



General Radiotelephone

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In Figure 3H17, the block labeled 4 would indicate that this schematic is most likely a/an:  
**SSB radio transmitter.**

**Illustrations:** FCC3H17

In Figure 3H17, which block diagram symbol (labeled 1 through 4) represents where audio intelligence is inserted?  
**2**

**Illustrations:** FCC3H17

Which statement is true regarding the filter output characteristics shown in Figure 3F16?  
**A is a low pass curve and D is a band stop curve.**

**Illustrations:** FCC3F16

In Figure 3F15, which block diagram symbol (labeled 1 through 4) is used to represent a local oscillator?  
**2**

**Illustrations:** FCC3F15

In Figure 3F15 at what point in the circuit (labeled 1 through 4) could a DC voltmeter be used to monitor signal strength?  
**4**

**Illustrations:** FCC3F15

Given the input levels shown in Figure 3E14 and assuming positive logic devices, what would the output be?  
**A is low, B is high and C is high. "**

**Illustrations:** FCC3E14

For the logic input levels given in Figure 3E13, what are the logic levels of test points A, B and C in this circuit? (Assume positive logic.)  
**A is high, B is high and C is high.**

**Illustrations:** FCC3E13

For the logic input levels shown in Figure 3E12, what are the logic levels of test points A, B and C in this circuit? (Assume positive logic.)  
**A is low, B is high and C is high.**

**Illustrations:** FCC3E12

With a pure AC signal input to the circuit shown in Figure 3D11, what output wave form would you expect to see on an oscilloscope display?  
**2**

**Illustrations:** FCC3D11

In Figure 3D10 with a square wave input what would be the output?  
**3**

**Illustrations:** FCC3D10

In Figure 3D9, determine if there is a problem with this regulated power supply and identify the problem \_\_\_\_\_.  
***There is no problem with the circuit.***

**Illustrations:** FCC3D9

Which lamps would be lit in the circuit shown in Figure 3D8?  
**2, 3, 4, 7 and 8.**

**Illustrations:** FCC3D8

Given the combined DC input voltages, what would the output voltage be in the circuit shown in Figure 3D7?  
**-5.5 V**

**Illustrations:** FCC3D7

In the op-amp oscillator circuit shown in Figure 3D6, what would be the most noticeable effect if the capacitance of C were suddenly doubled?  
***Frequency would be lower.***

**Illustrations:** FCC3D6

In Figure 3C5, which capacitor (labeled 1 through 4) is being used as a bypass capacitor?  
**3**

**Illustrations:** FCC3C5

In Figure 3C5, the 1  $\mu$ F capacitor is connected to a potentiometer that is used to:  
***Adjust tone.***

**Illustrations:** FCC3C5

In Figure 3C4, if a small variable capacitor were installed in place of the dashed line, it would?  
***Decrease parasitic oscillations.***

**Illustrations:** FCC3C4

In Figure 3C4, which component (labeled 1 through 4) is used to provide a signal ground?  
**2**

**Illustrations:** FCC3C4

Determine the phase relationship between the two signals shown in Figure 3B3.  
***B is lagging A by 90 degrees.***

**Illustrations:** FCC3B3

In Figure 3B2, what is the voltage drop across R1?  
**9 volts.**

**Illustrations:** FCC3B2

In Figure 3B1, what is the voltage drop across R1?  
**5 volts.**

**Illustrations:** FCC3B1

What is facsimile?

**The transmission of printed pictures for permanent display on paper.**

Which of the following is true about the soldering tip?

**The soldering tip should be tinned during the initial heating up of the soldering iron.**

On runway approach, an ILS Localizer shows:

**Deviation left or right of runway center line.**

When the earth's atmosphere is struck by a meteor, a cylindrical region of free electrons is formed at what layer of the ionosphere?

**The E layer.**

Which of the following is not one of the natural ways a radio wave may travel from transmitter to receiver?

**Micro wave.**

Ducts often form over:

**Water**

How can the frequency response of an oscilloscope be improved?

**By decreasing the minimum rise time of the vertical amplifier.**

What test instrument can be used to display spurious signals in the output of a radio transmitter?

**A spectrum analyzer.**

An absorption wave meter is useful in measuring:

**The resonant frequency of a powered LC tank circuit.**

Which of the following is the only service using self-excited, or variable-frequency, oscillators in transmitters?

**Amateur.**

What is the characteristic of the current flow in a parallel R-L-C circuit at resonance?

**The current circulating in the parallel elements is at a maximum.**

What does the power factor equal in an R-L circuit having a 45 degree phase angle between the voltage and the current?

**0.707.**

What happens to the resistance of a photoconductive material when light shines on it?

**It decreases.**

What is the time constant of a circuit having two series?

