

Subelement T6 - Electronic And Electrical Components

Group T6A - - Fixed and variable resistors; Capacitors; Inductors; Fuses; Switches; Batteries

T6A01 (B)

What electrical component opposes the flow of current in a DC circuit?

- A. Inductor
- B. Resistor
- C. Inverter
- D. Transformer

T6A02 (C)

What type of component is often used as an adjustable volume control?

- A. Fixed resistor
- B. Power resistor
- C. Potentiometer
- D. Transformer

T6A03 (B)

What electrical parameter is controlled by a potentiometer?

- A. Inductance
- B. Resistance
- C. Capacitance
- D. Field strength

T6A04 (B)

What electrical component stores energy in an electric field?

- A. Varistor
- B. Capacitor
- C. Inductor
- D. Diode

T6A05 (D)

What type of electrical component consists of conductive surfaces separated by an insulator?

- A. Resistor
- B. Potentiometer
- C. Oscillator
- D. Capacitor

T6A06 (C)

What type of electrical component stores energy in a magnetic field?

- A. Varistor
- B. Capacitor
- C. Inductor
- D. Diode

T6A07 (D)

What electrical component is typically constructed as a coil of wire?

- A. Switch
- B. Capacitor
- C. Diode
- D. Inductor

T6A08 (C)

What is the function of an SPDT switch?

- A. A single circuit is opened or closed
- B. Two circuits are opened or closed
- C. A single circuit is switched between one of two other circuits
- D. Two circuits are each switched between one of two other circuits

T6A09 (A)

What electrical component is used to protect other circuit components from current overloads?

- A. Fuse
- B. Thyatron
- C. Varactor
- D. All these choices are correct

T6A10 (D)

Which of the following battery chemistries is rechargeable?

- A. Nickel-metal hydride
- B. Lithium-ion
- C. Lead-acid
- D. All these choices are correct

T6A11 (B)

Which of the following battery chemistries is not rechargeable?

- A. Nickel-cadmium
- B. Carbon-zinc
- C. Lead-acid
- D. Lithium-ion

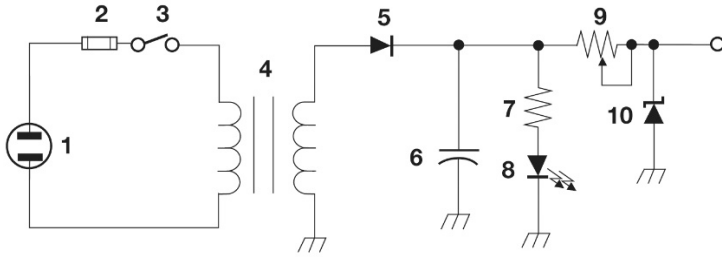


Figure T-2

T6A12 (A)

What type of switch is represented by component 3 in figure T-2?

- A. Single-pole single-throw
- B. Single-pole double-throw
- C. Double-pole single-throw
- D. Double-pole double-throw

Group T6B - - Semiconductors: basic principles and applications of solid state devices, diodes and transistors

T6B01 (A)

Which is true about forward voltage drop in a diode?

- A. It is lower in some diode types than in others
- B. It is proportional to peak inverse voltage
- C. It indicates that the diode is defective
- D. It has no impact on the voltage delivered to the load

T6B02 (C)

What electronic component allows current to flow in only one direction?

- A. Resistor
- B. Fuse
- C. Diode
- D. Driven element

T6B03 (C)

Which of these components can be used as an electronic switch?

- A. Varistor
- B. Potentiometer
- C. Transistor
- D. Thermistor

T6B04 (B)

Which of the following components can consist of three regions of semiconductor material?

- A. Alternator
- B. Transistor
- C. Triode
- D. Pentagrid converter

T6B05 (B)

What type of transistor has a gate, drain, and source?

- A. Varistor
- B. Field-effect
- C. Tesla-effect
- D. Bipolar junction

T6B06 (B)

How is the cathode lead of a semiconductor diode often marked on the package?

- A. With the word "cathode"
- B. With a stripe
- C. With the letter C
- D. With the letter K

T6B07 (A)

What causes a light-emitting diode (LED) to emit light?

- A. Forward current
- B. Reverse current
- C. Capacitively-coupled RF signal
- D. Inductively-coupled RF signal

T6B08 (D)

What does the abbreviation FET stand for?

