SUBELEMENT T7

Station Equipment

[4 Exam Questions]

PREPPERNET

T7A01
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

PREPPERNET

Sensitivity *is the ability to detect the presence (or absence) of a signal.*

It is one of the most important characteristics of a receiver.

Selectivity is the ability to detect a signal in the presence of other signals that are not on the frequency you want to receive. WRONG ANSWER...

Total Harmonic Distortion (THD) is a popular term that describes how well an amplifier reproduces its input. WRONG ANSWER…

Linearity refers to getting a proportional increase or decrease when you vary something, like the gain of an amplifier not detecting anything. WRONG ANSWER….

PREPPERNET

T7A02
WHAT IS A TRANSCEIVER?

A. A type of antenna switch

B. A unit combining the functions of a transmitter and a receiver

C. A component in a repeater that filters out unwanted interference

D. A type of antenna matching network

PREPPERNET

A transmitter is used to convert information to radio waves,

A receiver is used to convert radio waves back into information.

SO…

A Transceiver is ideal for 2-way communication because it facilitates both the talking and listening aspects of communication.

Besides, it is the only answer provided that combines TRANSmitter and reCEIVER!!!

PREPPERNET

T7A03
WHICH OF THE FOLLOWING IS USED TO CONVERT A RADIO SIGNAL FROM ONE FREQUENCY TO ANOTHER?

A. Phase splitter

B. Mixer

C. Inverter

D. Amplifier

PREPPERNET

A <u>mixer</u> allows two signals to be combined such that there will be an output signal at the sum and difference of the two signals.

A <u>mixer</u> is essential to almost every modern radio design…and is crucial to the overall performance of the radio in most cases!!!

PREPPERNET

T7A04
WHICH TERM DESCRIBES THE ABILITY OF A RECEIVER TO DISCRIMINATE BETWEEN MULTIPLE SIGNALS?

A. Discrimination ratio

B. Sensitivity

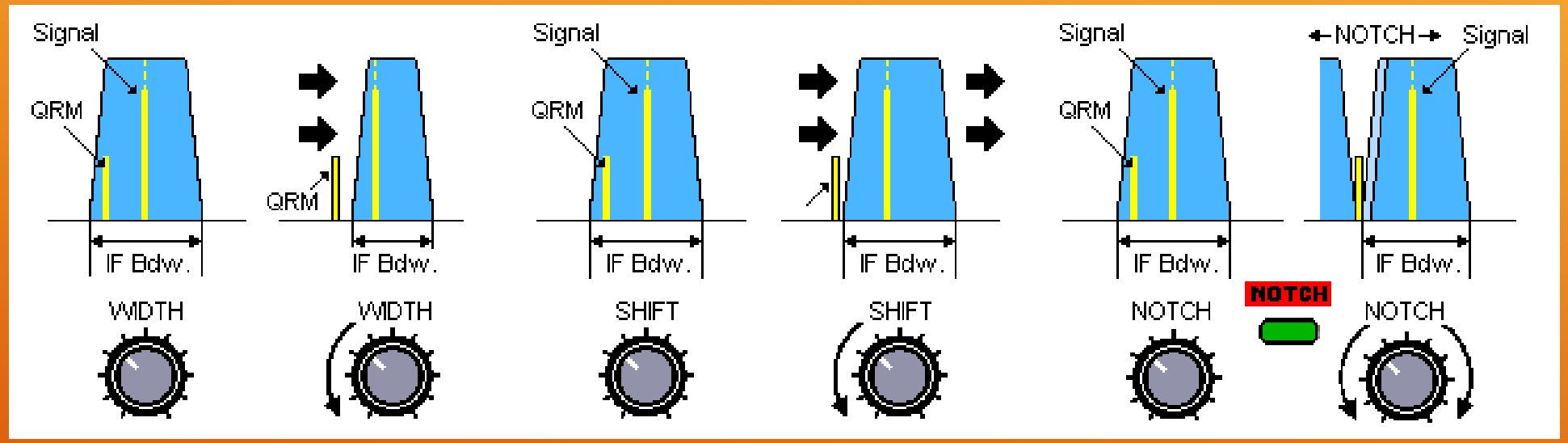
C. Selectivity

D. Harmonic distortion

PREPPERNET

<u>Selectivity</u> is the ability of a receiver to discriminate a desired signal from other adjacent signals on either side of the frequency.