**47 seconds.**

How long does it take for an initial charge of 800 V DC to decrease to 40.2 V DC in a 450-microfarad capacitor when a 1-megohm resistor is connected across it?

**Approximately 1,350 seconds.**

A 1 watt, 10 volt zener diode with the following characteristics:  $I_{min.} = 5 \text{ mA}$ ,  $I_{max.} = 480 \text{ mA}$ , and  $Z = 3 \text{ ohms}$ ; is to be used as part of a voltage regulator. Approximately what size current limiting resistor would set its bias to the midpoint of its operating range?

**40 ohms.**

There is an improper impedance match between a 30 watt transmitter and the antenna and 5 watts is reflected. How much power is actually radiated?

**25 watts.**

The effective value of an RF current and the heating value of the current are:  
**The same.**

The average fully-charged voltage of an Edison storage cell is:  
**1.2 volts.**

What is the purpose of a shunt resistor used with an ammeter?  
**It is used to increase the ampere indicating range of the ammeter.**

What is the conductance of circuit having three 300 ohm and two 200 ohm resistors connected in parallel?  
**20 mS.**

At  $\pi/3$  radius, what is the amplitude of a sine-wave having a peak value of 5 volts?  
**+4.3 volts.**

Structurally, what are the two main categories of semiconductor diodes?  
**Junction and point contact.**

What are the three terminals of a bipolar transistor?  
**Base, collector and emitter.**

When an SCR is in the triggered or on condition, its electrical characteristics are similar to what other solid-state device (as measured between its cathode and anode)?  
**The junction diode.**

Why do many MOSFET devices have built-in gate-protective Zener diodes?  
**The gate-protective Zener diode prevents the gate insulation from being punctured by small static charges or excessive voltages.**

What is the recommended power supply voltage for TTL series integrated circuits?  
**5.00 volts.**

Most bipolar junction transistors have a \_\_\_\_ doped and \_\_\_\_ collector region compared to the base and emitter regions..  
**Medium, large.**

What is an enhancement-mode FET?  
**An FET without a channel; no current between source and drain with zero gate voltage.**

An 800 kHz crystal, calibrated at 40 degrees Celsius and having a temperature coefficient of -30 parts per million per degree Celsius, will resonate at what frequency when operated at 60 degrees Celsius?  
**799.52 kHz.**

How many D flip-flops would be required to construct a MOD 16 ring counter?  
**16**

When referring to digital IC's, which of the following contains between 100 to 9999 gates?  
**LSI (large-scale integration).**

What class of amplifier is distinguished by the presence of output throughout the entire signal cycle and the input never goes into the cutoff region?  
**Class A.**

Why is the L-network of limited utility in impedance matching?

***It matches a small impedance range.***

What is the major advantage of a Pierce oscillator?

***It doesn't require an LC tank circuit.***

What is a product detector?

***A detector used to detect cross-modulation products.***

What is a bistable multivibrator circuit?

***A flip-flop.***

In a negative-logic circuit, what level is used to represent a logic 0?

***A high level.***

What is the theoretical minimum noise floor of a receiver with a 400-hertz bandwidth?

***-148 dBm.***

Which stage of a receiver primarily establishes its noise figure?

***The RF stage.***

(Refer to figure EL3F7) What change is needed in order to correct the grounded emitter amplifier shown?

***No change is necessary.***

What is meant by the term modulation index?

***The ratio between the deviation of a frequency modulated signal and the modulating frequency.***

What is a sine wave?

***A wave whose amplitude at any given instant can be represented by a point on a wheel rotating at a uniform speed.***

What is the peak voltage at a common household electrical outlet?

***165.5 volts.***

The International Organization for Standardization has developed a seven-level reference model for a packet-radio communications structure. What level arranges the bits into frames and controls data flow?

***The link layer.***

What is amplitude companded single sideband?

***Single sideband incorporating speech compression at the transmitter and speech expansion at the receiver.***

What is the fifth harmonic frequency of a transmitter operating on 480 kHz with a 1/4 wavelength antenna?

***2.4 MHz.***

What is the distance to a selected Distance Measuring Equipment (DME) station if an aircraft receives the ground station's reply 175 microseconds after it transmits its airborne interrogation signal? Use the standard 50 microsecond DME reply delay.

***11.6 statute miles.***

What is the frequency range of an aircraft's High Frequency (HF) communications?

***2.000 MHz to 29.999 MHz.***

What is meant by the term radiation resistance for an antenna?

***An equivalent resistance that would dissipate the same amount of power as that radiated from an antenna.***

What determines the velocity factor in a transmission line?

**Dielectrics in the line.**

What is an advantage of using top loading in a shortened HF vertical antenna?

