE requirements stated in Part 97 of the Commission's Rules; THAT I have administered to the applicant and graded an amateur radio operator examination in accordance with Part 97 of the Commission's Rules; THAT I have indicated in the Administering VE's Report the examination element(s) the applicant passed; THAT I have examined documents held by the applicant and I have indicated in the Administering VE's Report the examination element for which the applicant is given examination credit in accordance with Part 97 of the Commission's Rules.

1A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) *(Print or Type)*

1B. VE'S MAILING ADDRESS: (Number, Street, City, State, ZIP Code)

1C. VE'S OPERATOR CLASS: ☐ GENERAL ☐ ADVANCED ☐ AMATEUR EXTRA

1D. VE'S STATION CALL SIGN

1E. LICENSE EXPIRATION DATE:

1F. IF YOU HAVE AN APPLICATION PENDING FOR YOUR LICENSE, GIVE FILING DATE:

1G. SIGNATURE: (Must match Item 1A)

DATE SIGNED

2A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) *(Print or Type)*

2B. VE'S MAILING ADDRESS: (Number, Street, City, State, ZIP Code)

2C. VE'S OPERATOR CLASS: ☐ GENERAL ☐ ADVANCED ☐ AMATEUR EXTRA

2D. VE'S STATION CALL SIGN

2E. LICENSE EXPIRATION DATE:

2F. IF YOU HAVE AN APPLICATION PENDING FOR YOUR LICENSE, GIVE FILING DATE:

2G. SIGNATURE: (Must match Item 2A)

DATE SIGNED

SECTION II-B FOR TECHNICIAN, GENERAL, ADVANCED, OR AMATEUR EXTRA OPERATOR EXAMINATION ONLY. To be completed by the Administering VEs after completing the Administering VE's Report on the other side of this form.

CERTIFICATION

I CERTIFY THAT I have complied with the Administering VE requirements stated in Part 97 of the Commission's Rules; THAT I have administered to the applicant and graded an amateur radio operator examination in accordance with Part 97 of the Commission's Rules; THAT I have indicated in the Administering VE's Report the examination element(s) the applicant passed; THAT I have examined documents held by the applicant and I have indicated in the Administering VE's Report the examination element(s) for which the applicant is given examination credit in accordance with Part 97 of the Commission's Rules.

1A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) *(Print or Type)*
MICHAEL BRYANT 7059

1B. VE'S STATION CALL SIGN: N6UBW

1C. SIGNATURE: (Must match Item 1A)
Michael Bryant

DATE SIGNED: 9/14/91

2A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) *(Print or Type)*
RAYMOND A NAVARRO 6130

2B. VE'S STATION CALL SIGN: N6RXX

2C. SIGNATURE: (Must match Item 2A)
Raymond A. Navarro

DATE SIGNED: 9/14/91

3A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) *(Print or Type)*
JAMES E McKINLEY 9437

3B. VE'S STATION CALL SIGN: N6RPC

3C. SIGNATURE: (Must match Item 3A)
James E. McKinley

DATE SIGNED: 9/14/91

U.S. GOVERNMENT PRINTING OFFICE: 1987 190-665 (m)

Attachment 15

To: Federal Communications Commission
Personal Radio Branch
2025 M Street, N.W., Room 5328
Washington, DC 20554
Attn: Tom Fitz-Gibbon, Attorney

From: Dave Morse WW7K
OOC, Los Angeles Section, ARRL
15713 Romar St.
Granada Hills, CA. 91343
818-893-2817

And: Christine F. McElwain, KC6BLL
10331 Lindley Ave. #141
Northridge, CA. 91326
818-368-2123

Date: September 29, 1991

Dear Tom,

As per the tape enclosed you will find the following. Sandra Crane was acting as a member of the VE team administering the exams. This is clearly a conflict of interest in that the two owners of the school made and supplied the code tests and administered the written and code exams.

Sandra: The VE's are not paid but we comp. them to lunch or dinner.

Charlie talking to Mike Bryant: You or Ray or **SANDY** can interpret questions during the test.

This clearly shows that Sandra had planned to stay in the testing session and act as an examiner. Sandra did stay in the session most of the time. There were times where no Ve was present during testing. Jim Mc Kinley was rarely in the room during any testing session. The Ve's frequently deferred to Sandra and Charlie for instructions on using and locating test materials. It is obvious the Ve's had no control over the material to be administered, written and code.

On the tape you will find Sandra giving instructions on the code and written tests. This clearly shows she is acting as an examiner.

Dialogue between Mike, Charlie and Sandy indicates Charlie and Sandy knew the content of the test tape and the VE's did not