Obviously if two signals are present on the same channel then the receiver selectivity is unable to separate them, but where they are on different frequencies the degree of selectivity available should enable them to be separated.



PREPPERNET

T7A05
WHAT IS THE NAME OF A CIRCUIT THAT GENERATES A SIGNAL AT A SPECIFIC FREQUENCY?

A. Reactance modulator

B. Product detector

C. Low-pass filter

D. Oscillator

***Oscillators* generate a signal of a desired frequency.**

Oscillators come in countless varieties, using everything from vibrating quartz crystals to other "classic" circuits like Colpitts, Hartley, or Clapp oscillators to generate the signal.

Reactance Modulators are circuits that are used to add voice information to radio signals - they don't generate the signal. WRONG ANSWER…

Product Detector is a circuit in a receiver - it doesn't generate a radio signal. WRONG ANSWER…

Low Pass filters keep radio frequency energy above a certain cut-off level from passing through it, but it doesn't generate RF energy, so it doesn't generate any sort of signal. WRONG ANSWER…

PREPPERNET

PREPPERNET

T7A06
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

PREPPERNET

This question wants to know what electrical circuit converts a lower frequency Single-Side-Band (SSB) frequency to a higher frequency. This is done by a Transverter.

Real-World example: Many folks became ham radio operators from their experiences on CB (27 MHz). Their equipment can be modified and tied into a Transverter, making the 11 meter signal now come out on 222 MHz.

A High-Pass filter will reduce a signal's amplitude if it is not higher than the corner frequency of the filter. A Low-Pass filter will reduce a signal's amplitude if it is not lower than the corner frequency of the filter. BOTH ARE WRONG…

A Phase Converter will alter the phase of a signal but the frequency will stay the same. WRONG…

PREPPERNET

T7A07
WHAT IS MEANT BY “PTT”?

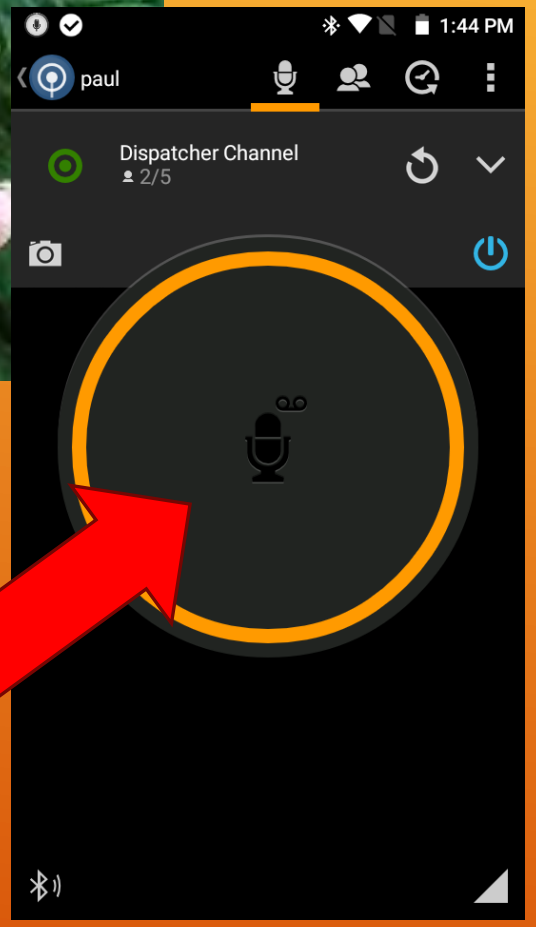
A. Pre-transmission tuning to reduce transmitter harmonic emission

B. Precise tone transmissions used to limit repeater access to only certain signals

C. A primary transformer tuner use to match antennas

D. The push-to-talk function that switches between receive and transmit

PREPPERNET



PTT means Push To Talk.

You can find a Push To Talk (PTT) switch on the side of a microphone.