**Improved radiation efficiency.**

What is the beamwidth of a symmetrical pattern antenna with a gain of 30 dB as compared to an isotropic radiator?

**6.4 degrees.**

What is the term used for an equivalent resistance that would dissipate the same amount of energy as that radiated from an antenna?

**Radiation resistance.**

Ignoring line losses, voltage at a point on a transmission line without standing waves is:

**Equal to the product of the line current and the surge impedance.**

What type of antenna is attached to an aircraft's Mode S transponder installation and used to receive 1030 MHz interrogation signals from the Air Traffic Control Radar Beacon System (ATCRBS)?

**An L-band monopole blade-type omnidirectional antenna.**

What type of antenna radiates the 1090 MHz "squitter" signals from an aircraft's Mode S transponder installation of the Air Traffic Control Radar Beacon System (ATCRBS)?

**An L-band monopole blade-type omnidirectional antenna.**

What type of antenna pattern is radiated from a phased-array directional antenna when transmitting the P2 Side Lobe Suppression (SLS) pulse in a Mode S interrogation signal of an aircraft's Traffic alert and Collision Avoidance System (TCAS) installation?

**A 1030 MHz omnidirectional pattern.**

What is the relative dielectric constant for air?

**1**

How does the input impedance of a field-effect transistor compare with that of a bipolar transistor?

**An FET has high input impedance; a bipolar transistor has low input impedance.**

Which of the following groups is correct for listing common materials in order of descending conductivity?

**Silver, copper, aluminum, iron, and lead.**

At 150 degrees, what is the amplitude of a sine-wave having a peak value of 5 volts?

**+2.5 volts.**

See REF1042

After two time constants, the capacitor in an RC circuit is discharged to what percentage of the starting voltage?

**0.135**

In polar coordinates, what is the impedance of a network composed of a 300-ohm-reactance capacitor, a 600-ohm-reactance inductor, and a 400-ohm resistor, all connected in series?

**500 ohms, /37 degrees**

What is the photoconductive effect?

**The increased conductivity of an illuminated semiconductor junction.**

A power transformer has a primary winding of 200 turns of #24 wire and a secondary winding consisting of 500 turns of the same size wire. When 20 volts are applied to the primary winding, the expected secondary voltage will be:  
**50 volts.**

What special type of diode is capable of both amplification and oscillation?  
**Tunnel diodes.**

What determines the visible color radiated by an LED junction?  
**The materials used to construct the device.**

What is the relationship between current through a resonant circuit and the voltage across the circuit?  
**The voltage and current are in phase.**

What wave form would appear on the voltage outputs at the collectors of an astable, multivibrator, common-emitter stage?  
**Square wave.**

What integrated circuit device converts an analog signal to a digital signal?  
**ADC**

What is the oscillator stage called in a frequency synthesizer?  
**VCO.**

How should the filter bandwidth of a receiver IF section compare with the bandwidth of a received signal?  
**Slightly greater than the received-signal bandwidth.**

What is a frequency discriminator in a radio receiver?  
**A circuit for detecting FM signals.**

What is the distinguishing feature of a Class A amplifier?  
**Output for the entire 360 degrees of the signal cycle.**

What is a balanced modulator?  
**A modulator that produces a double sideband, suppressed carrier signal.**

What term describes a wide-bandwidth communications system in which the RF carrier varies according to some pre-determined sequence?  
**Spread-spectrum communication.**

In a pulse-width modulation system, what parameter does the modulating signal vary?  
**Pulse duration.**

A 12.6 volt, 8 ampere-hour battery is supplying power to a receiver that uses 50 watts and a RADAR system that uses 300 watts. How long will the battery last?  
**17 minutes or 0.3 hours.**

At the ends of a half-wave antenna, what values of current and voltage exist compared to the remainder of the antenna?  
**Maximum voltage and minimum current.**

What is the effective radiated power of a repeater with 75 watts transmitter power output, 4 dB feedline loss, 3 dB duplexer and circulator loss, and 10 dB antenna gain?  
**150 watts.**



What is the main underlying operating principle of the Very-high-frequency Omnidirectional Range(VOR) aircraft navigational system?

**A phase difference between two AC voltages may be used to determine an aircraft's azimuth position in relation to a selected VOR station.**

Aircraft Emergency Locator Transmitters (ELT) operate on what frequencies?

**121.5, 243 and 406 MHz.**

What is a frequency standard?

**A device used to produce a highly accurate reference frequency.**

What instrument is commonly used by radio service technicians to monitor frequency, modulation, check receiver sensitivity, distortion, and to generate audio tones?

**Service monitor.**

What is the 6th pair color code in a 25 pair switchboard cable as is found in building telecommunications interconnections?