- A. Frequency Emission Transmitter
- B. Fast Electron Transistor
- C. Free Electron Transmitter
- D. Field Effect Transistor

T6B09 (C)

What are the names for the electrodes of a diode?

- A. Plus and minus
- B. Source and drain
- C. Anode and cathode
- D. Gate and base

T6B10 (B)

Which of the following can provide power gain?

- A. Transformer
- B. Transistor
- C. Reactor
- D. Resistor

T6B11 (A)

What is the term that describes a device's ability to amplify a signal?

- A. Gain
- B. Forward resistance
- C. Forward voltage drop
- D. On resistance

T6B12 (B)

What are the names of the electrodes of a bipolar junction transistor?

- A. Signal, bias, power
- B. Emitter, base, collector
- C. Input, output, supply
- D. Pole one, pole two, output

Group T6C - - Circuit diagrams: use of schematics, basic structure; Schematic symbols of basic components

T6C01 (C)

What is the name of an electrical wiring diagram that uses standard component symbols?

- A. Bill of materials
- B. Connector pinout
- C. Schematic
- D. Flow chart

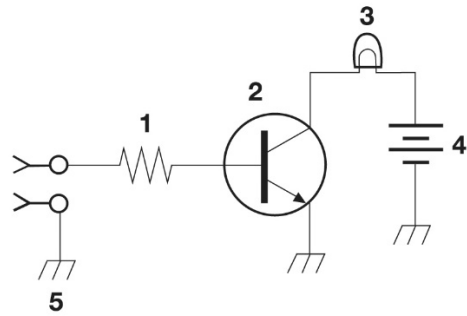


Figure T-1

T6C02 (A)

What is component 1 in figure T-1?

- A. Resistor
- B. Transistor
- C. Battery
- D. Connector

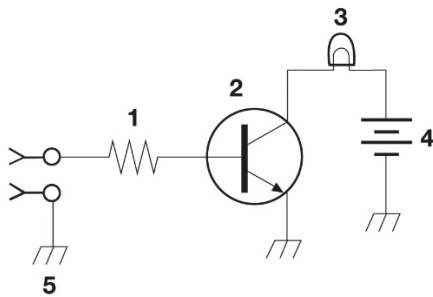


Figure T-1

T6C03 (B)

What is component 2 in figure T-1?

- A. Resistor
- B. Transistor
- C. Indicator lamp
- D. Connector

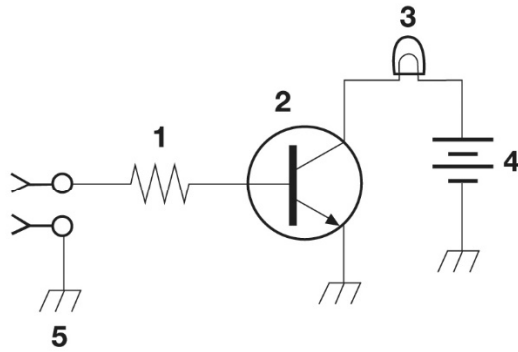


Figure T-1

T6C04 (C)

What is component 3 in figure T-1?

- A. Resistor
- B. Transistor
- C. Lamp
- D. Ground symbol

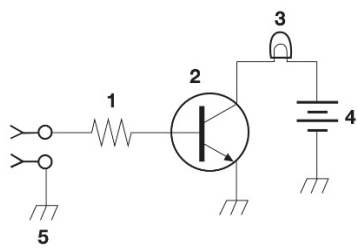


Figure T-1

T6C05 (D)

What is component 4 in figure T-1?

- A. Resistor
- B. Transistor
- C. Ground symbol
- D. Battery

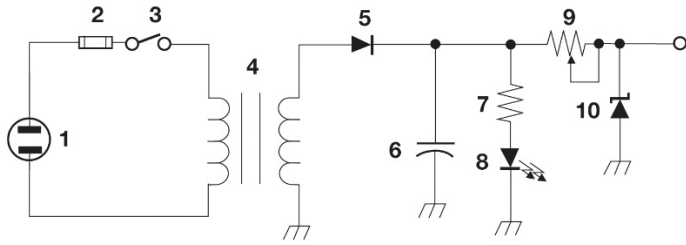


Figure T-2

T6C06 (B)

What is component 6 in figure T-2?