PREPPERNET

T7A08
WHICH OF THE FOLLOWING DESCRIBES COMBINING SPEECH WITH AN RF CARRIER SIGNAL?

A. Impedance matching

B. Oscillation

C. Modulation

D. Low-pass filtering

PREPPERNET

A Modulator is the circuit that "modulates" or encodes the RF carrier frequency with the speech signal in a transmitter.

The keyword "combines" indicates that the voice and carrier are put together, which should help you envision a circuit that modulates the signal.

PREPPERNET

T7A09
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 portion of the band

D. Reduce the received signal noise

A RF power amplifier must operate differently when amplifying a FM vs an AM (such as SSB or CW) signal.

VHF power amplifiers are more likely to be used with both modes by different people who may need both functions.

PREPPERNET

T7A10
WHAT DEVICE INCREASES THE LOW-POWER OUTPUT FROM A HANDHELD TRANSCEIVER?

A. A voltage divider

B. An RF power amplifier

C. An impedance network

D. All of these choices are correct

PREPPERNET

This one is probably pretty obvious if you think about it; an RF power amplifier amplifies (or increases) an RF signal from another device.

Side Note…

As a new Technician-class operator, your first radio purchase will most likely be or already has been a dual-band handheld (aka Baofeng). Instead of buying an additional radio to get 50 watt capabilities, you can purchase a RF power amplifier for about $1/watt that will convert your 5w radio into 50w or more!!!

PREPPERNET

T7A11
WHERE IS AN RF PREAMPLIFIER INSTALLED?

A. Between the antenna and receiver

B. At the output of the transmitter's power amplifier

C. Between a transmitter and antenna tuner

D. At the receiver's audio output

A preamplifier is used to amplify a signal before it gets to the receiver; this might be used if the receiver is not sensitive enough, but most commonly a preamplifier is installed as close to the antenna as possible and before the feedline in order to compensate for feedline loss.

Preamplification is only done on a received signal and is "pre" because it occurs before the receiver receives the signal.

Side Note…

Don't go buy one…your radio equipment already has an excellent built-in preamplifier!!!

PREPPERNET

T7B01
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

PREPPERNET

It is natural human response to think we need to talk louder when the speaker is farther from us…car Bluetooth, etc.

We are all guilty of it…

The louder the voice signal in an FM transmitter, the greater the frequency deviation of the modulator. The most convenient solution is…talk softer!!!

I know…IMAGINE THAT!!!

PREPPERNET

T7B02
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

Microphone gain might cause distortion, splatter or over deviation, but it wouldn't cause the signal to jump into a broadcast AM or FM band - they're too far away from the amateur bands. WRONG ANSWER…

Similarly, if the audio amplifier of the transmitter were overloaded, it might distort, but wouldn't shift the frequency or cause harmonics to be radiated. WRONG ANSWER…

If the deviation of an FM transmitter were set too low, the signal would sound very quiet, the opposite of loud or even loud enough. WRONG ANSWER…

The only remaining choice is the right one, that the receiver is unable to reject the strong signals outside of the broadcast band.

T7B03

WHICH OF THE FOLLOWING CAN CAUSE RADIO FREQUENCY INTERFERENCE?

A. Fundamental overload

B. Harmonics

C. Spurious emissions

D. All of these choices are correct

PREPPERNET

There are many things that can cause interference with radio signals. All three of those listed here can cause interference, therefore the correct answer is "All of these choices are correct".

Fundamental overload - This is a case when the transmitted signal is so strong that it overloads the receiver which prevents proper reception of the desired signal.

Harmonics - When a sine wave is distorted (not pure) it creates harmonics that are integer multiples of the fundamental frequency; these harmonics end up getting into receivers at these harmonic frequencies interfering with operation on those frequencies.

Spurious emissions - There are a number of undesirable emissions that can interfere with normal signal reception. Most of these can be termed Spurious emissions. From ITU, 1.145 "Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions."

PREPPERNET

T7B04

WHICH OF THE FOLLOWING IS A WAY TO REDUCE OR ELIMINATE INTERFERENCE FROM AN AMATEUR TRANSMITTER TO A NEARBY TELEPHONE?