**Red/Blue, Blue/Red.**

The GSM (Global System for Mobile Communications) uses what type of CODEC for digital mobile radio system communications?

**Regular-Pulse Excited (RPE).**

How might an installer verify correct GPS sentence to marine DSC VHF radio?

**Look for latitude and longitude, plus speed, on VHF display.**

Which of the following statements about NAVTEX is true?

**Receives MSI broadcasts using SITOR-B or FEC mode.**

What is the purpose or function of the RADAR duplexer/circulator? It is a/an:

**Electronic switch that allows the use of one antenna for both transmission and reception.**

To couple energy into and out of a waveguide use:

**A thin piece of wire as an antenna.**

When engaging in voice communications via an INMARSAT-B terminal, what techniques are used?

**CODECs are used to digitize the voice signal.**

What is the purpose of not putting sharp corners on the ground leads within a building?

**Lightning will jump off of the ground lead because it is not able to make sharp bends.**

What is the standard scan rate for VHF 137 MHz polar orbiting weather facsimile reception?

**240 lines per minute.**

3:00 PM Central Standard Time is:

**2100 UTC.**

What radio navigation aid determines the distance from an aircraft to a selected VORTAC station by measuring the length of time the radio signal takes to travel to and from the station?

**Distance Measuring Equipment (DME).**

What is transequatorial propagation?

**Propagation between two points at approximately the same distance north and south of the magnetic equator.**

Which of the following terrain types permits a ground wave to travel the farthest?

**Salt water.**

What is a frequency standard?

**A device used to produce a highly accurate reference frequency.**

How can the accuracy of a frequency counter be improved?

**By using a crystal controlled oscillator mounted in a thermal oven for the time base.**

What test instrument is used to display intermodulation distortion products from an SSB transmitter?

**An audio distortion analyzer.**

Which of the following navigational methods utilizes the lowest frequency for a carrier?

**OMEGA.**

Aviation services use predominantly \_\_\_\_\_ microphones.

**Dynamic.**

What is the skin effect?

**The phenomenon where RF current flows in a thinner layer of the conductor, close to the surface, as frequency increases.**

What does the power factor equal in an R-L circuit having a 30 degree phase angle between the voltage and the current?

**0.866.**

What happens to the conductivity of a semiconductor junction when it is illuminated?

**It increases.**

What is the time constant of a circuit having two 100-microfarad capacitors and two 470-kilohm resistors all in parallel?

**47 seconds.**

How long does it take for an initial charge of 800 V DC to decrease to 14.8 V DC in a 450-microfarad capacitor when a 1-megohm resistor is connected across it?

**Approximately 1,804 seconds.**

A crowbar circuit is often added to a power supply to:

**Protect the load by activating circuit protective devices.**

How long will a 12.6 volt, 50 ampere-hour battery last if it supplies power to an emergency transmitter rated at 531 watts of plate input power and other emergency equipment with a combined power rating of 530 watts?

**35 minutes.**

746 watts, roughly 3/4 kilowatt corresponding to the lifting of 550 pounds at the rate of one foot per second is:

**One horsepower.**

The average fully-charged voltage of a lead-acid storage cell is:

**2.06 volts.**

The product of the readings of an ac voltmeter and ac ammeter is called:

**Apparent power.**

A 500 ohm, 2 watt resistor and a 1500 ohm, 1 watt resistor are connected in parallel. What is the maximum voltage that can be applied across the parallel circuit without exceeding wattage ratings?

**31.6 volts.**

If 4 amperes of current is flowing at 60 degrees, how much will flow at 150 degrees?

**2.3 amperes.**

What are the two primary classifications of Zener diodes?

**Voltage regulator and voltage reference.**

What is the meaning of the term alpha with regard to bipolar transistors?

**The change of collector current with respect to emitter current.**

Under what operating condition does an SCR exhibit electrical characteristics similar to a forward-biased silicon rectifier?

**When it is gated "on".**

What do the initials CMOS stand for?

**Complementary metal-oxide semiconductor.**

What logic state do the inputs of a TTL device assume if they are left open?

**A high logic state.**

A common emitter amplifier has:

**More power gain than common base or common collector.**

What is a depletion-mode FET?

**An FET that has a channel with no gate voltage applied; there is current between source and drain when the gate voltage is zero.**

An 800 kHz crystal, calibrated at 40 degrees Celsius and having a temperature coefficient of +30 parts per million per degree Celsius, will resonate at what frequency when operated at 60 degrees C.?

**800.48 kHz.**

If an input CLK frequency of 160 kHz is applied to a four bit ripple counter capable of achieving full count before roll-over, what frequency can you expect to measure at the MSB output?

**10 kHz.**

Which of the following devices acts as two SCR's connected back to back, but facing in opposite directions and sharing a common gate?