- A. Resistor
- B. Capacitor
- C. Regulator IC
- D. Transistor

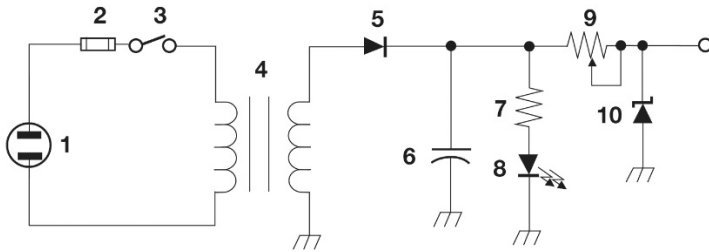


Figure T-2

T6C07 (D)

What is component 8 in figure T-2?

- A. Resistor
- B. Inductor
- C. Regulator IC
- D. Light emitting diode

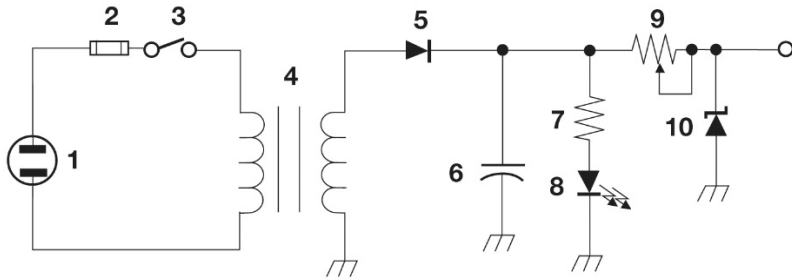


Figure T-2

T6C08 (C)

What is component 9 in figure T-2?

- A. Variable capacitor
- B. Variable inductor
- C. Variable resistor
- D. Variable transformer

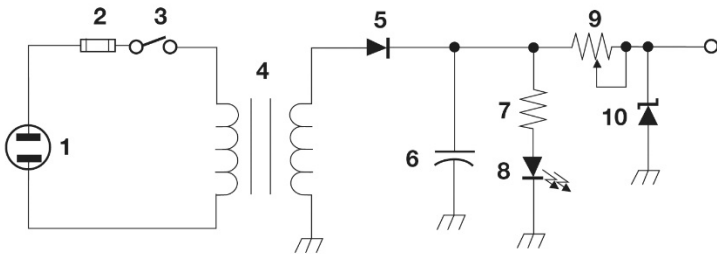


Figure T-2

T6C09 (D)

What is component 4 in figure T-2?

- A. Variable inductor
- B. Double-pole switch
- C. Potentiometer
- D. Transformer

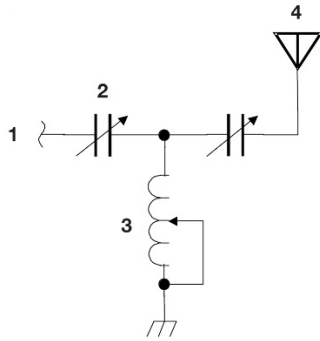


Figure T-3

T6C10 (D)

What is component 3 in figure T-3?

- A. Connector
- B. Meter
- C. Variable capacitor
- D. Variable inductor

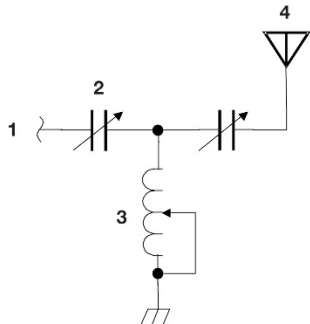


Figure T-3

T6C11 (A)

What is component 4 in figure T-3?

- A. Antenna
- B. Transmitter
- C. Dummy load
- D. Ground

T6C12 (C)

Which of the following is accurately represented in electrical schematics?

- A. Wire lengths
- B. Physical appearance of components
- C. Component connections
- D. All these choices are correct

Group T6D - - Component functions: rectifiers, relays, voltage regulators, meters, indicators, integrated circuits, transformers; Resonant circuit; Shielding

T6D01 (B)

Which of the following devices or circuits changes an alternating current into a varying direct current signal?

- A. Transformer
- B. Rectifier
- C. Amplifier
- D. Reflector

T6D02 (A)

What is a relay?

- A. An electrically-controlled switch
- B. A current controlled amplifier
- C. An inverting amplifier
- D. A pass transistor

T6D03 (C)

Which of the following is a reason to use shielded wire?