A. Put a filter on the amateur transmitter

B. Reduce the microphone gain

C. Reduce the SWR on the transmitter transmission line

D. Put an RF filter on the telephone

Since the problem is that the telephone is acting as a receiver and should only be acting as a telephone, the only solutions would be to reduce the power of the transmitter so it's not detected by the telephone (acting as a receiver), or to stop the telephone from acting as a receiver. WRONG ANSWER…

Although sometimes a high SWR (Standing Wave Ratio) can cause unwanted radiation near the ground that results in a strong signal appearing at a nearby telephone, the problem is still that the telephone is acting as a receiver. WRONG ANSWER…

The microphone gain being too high could cause splatter on adjacent frequencies or over-deviation, but can't turn a telephone into a receiver. WRONG ANSWER…

The only remaining choice is to keep the RF energy from even getting to the telephone by installing an RF filter on the telephone.

PREPPERNET

The most efficient and affordable solution to this issue is utilizing <u>Ferrite Chokes</u> to reduce or eliminate interference BEFORE it ever reaches the affected equipment.

You can usually pick up Ferrite Chokes for around $1 at hamfests and $2 on Amazon or eBay.

PREPPERNET

T7B05
HOW CAN 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

PREPPERNET

The problem here is that the non-amateur radio is receiving signals in the amateur radio band, so a filter on the amateur transmitter won't help - the signal in the amateur band will still be radiated. WRONG ANSWER…

Changing the transmitter to another mode will only change the mode of the interference, so it will still be received by the TV receiver. WRONG ANSWERS…

The bandwidth of the transmitted signal isn't the problem - the problem is that the TV is receiving signals in the amateur radio bands. So the only way to reduce or eliminate the signal is to block the amateur radio signal before it gets into the TV, using a filter at the antenna input of the affected receiver.

PREPPERNET

T7B06

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. Tell them that your license gives you the right to transmit and nothing can be done to reduce the interference

D. Install a harmonic doubler on the output of your transmitter and tune it until the interference is eliminated

PREPPERNET

It is YOUR responsibility to ensure your equipment does not interfere with neighboring electronics.

Your local FCC office is not going to help you accomplish (they don't have the manpower) and your license does not give you priority over all the airwaves in your neighborhood.

In this case, the easiest and fastest test is to see if your TV gets the same interference on the same channel. If there is not interference, show your neighbor and then go verify their issue on their TV…the neighbor could have a bad antenna or the cable TV feedline is poor quality which the cable provider should alleviate the issue.

Make yourself a concerned and respectful neighbor by giving attention to complaints of interference…be a good steward of ham radio toward non-operators!!!

PREPPERNET

T7B07

WHICH OF THE FOLLOWING CAN REDUCE OVERLOAD TO A VHF TRANSCEIVER FROM A NEARBY FM BROADCAST STATION?

A. RF preamplifier

B. Double-shielded coaxial cable

C. Using headphones instead of the speaker

D. Band-reject filter

If a nearby station is on an adjacent frequency, but is bleeding into your signal so much that you are having a hard time discerning your audience, you can utilize a "Band Stop" or "Band Reject" filter to filter out the over-deviating signal that is sits beside your own…

A band reject filter knocks out the frequency range from the FM broadcast station before it ever gets to your radio and has a chance to cause interference.