**TRIAC.**

What is the distinguishing characteristic of a Class B amplifier?

**Output for 180 degrees of the input signal cycle.**

What is an advantage of using a pi-L-network instead of a pi-network for impedance matching between the final amplifier of a vacuum-tube type transmitter and a multiband antenna?

**Greater harmonic suppression.**

Which type of oscillator circuit is commonly used in a VFO?

**Colpitts.**

How are FM-phone signals detected?

**By a frequency discriminator.**

How many output changes are obtained for every two trigger pulses applied to the input of a bistable T flip-flop circuit?

**Two output level changes.**

What is a crystal-controlled marker generator?

**A high-stability oscillator that generates a series of reference signals at known frequency intervals.**

How can selectivity be achieved in the front-end circuitry of a communications receiver?

**By using a preselector.**

What is an inverting op-amp circuit?

**An operational amplifier circuit connected such that the input and output signals are 180 degrees out of phase.**

What is emission A3C?

**Facsimile.**

In an FM-phone signal, what is the term for the ratio between the deviation of the frequency-modulated signal and the modulating frequency?

**Modulation index.**

If a sine wave begins from above or below the zero axis, how many times will it cross the zero axis in one complete cycle?

**2 times.**

What is the peak-to-peak voltage at a common household electrical outlet?

**331 volts.**

What is one advantage of using the ASCII code, with its larger character set, instead of the Baudot code?

**It is possible to transmit upper and lower case text.**

What is meant by companding?

**Compressing speech at the transmitter and expanding it at the receiver.**

What is the frequency range of the ground-based Very High Frequency Omnidirectional Range (VOR) stations used for aircraft navigation?

**108.00 MHz to 117.95 MHz.**

What are the transmission and the reception frequencies of an aircraft's mode C transponder operating in the Air Traffic Control Radar Beacon System (ATCRBS)?

**Transmit at 1090 MHz and receive at 1030 MHz.**

Why is an antenna coupler used in an aircraft's High Frequency (HF) communications installation?

**The antenna coupler is a device that is used to provide an efficient voltage standing-wave ratio impedance match between the HF transmitter load and the transmission line antenna.**

What are the factors that determine the radiation resistance of an antenna?

**The location of the antenna with respect to nearby objects and the length/diameter ratio of the conductors.**

Why is the physical length of a coaxial cable transmission line shorter than its electrical length?

**RF energy moves slower along the coaxial cable.**

What is an isotropic radiator?

**A hypothetical, omnidirectional antenna.**

What is the beamwidth of a symmetrical pattern antenna with a gain of 15 dB as compared to an isotropic radiator?

**36.1 degrees.**

Why is the value of the radiation resistance of an antenna important?

**Knowing the radiation resistance makes it possible to match impedances for maximum power transfer.**

Stacking antenna elements:

**Increases sensitivity to weak signals.**

The resonant frequency of a Hertz antenna can be lowered by:

**Placing an inductance in series with the antenna.**

To lengthen an antenna electrically, add a:

**Coil.**

If a 3/4 wavelength transmission is shortened at one end, impedance at the open will be:

**Infinite.**

Which metal object may be least affected by galvanic corrosion when submerged in seawater?

**Stainless steel propeller shaft.**

An AC ammeter indicates:

**Effective (RMS) values of current.**

How do you compute true power (power dissipated in the circuit) in a circuit where AC voltage and current are out of phase?

**Multiply apparent power times the power factor.**

At 240 degrees, what is the amplitude of a sine-wave having a peak value of 5 volts?

**-4.3 volts.**

What is the time constant of a circuit having two 220-microfarad capacitors and two 1-megohm resistors all in parallel?

**220 seconds.**

In polar coordinates, what is the impedance of a network comprised of a 400-ohm-reactance inductor in parallel with a 300-ohm resistor?

**240 ohms, /36.9 degrees**

What does the photoconductive effect in crystalline solids produce a noticeable change in?

**The resistance of the solid.**

In a linear electronic voltage regulator:

**The conduction of a control element is varied in direct proportion to the line voltage or load current.**

What type of semiconductor diode varies its internal capacitance as the voltage applied to its terminals varies?

**Varactor diode.**

What is the approximate operating current of a light-emitting diode?

**20 mA.**

What is the main advantage of using an op-amp audio filter over a passive LC audio filter?

**Op-amps exhibit gain rather than insertion loss.**

What is the name of the semiconductor memory IC whose digital data can be written or read, and whose memory word address can be accessed randomly?

**RAM -- Random-Access Memory.**

What integrated circuit device converts digital signals to analog signals?

**DAC**

What are three major oscillator circuits found in radio equipment?

**Colpitts, Hartley, and Pierce.**

What is the primary purpose of the final IF amplifier stage in a receiver?