- A. To decrease the resistance of DC power connections
- B. To increase the current carrying capability of the wire
- C. To prevent coupling of unwanted signals to or from the wire
- D. To couple the wire to other signals

T6D04 (C)

Which of the following displays an electrical quantity as a numeric value?

- A. Potentiometer
- B. Transistor
- C. Meter
- D. Relay

T6D05 (A)

What type of circuit controls the amount of voltage from a power supply?

- A. Regulator
- B. Oscillator
- C. Filter
- D. Phase inverter

T6D06 (B)

What component changes 120 V AC power to a lower AC voltage for other uses?

- A. Variable capacitor
- B. Transformer
- C. Transistor
- D. Diode

T6D07 (A)

Which of the following is commonly used as a visual indicator?

- A. LED
- B. FET
- C. Zener diode
- D. Bipolar transistor

T6D08 (D)

Which of the following is combined with an inductor to make a resonant circuit?

- A. Resistor
- B. Zener diode
- C. Potentiometer
- D. Capacitor

T6D09 (C)

What is the name of a device that combines several semiconductors and other components into one package?

- A. Transducer
- B. Multi-pole relay
- C. Integrated circuit
- D. Transformer

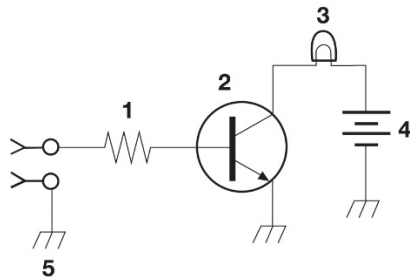


Figure T-1

T6D10 (C)

What is the function of component 2 in figure T-1?

- A. Give off light when current flows through it
- B. Supply electrical energy
- C. Control the flow of current
- D. Convert electrical energy into radio waves

T6D11 (A)

Which of the following is a resonant or tuned circuit?

- A. An inductor and a capacitor in series or parallel
- B. A linear voltage regulator
- C. A resistor circuit used for reducing standing wave ratio
- D. A circuit designed to provide high-fidelity audio

Subelement T7 - Practical Circuits

Group T7A - - Station equipment: receivers, transceivers, transmitter amplifiers, receive amplifiers, transverters; Basic radio circuit concepts and terminology: sensitivity, selectivity, mixers, oscillators, PTT, modulation

T7A01 (B)

Which term describes the ability of a receiver to detect the presence of a signal?

- A. Linearity
- B. Sensitivity
- C. Selectivity
- D. Total Harmonic Distortion

T7A02 (A)

What is a transceiver?

- A. A device that combines a receiver and transmitter
- B. A device for matching feed line impedance to 50 ohms
- C. A device for automatically sending and decoding Morse code
- D. A device for converting receiver and transmitter frequencies to another band

T7A03 (B)

Which of the following is used to convert a signal from one frequency to another?

- A. Phase splitter
- B. Mixer
- C. Inverter
- D. Amplifier

T7A04 (C)

Which term describes the ability of a receiver to discriminate between multiple signals?

- A. Discrimination ratio
- B. Sensitivity
- C. Selectivity
- D. Harmonic distortion

T7A05 (D)

What is the name of a circuit that generates a signal at a specific frequency?

- A. Reactance modulator
- B. Phase modulator
- C. Low-pass filter
- D. Oscillator

T7A06 (C)

What device converts the RF input and output of a transceiver to another band?

- A. High-pass filter
- B. Low-pass filter
- C. Transverter
- D. Phase converter

T7A07 (B)

What is the function of a transceiver's PTT input?

- A. Input for a key used to send CW
- B. Switches transceiver from receive to transmit when grounded
- C. Provides a transmit tuning tone when grounded
- D. Input for a preamplifier tuning tone

T7A08 (C)

Which of the following describes combining speech with an RF carrier signal?

- A. Impedance matching
- B. Oscillation
- C. Modulation
- D. Low-pass filtering

T7A09 (B)

What is the function of the SSB/CW-FM switch on a VHF power amplifier?

- A. Change the mode of the transmitted signal
- B. Set the amplifier for proper operation in the selected mode
- C. Change the frequency range of the amplifier to operate in the proper segment of the band
- D. Reduce the received signal noise

T7A10 (B)

What device increases the transmitted output power from a transceiver?

