

Subelement T4 - Amateur Radio Practices

Group T4A - - Station setup: connecting a microphone, a power source, a computer, digital equipment, an SWR meter; bonding; Mobile radio installation

T4A01 (D)

Which of the following is an appropriate power supply rating for a typical 50 watt output mobile FM transceiver?

- A. 24.0 volts at 4 amperes
- B. 13.8 volts at 4 amperes
- C. 24.0 volts at 12 amperes
- D. 13.8 volts at 12 amperes

T4A02 (A)

Which of the following should be considered when selecting an accessory SWR meter?

- A. The frequency and power level at which the measurements will be made
- B. The distance that the meter will be located from the antenna
- C. The types of modulation being used at the station
- D. All these choices are correct

T4A03 (A)

Why are short, heavy-gauge wires used for a transceiver's DC power connection?

- A. To minimize voltage drop when transmitting
- B. To provide a good counterpoise for the antenna
- C. To avoid RF interference
- D. All these choices are correct

T4A04 (B)

How are the transceiver audio input and output connected in a station configured to operate using FT8?

- A. To a computer running a terminal program and connected to a terminal node controller unit
- B. To the audio input and output of a computer running WSJT-X software
- C. To an FT8 conversion unit, a keyboard, and a computer monitor
- D. To a computer connected to the FT8converter.com website

T4A05 (A)

Where should an RF power meter be installed?

- A. In the feed line, between the transmitter and antenna
- B. At the power supply output
- C. In parallel with the push-to-talk line and the antenna
- D. In the power supply cable, as close as possible to the radio

T4A06 (C)

What signals are used in a computer-radio interface for digital mode operation?

- A. Receive and transmit mode, status, and location
- B. Antenna and RF power
- C. Receive audio, transmit audio, and transmitter keying
- D. NMEA GPS location and DC power

T4A07 (C)

Which of the following connections is made between a computer and a transceiver to use computer software when operating digital modes?

- A. Computer "line out" to transceiver push-to-talk
- B. Computer "line in" to transceiver push-to-talk
- C. Computer "line in" to transceiver speaker connector
- D. Computer "line out" to transceiver speaker connector

T4A08 (D)

Which of the following conductors is preferred for bonding at RF?

- A. Copper braid removed from coaxial cable
- B. Steel wire
- C. Twisted-pair cable
- D. Flat copper strap

T4A09 (B)

How can you determine the length of time that equipment can be powered from a battery?

- A. Divide the watt-hour rating of the battery by the peak power consumption of the equipment
- B. Divide the battery ampere-hour rating by the average current draw of the equipment
- C. Multiply the watts per hour consumed by the equipment by the battery power rating
- D. Multiply the square of the current rating of the battery by the input resistance of the equipment

T4A10 (A)

What function is performed with a transceiver and a digital mode hot spot?

- A. Communication using digital voice or data systems via the internet
- B. FT8 digital communications via AFSK
- C. RTTY encoding and decoding without a computer
- D. High-speed digital communications for meteor scatter

T4A11 (A)

Where should the negative power return of a mobile transceiver be connected in a vehicle?

- A. At the 12 volt battery chassis ground
- B. At the antenna mount
- C. To any metal part of the vehicle
- D. Through the transceiver's mounting bracket

T4A12 (C)

What is an electronic keyer?

- A. A device for switching antennas from transmit to receive
- B. A device for voice activated switching from receive to transmit
- C. A device that assists in manual sending of Morse code
- D. An interlock to prevent unauthorized use of a radio

Group T4B - - Operating controls: frequency tuning, use of filters, squelch function, AGC, memory channels, noise blanker, microphone gain, receiver incremental tuning (RIT), bandwidth selection, digital transceiver configuration

T4B01 (B)

What is the effect of excessive microphone gain on SSB transmissions?

- A. Frequency instability
- B. Distorted transmitted audio
- C. Increased SWR
- D. All these choices are correct

T4B02 (A)

Which of the following can be used to enter a transceiver's operating frequency?