**Gain.**

In a CTCSS controlled FM receiver, the CTCSS tone is filtered out after the:

**Discriminator but before the audio section.**

Which class of amplifier has the highest linearity and least distortion?

**Class A.**

What is an L-network?

**A network consisting of an inductor and a capacitor.**

How can even-order harmonics be reduced or prevented in transmitter amplifier design?

**By using a push-pull amplifier.**

What is the name of the type of modulation in which the modulating signal varies the duration of the transmitted pulse?

**Pulse-width modulation.**

What occurs if the load is removed from an operating series DC motor?

**It will accelerate until it falls apart.**

An antenna radiates a primary signal of 500 watts output. If there is a 2nd harmonic output of 0.5 watt, what attenuation of the 2nd harmonic has occurred?

**30 dB.**

What is the effective radiated power of a repeater with 75 watts transmitter power output, 5 dB feedline loss, 4 dB duplexer and circulator loss, and 6 dB antenna gain?

**37.6 watts.**

What is the frequency range of the localizer beam system used by aircraft to find the centerline of a runway during an Instrument Landing System (ILS) approach to an airport?

**108.10 MHz to 111.95 MHz.**

What is the frequency range of an aircraft's radio altimeter?

**4250 MHz to 4350 MHz.**

What equipment may be useful to track down EMI aboard a ship or aircraft?

**Portable AM receiver.**

Can a P25 radio system be monitored with a scanner?

**Yes, if the scanner has P25 decoding.**

What tolerance off of plumb should a single base station radio rack be installed?

**Just inside the bubble on a level.**

Which of the following codes has gained the widest acceptance for exchange of data from one computer to another?

**ASCII.**

What is a common occurrence when voice-testing an SSB aboard a boat?

**Voltage panel indicator lamps may glow with each syllable.**

Which of the following is the primary frequency that is used exclusively for NAVTEX broadcasts internationally?  
**518 kHz.**

What device can be used to determine the performance of a RADAR system at sea?  
**Echo box.**

The permanent magnetic field that surrounds a traveling-wave tube (TWT) is intended to:  
**Prevent the electron beam from spreading.**

Which of the following statements concerning INMARSAT geostationary satellites is true?  
**They provide coverage to vessels in nearly all of the world's navigable waters.**

Should you use a power drill without eye protection?  
**No.**

What is the standard scan rate for high-frequency 3 MHz-23 MHz weather facsimile reception from associated shore stations?  
**120 lines per minute.**

Which of the following is an acceptable method of solder removal from holes in a printed board?  
**Soldering iron and a suction device.**

Which of the following is a feature of an Instrument Landing System (ILS)?  
**Localizer: shows aircraft deviation horizontally from center of runway.**

What is the maximum range for signals using transequatorial propagation?  
**About 5,000 miles.**

Which of the following frequency bands is best suited for ground wave propagation?  
**30 kHz to 300 kHz.**

What is a frequency-marker generator?  
**A device used to produce a highly accurate reference frequency.**

What is the name of the condition that occurs when the signals of two transmitters in close proximity mix together in one or both of their final amplifiers, and unwanted signals at the sum and difference frequencies of the original transmissions are generated?  
**Intermodulation interference.**

How can ferrite beads be used to suppress ignition noise?  
**Install them in the primary and secondary ignition leads.**

Neglecting line losses, the RMS voltage along an RF transmission line having no standing waves \_\_\_\_\_.  
**Is the product of the surge impedance times the line current.**

What geometric patterns will be displayed on an oscilloscope if the modulating audio is fed to the horizontal plates while the modulated RF is fed to the vertical plates, assume 100 % modulation?  
**Triangle.**

What is the term for the phenomenon where most of an RF current flows along the surface of the conductor?  
**Skin effect.**

How many watts are being consumed in a circuit having a power factor of 0.2 when the input is 100-V AC and 4-amperes is being drawn?  
**80 watts.**



Most bipolar junction transistors have a \_\_\_\_ doped and \_\_\_\_ base region compared to the emitter and collector regions..  
**Lightly, thin.**

What are the operating modes for field-effect transistors?  
**Depletion and enhancement modes.**

A pulse width modulator IC would most likely be found in which of the following:  
**Ringing choke power supply.**

How many J-K flip-flops would be required to construct a MOD 16 ripple counter?  
**4**

How many individual memory cells would be contained in a memory IC that has 4 data bus input/output pins and 4 address pins for connection to the address bus?  
**64 memory cells.**

What is the distinguishing feature of a Class A amplifier?  
**Output for the entire 360 degrees of the signal cycle.**

Which type of network offers the greater transformation ratio?  
**Pi-network.**

What is the piezoelectric effect?  
**Mechanical vibration of a crystal by the application of a voltage.**