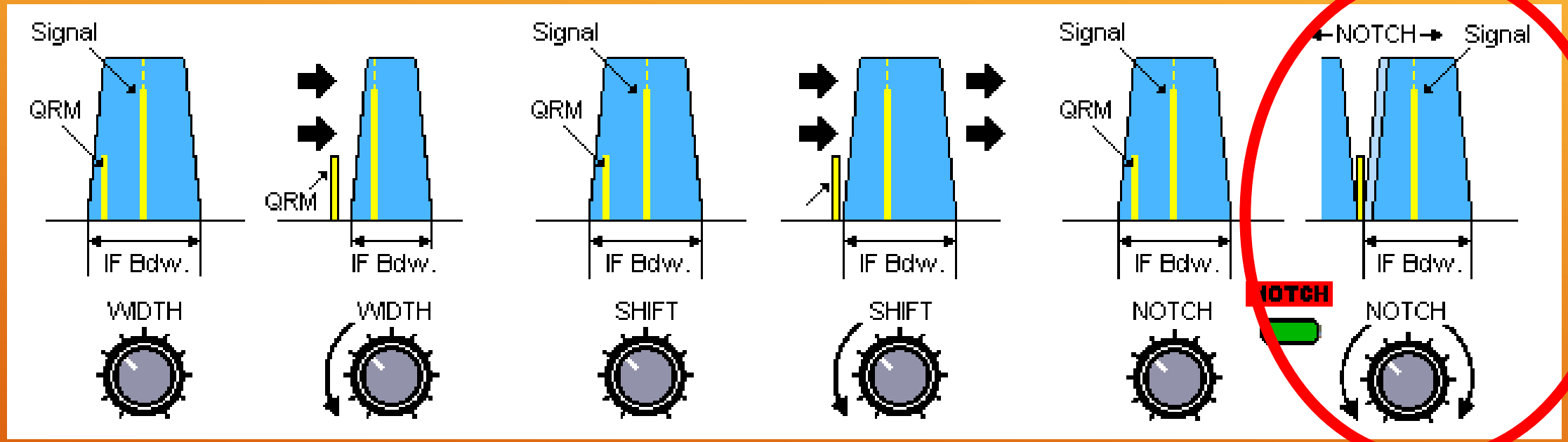
Using headphones is NOT going to eliminate or reduce the presence of an unwanted signal.

An RF power amplifier only boosts your TRANSMIT signal and not the receive signal.

Your coax's shielding may reduce the unwanted signal but filters do a much better job of eliminating unwanted frequencies from your receiver.

PREPPERNET

The band-reject filter is a filter which its operation is opposite to that of the "Band-Pass" filter because the frequencies within the bandwidth are rejected, and the frequencies outside the bandwidth are passed. It is also known as notch, band-stop, or band-elimination filter.



PREPPERNET

T7B08
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 about the rules that prohibit the use of devices that cause interference

C. Check your station and make sure it meets the standards of good amateur practice

D. All of these choices are correct

PREPPERNET

Cooperation with others is the best way to start solving an interference problem. Many devices, especially digital computers and peripherals, generate RF interference. Turning off devices one at a time is a good way to locate an offending device.

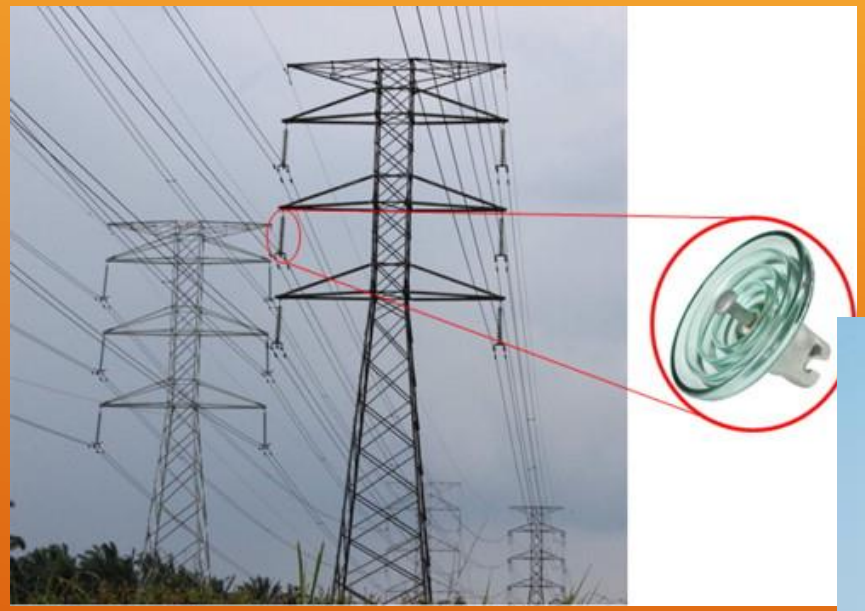
However, you can only hope your neighbor is cooperative since the interference may be caused by someone the neighbor does not feel obligated or want to be inconvenienced in helping you eliminate. In these cases, you do the best you can to alleviate the issue on your end with your equipment.