- A. The keypad or VFO knob
- B. The CTCSS or DTMF encoder
- C. The Automatic Frequency Control
- D. All these choices are correct

T4B03 (A)

How is squelch adjusted so that a weak FM signal can be heard?

- A. Set the squelch threshold so that receiver output audio is on all the time
- B. Turn up the audio level until it overcomes the squelch threshold
- C. Turn on the anti-squelch function
- D. Enable squelch enhancement

T4B04 (B)

What is a way to enable quick access to a favorite frequency or channel on your transceiver?

- A. Enable the frequency offset
- B. Store it in a memory channel
- C. Enable the VOX
- D. Use the scan mode to select the desired frequency

T4B05 (C)

What does the scanning function of an FM transceiver do?

- A. Checks incoming signal deviation
- B. Prevents interference to nearby repeaters
- C. Tunes through a range of frequencies to check for activity
- D. Checks for messages left on a digital bulletin board

T4B06 (D)

Which of the following controls could be used if the voice pitch of a single-sideband signal returning to your CQ call seems too high or low?

- A. The AGC or limiter
- B. The bandwidth selection
- C. The tone squelch
- D. The RIT or Clarifier

T4B07 (B)

What does a DMR "code plug" contain?

- A. Your call sign in CW for automatic identification
- B. Access information for repeaters and talkgroups
- C. The codec for digitizing audio
- D. The DMR software version

T4B08 (B)

What is the advantage of having multiple receive bandwidth choices on a multimode transceiver?

- A. Permits monitoring several modes at once by selecting a separate filter for each mode
- B. Permits noise or interference reduction by selecting a bandwidth matching the mode
- C. Increases the number of frequencies that can be stored in memory
- D. Increases the amount of offset between receive and transmit frequencies

T4B09 (C)

How is a specific group of stations selected on a digital voice transceiver?

- A. By retrieving the frequencies from transceiver memory
- B. By enabling the group's CTCSS tone
- C. By entering the group's identification code
- D. By activating automatic identification

T4B10 (C)

Which of the following receiver filter bandwidths provides the best signal-to-noise ratio for SSB reception?

- A. 500 Hz
- B. 1000 Hz
- C. 2400 Hz
- D. 5000 Hz

T4B11 (A)

Which of the following must be programmed into a D-STAR digital transceiver before transmitting?

- A. Your call sign
- B. Your output power
- C. The codec type being used
- D. All these choices are correct

T4B12 (D)

What is the result of tuning an FM receiver above or below a signal's frequency?

- A. Change in audio pitch
- B. Sideband inversion
- C. Generation of a heterodyne tone
- D. Distortion of the signal's audio

Subelement T5 - Electrical Principles

Group T5A - - Current and voltage: terminology and units, conductors and insulators, alternating and direct current

T5A01 (D)

Electrical current is measured in which of the following units?

- A. Volts
- B. Watts
- C. Ohms
- D. Amperes

T5A02 (B)

Electrical power is measured in which of the following units?

- A. Volts
- B. Watts
- C. Watt-hours
- D. Amperes

T5A03 (D)

What is the name for the flow of electrons in an electric circuit?

- A. Voltage
- B. Resistance
- C. Capacitance
- D. Current

T5A04 (C)

What are the units of electrical resistance?

- A. Siemens
- B. Mhos
- C. Ohms
- D. Coulombs

T5A05 (A)

What is the electrical term for the force that causes electron flow?

- A. Voltage
- B. Ampere-hours
- C. Capacitance
- D. Inductance

T5A06 (A)

What is the unit of frequency?

- A. Hertz
- B. Henry
- C. Farad
- D. Tesla

T5A07 (B)

Why are metals generally good conductors of electricity?

- A. They have relatively high density
- B. They have many free electrons
- C. They have many free protons
- D. All these choices are correct

T5A08 (B)

Which of the following is a good electrical insulator?

- A. Copper
- B. Glass
- C. Aluminum
- D. Mercury

T5A09 (C)

Which of the following describes alternating current?