What is the principle of detection in a diode detector?  
**Rectification and filtering of RF.**

How many bits of information can be stored in a single flip-flop circuit?  
**1**

In a negative-logic circuit, what level is used to represent a logic 1?  
**A low level.**

What is the limiting condition for sensitivity in a communications receiver?  
**The noise floor of the receiver.**

What is meant by the term noise figure of a communications receiver?  
**The level of noise generated in the front end and succeeding stages of a receiver.**

(Refer to figure EL3F6) How can we correct the defect, if any, in this voltage doubler circuit?  
**Omit C1.**

What is the deviation ratio of an FM-phone signal having a maximum frequency swing of plus or minus 7.5 kHz and accepting a maximum modulation rate of 3.5 kHz?  
**2.14.**

When the electric field is parallel to the surface of the earth, what is the polarization of the electromagnetic wave?  
**Horizontal.**

What is the RMS voltage at a common household electrical power outlet?  
**117-V AC.**



The International Organization for Standardization has developed a seven-level reference model for a packet-radio communications structure. What level is responsible for the actual transmission of data and handshaking signals?

**The physical layer.**

What is the necessary bandwidth for a 170-hertz shift, 300-baud ASCII emission J2D transmission?

**0.5 kHz.**

What is the seventh harmonic of 2182 kHz when the transmitter is connected to a half-wave Hertz antenna?

**15.27 MHz.**

What is the slant range distance of an aircraft's Distance Measuring Equipment (DME)?

**It is the line-of-sight distance between an aircraft and a selected ground-based navigation station.**

What is meant by the term, "night effect", when using an aircraft's Automatic Direction Finding (ADF) equipment?

**Night effect refers to the fact that Non Directional Beacon (NDB) transmissions can bounce-off the earth's ionosphere at night and be received at almost any direction.**

How does the length of the director element of a parasitic element beam antenna compare with that of the driven element?

**It is about 5% shorter.**

What is the velocity factor for non-foam dielectric 50 or 75 ohm flexible coaxial cable such as RG 8, 11, 58 and 59?

**0.66.**

What type of antenna is used in an aircraft's Instrument Landing System (ILS) glideslope installation?

**A folded dipole reception antenna.**

What is the beamwidth of a symmetrical pattern antenna with a gain of 20 dB as compared to an isotropic radiator?

**20.3 degrees.**

What kind of impedance does a 1/2-wavelength transmission line present to a generator when the line is open at the far end?

**A very high impedance.**

Adding parasitic elements to a quarter-wavelength antenna will:

**Increase its directional characteristics and increase its sensitivity.**

The parasitic elements on a receiving antenna:

**Increase its directivity.**

Waveguide construction:

**Should not have long horizontal runs.**

Concerning shunt-fed 1/4 wavelength Marconi antenna:

**DC resistance of the antenna to ground is zero.**

What metal is usually employed as a sacrificial anode for corrosion control purposes?

**Zinc bar.**

A common emitter amplifier has:

**More voltage gain than a common collector.**

Halving the cross-sectional area of a conductor will:

**Double the resistance.**

At  $\pi/3$  radians, what is the amplitude of a sine-wave having a peak value of 5 volts?

**+4.3 volts.**

After two time constants, the capacitor in an RC circuit is charged to what percentage of the supply voltage?

**0.865**

In polar coordinates, what is the impedance of a network composed of a 400-ohm-reactance capacitor in series with a 300-ohm resistor?

**500 ohms, -53.1 degrees**

What happens to the conductivity of photoconductive material when light shines on it?

**It increases.**

A power transformer has a single primary winding and three secondary windings producing 5.0 volts, 12.6 volts, and 150 volts. Assuming similar wire sizes, which of the three secondary windings will have the highest measured DC resistance?

**The 150 volt winding.**

Structurally, what are the two main categories of semiconductor diodes?

**Junction and point contact.**

What type of bias is required for an LED to produce luminescence?

**Forward bias.**

What is the characteristic of the current flow within the parallel elements in a parallel R-L-C circuit at resonance?

**Maximum.**

What will occur if an amplifier input signal coupling capacitor fails open?

**No amplification will occur, with DC within the circuit measuring normal.**

In a negative-logic circuit, what level is used to represent a logic 0?

**High level.**

What is a bistable multivibrator circuit?

**Flip-flop.**

What is the function of a decade counter digital IC?

**Produce one output pulse for every ten input pulses.**

Why is the Colpitts oscillator circuit commonly used in a VFO (variable frequency oscillator)?

**It is stable.**

What is an undesirable effect of using too wide a filter bandwidth in the IF section of a receiver?

**Undesired signals will reach the audio stage.**

What is the process of detection in a radio diode detector circuit?