PREPPERNET

In rural areas, a huge source of interference is electric fences. Things like tall grass rubbing the fence and causing arching to worn insulators can be the source of the problem.

PREPPERNET

Sometimes the issue is not in your neighbors home like you initially thought. If you have power transmission lines near your home that feed the neighborhood power, you may need to call your electric provider. They are obligated to investigate by law.



PREPPERNET

More often then not, the most common cause of interference (RFI) being emitted from your neighbors house are "wall warts" so make these the start of your investigation by unplugging them one at a time and checking to see if the unwanted signal disappears.

PREPPERNET

T7B09
WHAT IS A PART 15 DEVICE?

A. An unlicensed device that may emit low-powered radio signals on frequencies used by a licensed service

B. An amplifier that has been type-certified for amateur radio

C. A device for long-distance communications using special codes sanctioned by the International Amateur Radio Union

D. A type of test set used to determine whether a transmitter complies with FCC regulation 91.15

Part 15 devices are things like Wireless Routers or the little switching power supplies that you plug in the wall, or even computers. They can put out some low powered radio signals, but they're supposed to be limited to very low powered signals that could be filtered out or avoided by placement of a radio receiver.

Since they're not intended to radiate RF outside their intended band, they can't be citizen's band radios, and amateur radios don't share any frequencies with Citizen's Bands.

Part 15 devices radiate tiny amounts of radio frequency energy, so they are not likely to be useful for long distance communications. Indeed, you should be able to get rid of interference from a Part 15 device by locating the receiver at a greater distance from the device.

PREPPERNET

T7B10

WHAT MIGHT BE A PROBLEM IF YOU RECEIVE A REPORT THAT YOUR AUDIO SIGNAL THROUGH THE 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 of these choices are correct

PREPPERNET

How do each of these cause your signal to be distorted or unintelligible?

"Your transmitter may be slightly off frequency" - If your transmitter is slightly off frequency the receiver will not be able to demodulate the signal and it may sound garbled, distorted and low in volume.

"Your batteries may be running low" - When your batteries are low the audio amplifier cannot generate the proper amplitude signals; the signal is limited by the lower than normal voltage which clips the signal causing it to be distorted.

"You could be in a bad location" - As in real estate, location, location and location are vital. Multipath signals can cause an interference pattern that can make the received audio sound badly.

PREPPERNET

T7B11
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

PREPPERNET

Your own transmitter output can be picked up by the sensitive circuits inside your microphone. This is called RF feedback. The symptom is that the transmission may be distorted, garbled or unintelligible.

One solution to try is to run a jumper wire from the microphone chassis to the metal frame of the radio…

PREPPERNET

Another quick solution is to create a "common mode choke" by wrapping a section of feedline through a torroid.

PREPPERNET

T7B12

WHAT SHOULD BE THE FIRST STEP TO RESOLVE CABLE TV INTERFERENCE FROM YOUR HAM 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 coaxial connectors are installed properly

PREPPERNET

Once it is known that the TV interference is originating from your ham radio transmission, and that your own equipment is functioning within acceptable parameters, your first step is to determine how best to solve or reduce the effects of the interference at the TV.

While it's possible to reduce the effects of the interference by installing a preamplifier at the TV antenna input, you will only be masking the problem rather than solving it. Also, as well-intentioned as they might be, installing filters might not prove very useful because their effective frequency ranges might be so close to those of the TV that the TV signals themselves could just as easily get filtered out with the interference.

Usually the problem will be that something connected to the TV antenna input is acting as an antenna, picking up your transmissions. This is especially true for loose connectors, mismatched connectors, frayed cables, and other damaged or corroded connections. Therefore, checking to be sure that all TV coaxial connectors are installed properly is a good way to satisfy that first step.

PREPPERNET

T7C01
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

PREPPERNET

A dummy load is a simple resistive load inside a shielded container that allows a transmitter to be operated without the RF signal being radiated into the atmosphere.