- A. Current that alternates between a positive direction and zero
- B. Current that alternates between a negative direction and zero
- C. Current that alternates between positive and negative directions
- D. All these answers are correct

T5A10 (C)

Which term describes the rate at which electrical energy is used?

- A. Resistance
- B. Current
- C. Power
- D. Voltage

T5A11 (D)

What type of current flow is opposed by resistance?

- A. Direct current
- B. Alternating current
- C. RF current
- D. All these choices are correct

T5A12 (D)

What describes the number of times per second that an alternating current makes a complete cycle?

- A. Pulse rate
- B. Speed
- C. Wavelength
- D. Frequency

Group T5B - - Math for electronics: conversion of electrical units, decibels

T5B01 (C)

How many milliamperes is 1.5 amperes?

- A. 15 milliamperes
- B. 150 milliamperes
- C. 1500 milliamperes
- D. 15,000 milliamperes

T5B02 (A)

Which is equal to 1,500,000 hertz?

- A. 1500 kHz
- B. 1500 MHz
- C. 15 GHz
- D. 150 kHz

T5B03 (C)

Which is equal to one kilovolt?

- A. One one-thousandth of a volt
- B. One hundred volts
- C. One thousand volts
- D. One million volts

T5B04 (A)

Which is equal to one microvolt?

- A. One one-millionth of a volt
- B. One million volts
- C. One thousand kilovolts
- D. One one-thousandth of a volt

T5B05 (B)

Which is equal to 500 milliwatts?

- A. 0.02 watts
- B. 0.5 watts
- C. 5 watts
- D. 50 watts

T5B06 (D)

Which is equal to 3000 milliamperes?

- A. 0.003 amperes
- B. 0.3 amperes
- C. 3,000,000 amperes
- D. 3 amperes

T5B07 (C)

Which is equal to 3.525 MHz?

- A. 0.003525 kHz
- B. 35.25 kHz
- C. 3525 kHz
- D. 3,525,000 kHz

T5B08 (B)

Which is equal to 1,000,000 picofarads?

- A. 0.001 microfarads
- B. 1 microfarad
- C. 1000 microfarads
- D. 1,000,000,000 microfarads

T5B09 (B)

Which decibel value most closely represents a power increase from 5 watts to 10 watts?

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

T5B10 (C)

Which decibel value most closely represents a power decrease from 12 watts to 3 watts?

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

T5B11 (A)

Which decibel value represents a power increase from 20 watts to 200 watts?

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

T5B12 (D)

Which is equal to 28400 kHz?

- A. 28.400 kHz
- B. 2.800 MHz
- C. 284.00 MHz
- D. 28.400 MHz

T5B13 (C)

Which is equal to 2425 MHz?

- A. 0.002425 GHz
- B. 24.25 GHz
- C. 2.425 GHz
- D. 2425 GHz

Group T5C - - Capacitance and inductance terminology and units; Radio frequency definition and units; Impedance definition and units; Calculating power

T5C01 (D)

What describes the ability to store energy in an electric field?

- A. Inductance
- B. Resistance
- C. Tolerance
- D. Capacitance

T5C02 (A)

What is the unit of capacitance?

- A. The farad
- B. The ohm
- C. The volt
- D. The henry

T5C03 (D)

What describes the ability to store energy in a magnetic field?

- A. Admittance
- B. Capacitance
- C. Resistance
- D. Inductance

T5C04 (C)

What is the unit of inductance?

- A. The coulomb
- B. The farad
- C. The henry
- D. The ohm

T5C05 (D)

What is the unit of impedance?

- A. The volt
- B. The ampere
- C. The coulomb
- D. The ohm

T5C06 (A)

What does the abbreviation "RF" mean?

- A. Radio frequency signals of all types
- B. The resonant frequency of a tuned circuit
- C. The real frequency transmitted as opposed to the apparent frequency
- D. Reflective force in antenna transmission lines

T5C07 (D)

What is the abbreviation for megahertz?