- A. A voltage divider
- B. An RF power amplifier
- C. An impedance network
- D. All these choices are correct

T7A11 (A)

Where is an RF preamplifier installed?

- A. Between the antenna and receiver
- B. At the output of the transmitter power amplifier
- C. Between the transmitter and the antenna tuner
- D. At the output of the receiver audio amplifier

Group T7B - - Symptoms, causes, and cures of common transmitter and receiver problems: overload and overdrive, distortion, interference and consumer electronics, RF feedback

T7B01 (D)

What can you do if you are told your FM handheld or mobile transceiver is over-deviating?

- A. Talk louder into the microphone
- B. Let the transceiver cool off
- C. Change to a higher power level
- D. Talk farther away from the microphone

T7B02 (A)

What would cause a broadcast AM or FM radio to receive an amateur radio transmission unintentionally?

- A. The receiver is unable to reject strong signals outside the AM or FM band
- B. The microphone gain of the transmitter is turned up too high
- C. The audio amplifier of the transmitter is overloaded
- D. The deviation of an FM transmitter is set too low

T7B03 (D)

Which of the following can cause radio frequency interference?

- A. Fundamental overload
- B. Harmonics
- C. Spurious emissions
- D. All these choices are correct

T7B04 (D)

Which of the following could you use to cure distorted audio caused by RF current on the shield of a microphone cable?

- A. Band-pass filter
- B. Low-pass filter
- C. Preamplifier
- D. Ferrite choke

T7B05 (A)

How can fundamental overload of a non-amateur radio or TV receiver by an amateur signal be reduced or eliminated?

- A. Block the amateur signal with a filter at the antenna input of the affected receiver
- B. Block the interfering signal with a filter on the amateur transmitter
- C. Switch the transmitter from FM to SSB
- D. Switch the transmitter to a narrow-band mode

T7B06 (A)

Which of the following actions should you take if a neighbor tells you that your station's transmissions are interfering with their radio or TV reception?

- A. Make sure that your station is functioning properly and that it does not cause interference to your own radio or television when it is tuned to the same channel
- B. Immediately turn off your transmitter and contact the nearest FCC office for assistance
- C. Install a harmonic doubler on the output of your transmitter and tune it until the interference is eliminated
- D. All these choices are correct

T7B07 (D)

Which of the following can reduce overload of a VHF transceiver by a nearby commercial FM station?

- A. Installing an RF preamplifier
- B. Using double-shielded coaxial cable
- C. Installing bypass capacitors on the microphone cable
- D. Installing a band-reject filter

T7B08 (D)

What should you do if something in a neighbor's home is causing harmful interference to your amateur station?

- A. Work with your neighbor to identify the offending device
- B. Politely inform your neighbor that FCC rules prohibit the use of devices that cause interference
- C. Make sure your station meets the standards of good amateur practice
- D. All these choices are correct

T7B09 (D)

What should be the first step to resolve non-fiber optic cable TV interference caused by your amateur radio transmission?

- A. Add a low-pass filter to the TV antenna input
- B. Add a high-pass filter to the TV antenna input
- C. Add a preamplifier to the TV antenna input
- D. Be sure all TV feed line coaxial connectors are installed properly

T7B10 (D)

What might be a problem if you receive a report that your audio signal through an FM repeater is distorted or unintelligible?

- A. Your transmitter is slightly off frequency
- B. Your batteries are running low
- C. You are in a bad location
- D. All these choices are correct

T7B11 (C)

What is a symptom of RF feedback in a transmitter or transceiver?

- A. Excessive SWR at the antenna connection
- B. The transmitter will not stay on the desired frequency
- C. Reports of garbled, distorted, or unintelligible voice transmissions
- D. Frequent blowing of power supply fuses

Group T7C - - Antenna and transmission line measurements and troubleshooting: measuring SWR, effects of high SWR, causes of feed line failures; Basic coaxial cable characteristics; Use of dummy loads when testing

T7C01 (A)

What is the primary purpose of a dummy load?

- A. To prevent transmitting signals over the air when making tests
- B. To prevent over-modulation of a transmitter
- C. To improve the efficiency of an antenna
- D. To improve the signal-to-noise ratio of a receiver

T7C02 (B)

Which of the following is used to determine if an antenna is resonant at the desired operating frequency?