You can test the output power of your transmitter to ensure that it is operating within specification.

A dummy load is often used while troubleshooting a transmitter problem.

PREPPERNET

T7C02

WHICH OF THE FOLLOWING INSTRUMENTS CAN BE 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

PREPPERNET

"Antenna" is the key word for both this question and answer. An antenna analyzer is a very helpful instrument for analyzing the characteristics of an antenna.

It can indicate resonant frequency and VSWR by outputting a small adjustable frequency while looking at the amplitude of the forward and reflected!

PREPPERNET

T7C03
WHAT, IN GENERAL TERMS, IS STANDING WAVE RATIO (SWR)?

A. A measure of how well a load is matched to a transmission line

B. The ratio of high to low impedance in a feed line

C. The transmitter efficiency ratio

D. An indication of the quality of your station's ground connection

Standing Wave Ratio is a ratio, but the answer here that lists "ratio" as an option is not it, so don't be fooled. The most efficient transfer of power occurs when the load and the transmission line have the same impedence; in this case, radios are all designed for 50 ohm, so if your feedline and antenna system are not 50 ohm some of the power will get reflected back to the transmitter.

The Standing Wave Ratio is the ratio of how much forward power there (the power out of the transmitter) is to how much power is reflected back (or reflected power), but what it actually measures is how well the antenna and feedline (load) are matched in impedence to the transmitter (transmission line).

Note that although resistance and impedence are both measured in ohms, they are not the same thing! The primary difference for the purpose of this discussion is that resistance is always the same, but impedence changes with frequency; this is why you may have a very close match (and a good SWR) at one frequency but a very bad match at another.

PREPPERNET

T7C04

WHAT READING ON AN SWR METER INDICATES A PERFECT IMPEDANCE MATCH BETWEEN THE ANTENNA AND THE FEED LINE?

A. 2 to 1

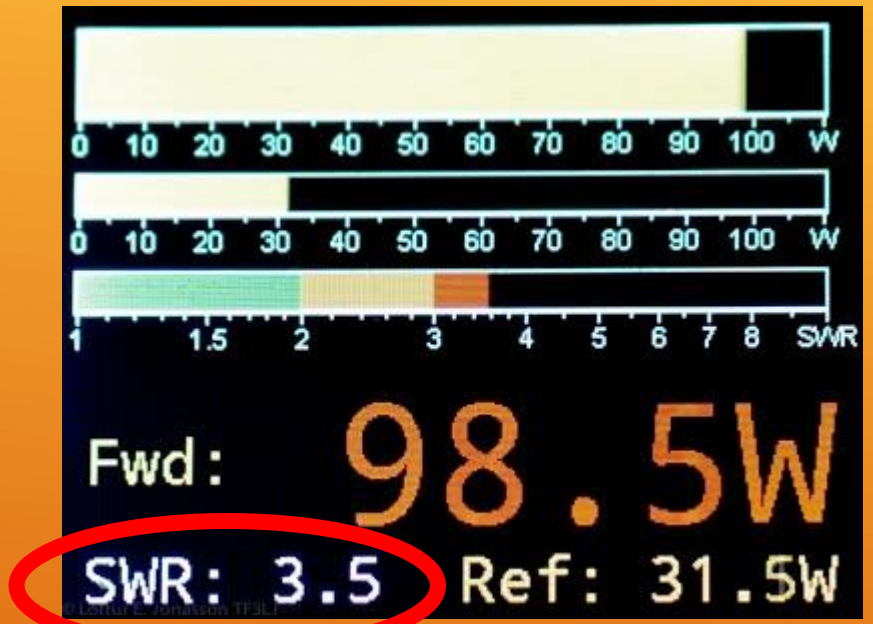
B. 1 to 3

C. 1 to 1

D. 10 to 1

PREPPERNET

A standing wave is created when energy is reflected back from the antenna system and the SWR is the ratio of the maximum to the minimum. The second number is always 1 and a perfect impedance match is when the first number is 1 also.



PREPPERNET

T7C05
WHY DO MOST SOLID-STATE AMATEUR RADIO TRANSMITTERS REDUCE OUTPUT POWER AS SWR INCREASES?