**Rectification and filtering of RF.**

What class of amplifier is distinguished by the presence of output throughout the entire signal cycle and the input never goes into the cutoff region?

**Class A.**

How can a single-sideband phone signal be generated?

**By using a balanced modulator followed by a filter.**

What is the name of the condition that occurs when the signals of two transmitters in close proximity mix together in one or both of their final amplifiers, and unwanted signals at the sum and difference frequencies of the original transmissions are generated?

**Intermodulation interference.**

What is an important factor in pulse-code modulation using time-division multiplex?

**Synchronization of transmit and receive clock pulse rates.**

A 6 volt battery with 1.2 ohms internal resistance is connected across two light bulbs in parallel whose resistance is 12 ohms each. What is the current flow?

**0.83 amps.**

Which of the following represents the best standing wave ratio (SWR)?

**A. 1:1.**

What is the effective radiated power of a repeater with 50 watts transmitter power output, 4 dB feedline loss, 3 dB duplexer and circulator loss, and 6 dB antenna gain?

**39.7 watts.**

The amplitude modulated variable phase signal and the frequency modulated reference phase signal of a Very-high-frequency Omnidirectional Range (VOR) station used for aircraft navigation are synchronized so that both signals are in phase with each other at \_\_\_\_\_ of the VOR station.

**360 degrees North, magnetic bearing position.**

What is the frequency range of an aircraft's Very High Frequency (VHF) communications?

**118.000 MHz to 136.975 MHz (worldwide up to 151.975 MHz).**

How is a frequency counter used?

**To measure the time between events, or the frequency, which is the reciprocal of the time.**

What test instrument can be used to display spurious signals in the output of a radio transmitter?

**A spectrum analyzer.**

Why should you not use white or translucent plastic tie wraps on a radio tower?

**UV radiation from the Sun deteriorates the plastic very quickly.**

What is a CODEC?

**A coder/decoder IC or circuitry that converts a voice signal into a predetermined digital format for encrypted transmission.**

What is the reason for the USA-INT control or function?

**It changes some channels that are normally duplex channels into simplex channels.**

What would be the bandwidth of a good crystal lattice band-pass filter for weather facsimile HF (high frequency) reception?

**1 kHz at -6 dB.**

The ATR box:

**Prevents the received signal from entering the transmitter.**

Conductance takes place in a waveguide:

**Through electromagnetic and electrostatic fields in the walls of the waveguide.**

What are the directional characteristics of the INMARSAT-C SES antenna?

**Omnidirectional.**

What device can protect a transmitting station from a direct lightning hit?

***There is no device to protect a station from a direct hit from lightning.***

REF1042

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REF1887

Capacitor = an electrical device that can store a limited amount of electricity. If a capacitor is shorted, it would not have this ability. A megohm is 1,000,000 ohms. An instrument called a megger (Le., a megohmmeter) is used to test whether the insulation on a conductor has broken down. The megger, is a portable instrument consisting of a hand-cranked DC generator that supplies the necessary voltage to make the measurement, and an instrument portion, which indicates the value of the resistance you are measuring. A Megger tests for a breakdown of insulation surrounding a conductor. Meggers used aboard ship usually are rated at 500 volts. To avoid excessive test voltages, most meggers are equipped with friction clutches on their small DC generator. When the generator is cranked faster than its rated speed, the clutch slips so the generator speed and output voltage do not exceed their rated values. For extended ranges, a 1,000-volt hand cranked generator is available. When extremely high resistances (R), in the range of 10 ,000 megohms, must be measured, a high voltage is needed to cause sufficient current flow to actuate the meter movement. Meggers are expensive instruments. An electrician is generally brought in when a diagnosis of an electrical problem that involves the possible breakdown of insulation is involved. However, you should be alert to the possibility of insulation failure or grounding of electrical equipment. A megohmmeter is commonly called a "megger" . It measures very high resistances and is most commonly used to measure the resistance of wire insulation. A series of slight kicks downscale by the needle on your megger indicates that current is leaking somewhere along the surface of a wire's dirty insulation. When reading an instrument that measures resistance, be sure to note which end of the scale is zero and which is the highest reading. Also be careful that you understand the units you are using. In meggers, one side of the scale is often in thousands of ohms while the other end is in megohms (i.e., millions of ohms). The downward dip of the needle at the beginning of the test is caused by the capacitive effect of the windings of the machine being tested (i.e., its ability to absorb the electricity being cranked into it from the megger) and is particularly noticeable in large motors or generators that are being tested.

REF2173

Solder is an alloy (i.e., mixture) of tin and lead and must melt at a lower temperature than the metals it joins. Soldering irons are "tinned" with solder to prevent tip oxidation when they are heated.