- A. MH
- B. mh
- C. Mhz
- D. MHz

T5C08 (A)

What is the formula used to calculate electrical power (P) in a DC circuit?

- A. $P = E * I$
- B. $P = E / I$
- C. $P = E - I$
- D. $P = E + I$

T5C09 (A)

How much power is delivered by a voltage of 13.8 volts DC and a current of 10 amperes?

- A. 138 watts
- B. 0.7 watts
- C. 23.8 watts
- D. 3.8 watts

T5C10 (B)

How much power is delivered by a voltage of 12 volts DC and a current of 2.5 amperes?

- A. 4.8 watts
- B. 30 watts
- C. 14.5 watts
- D. 0.208 watts

T5C11 (B)

How much current is required to deliver 120 watts at a voltage of 12 volts DC?

- A. 0.1 amperes
- B. 10 amperes
- C. 12 amperes
- D. 132 amperes

T5C12 (A)

What is impedance?

- A. The opposition to AC current flow
- B. The inverse of resistance
- C. The Q or Quality Factor of a component
- D. The power handling capability of a component

T5C13 (D)

What is the abbreviation for kilohertz?

- A. KHZ
- B. khz
- C. khZ
- D. kHz

Group T5D - - Ohm's Law; Series and parallel circuits

T5D01 (B)

What formula is used to calculate current in a circuit?

- A. $I = E * R$
- B. $I = E / R$
- C. $I = E + R$
- D. $I = E - R$

T5D02 (A)

What formula is used to calculate voltage in a circuit?

- A. $E = I \times R$
- B. $E = I / R$
- C. $E = I + R$
- D. $E = I - R$

T5D03 (B)

What formula is used to calculate resistance in a circuit?

- A. $R = E \times I$
- B. $R = E / I$
- C. $R = E + I$
- D. $R = E - I$

T5D04 (B)

What is the resistance of a circuit in which a current of 3 amperes flows when connected to 90 volts?

- A. 3 ohms
- B. 30 ohms
- C. 93 ohms
- D. 270 ohms

T5D05 (C)

What is the resistance of a circuit for which the applied voltage is 12 volts and the current flow is 1.5 amperes?

- A. 18 ohms
- B. 0.125 ohms
- C. 8 ohms
- D. 13.5 ohms

T5D06 (A)

What is the resistance of a circuit that draws 4 amperes from a 12-volt source?

- A. 3 ohms
- B. 16 ohms
- C. 48 ohms
- D. 8 ohms

T5D07 (D)

What is the current in a circuit with an applied voltage of 120 volts and a resistance of 80 ohms?

- A. 9600 amperes
- B. 200 amperes
- C. 0.667 amperes
- D. 1.5 amperes

T5D08 (C)

What is the current through a 100-ohm resistor connected across 200 volts?

- A. 20,000 amperes
- B. 0.5 amperes
- C. 2 amperes
- D. 100 amperes

T5D09 (C)

What is the current through a 24-ohm resistor connected across 240 volts?

- A. 24,000 amperes
- B. 0.1 amperes
- C. 10 amperes
- D. 216 amperes

T5D10 (A)

What is the voltage across a 2-ohm resistor if a current of 0.5 amperes flows through it?

- A. 1 volt
- B. 0.25 volts
- C. 2.5 volts
- D. 1.5 volts

T5D11 (B)

What is the voltage across a 10-ohm resistor if a current of 1 ampere flows through it?

- A. 1 volt
- B. 10 volts
- C. 11 volts
- D. 9 volts

T5D12 (D)

What is the voltage across a 10-ohm resistor if a current of 2 amperes flows through it?

- A. 8 volts
- B. 0.2 volts
- C. 12 volts
- D. 20 volts

T5D13 (A)

In which type of circuit is DC current the same through all components?

- A. Series
- B. Parallel
- C. Resonant
- D. Branch

T5D14 (B)

In which type of circuit is voltage the same across all components?

- A. Series
- B. Parallel
- C. Resonant
- D. Branch