- A. A VTVM
- B. An antenna analyzer
- C. A Q meter
- D. A frequency counter

T7C03 (B)

What does a dummy load consist of?

- A. A high-gain amplifier and a TR switch
- B. A non-inductive resistor mounted on a heat sink
- C. A low-voltage power supply and a DC relay
- D. A 50-ohm reactance used to terminate a transmission line

T7C04 (C)

What reading on an SWR meter indicates a perfect impedance match between the antenna and the feed line?

- A. 50:50
- B. Zero
- C. 1:1
- D. Full Scale

T7C05 (A)

Why do most solid-state transmitters reduce output power as SWR increases beyond a certain level?

- A. To protect the output amplifier transistors
- B. To comply with FCC rules on spectral purity
- C. Because power supplies cannot supply enough current at high SWR
- D. To lower the SWR on the transmission line

T7C06 (D)

What does an SWR reading of 4:1 indicate?

- A. Loss of -4 dB
- B. Good impedance match
- C. Gain of +4 dB
- D. Impedance mismatch

T7C07 (C)

What happens to power lost in a feed line?

- A. It increases the SWR
- B. It is radiated as harmonics
- C. It is converted into heat
- D. It distorts the signal

T7C08 (D)

Which instrument can be used to determine SWR?

- A. Voltmeter
- B. Ohmmeter
- C. Iambic pentameter
- D. Directional wattmeter

T7C09 (A)

Which of the following causes failure of coaxial cables?

- A. Moisture contamination
- B. Solder flux contamination
- C. Rapid fluctuation in transmitter output power
- D. Operation at 100% duty cycle for an extended period

T7C10 (D)

Why should the outer jacket of coaxial cable be resistant to ultraviolet light?

- A. Ultraviolet resistant jackets prevent harmonic radiation
- B. Ultraviolet light can increase losses in the cable's jacket
- C. Ultraviolet and RF signals can mix, causing interference
- D. Ultraviolet light can damage the jacket and allow water to enter the cable

T7C11 (C)

What is a disadvantage of air core coaxial cable when compared to foam or solid dielectric types?

- A. It has more loss per foot
- B. It cannot be used for VHF or UHF antennas
- C. It requires special techniques to prevent moisture in the cable
- D. It cannot be used at below freezing temperatures

Group T7D - - Using basic test instruments: voltmeter, ammeter, and ohmmeter; Soldering

T7D01 (B)

Which instrument would you use to measure electric potential?

- A. An ammeter
- B. A voltmeter
- C. A wavemeter
- D. An ohmmeter

T7D02 (B)

How is a voltmeter connected to a component to measure applied voltage?

- A. In series
- B. In parallel
- C. In quadrature
- D. In phase

T7D03 (A)

When configured to measure current, how is a multimeter connected to a component?

- A. In series
- B. In parallel
- C. In quadrature
- D. In phase

T7D04 (D)

Which instrument is used to measure electric current?

- A. An ohmmeter
- B. An electrometer
- C. A voltmeter
- D. An ammeter

T7D06 (C)

Which of the following can damage a multimeter?

- A. Attempting to measure resistance using the voltage setting
- B. Failing to connect one of the probes to ground
- C. Attempting to measure voltage when using the resistance setting
- D. Not allowing it to warm up properly

T7D07 (C)

Which of the following measurements are made using a multimeter?

- A. Signal strength and noise
- B. Impedance and reactance
- C. Voltage and resistance
- D. All these choices are correct

T7D08 (A)

Which of the following types of solder should not be used for radio and electronic applications?

- A. Acid-core solder
- B. Lead-tin solder
- C. Rosin-core solder
- D. Tin-copper solder

T7D09 (C)

What is the characteristic appearance of a cold tin-lead solder joint?

- A. Dark black spots
- B. A bright or shiny surface
- C. A rough or lumpy surface
- D. Excessive solder

T7D10 (A)

What reading indicates that an ohmmeter is connected across a large, discharged capacitor?

- A. Increasing resistance with time
- B. Decreasing resistance with time
- C. Steady full-scale reading
- D. Alternating between open and short circuit

T7D11 (B)

Which of the following precautions should be taken when measuring in-circuit resistance with an ohmmeter?

- A. Ensure that the applied voltages are correct
- B. Ensure that the circuit is not powered
- C. Ensure that the circuit is grounded
- D. Ensure that the circuit is operating at the correct frequency