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 improve the impedance match to the feed line

PREPPERNET

The SWR, or Standing Wave Ratio, is a measure of how well the impedance of the transmitter (or receiver) matches the impedance of the antenna system.

When the impedance (effective resistance at a given frequency) of each are the same it results in the most efficient transfer of power from the transmitter to the antenna.

When your antenna system produces a higher SWR some of the power is reflected back to the transmitter; at higher power levels this can damage the transmitter. With older radios this was a common problem that needed to be protected against, but most modern solid-state transmitters automatically protect against that by reducing the power in cases of high SWR so that the reflected power will not cause damage to the transistors in the output amplifier.

PREPPERNET

T7C06
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

PREPPERNET

You can think of this effect much like a glass window. The goal of a perfect window is to have all of the light to go right through the window and not be reflected back.

A mirror is a special kind of window that is designed to reflect most of the light back; it does not let the light through so this is a very high reflection ratio.

One-way glass is made to be partially reflective so that some light is reflected and some is passed through such that it operates as a mirror in the room with bright lights on and a partial window on the other side where the lights are off or very low.

Radios need a good clear window and have very low reflections so that we efficiently transmit our energy into the atmosphere, not back to our electronics.

PREPPERNET

T7C07
WHAT HAPPENS TO POWER LOST IN A FEED LINE?

A. It increases the SWR

B. It comes back into your transmitter and could cause damage

C. It is converted into heat

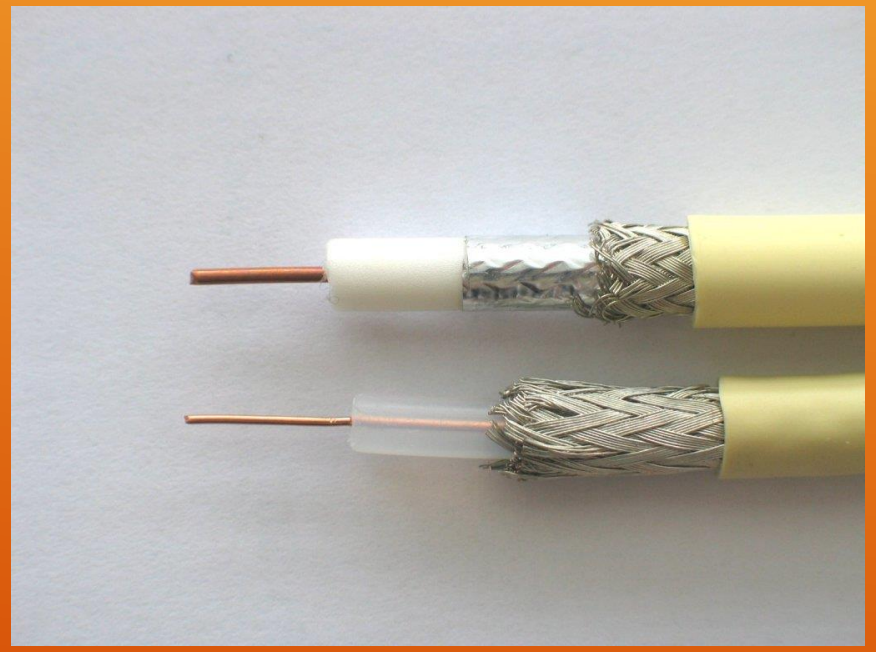
D. It can cause distortion of your signal

PREPPERNET

All cables, no matter how well designed, have some "loss". This comes from the natural resistance that the cable has to electricity.

The amount of resistance that a wire has can be roughly calculated based on the thickness (gauge) of the wire and the length; the longer the length, the more resistance it has. Feed line, like other cables, also has resistance.

This resistance results in power lost when going through the feedline and being converted into heat.



PREPPERNET

T7C08

WHAT INSTRUMENT OTHER THAN AN SWR METER COULD YOU USE TO DETERMINE IF A FEED LINE AND ANTENNA ARE PROPERLY MATCHED?

A. Voltmeter

B. Ohmmeter

C. Iambic pentameter

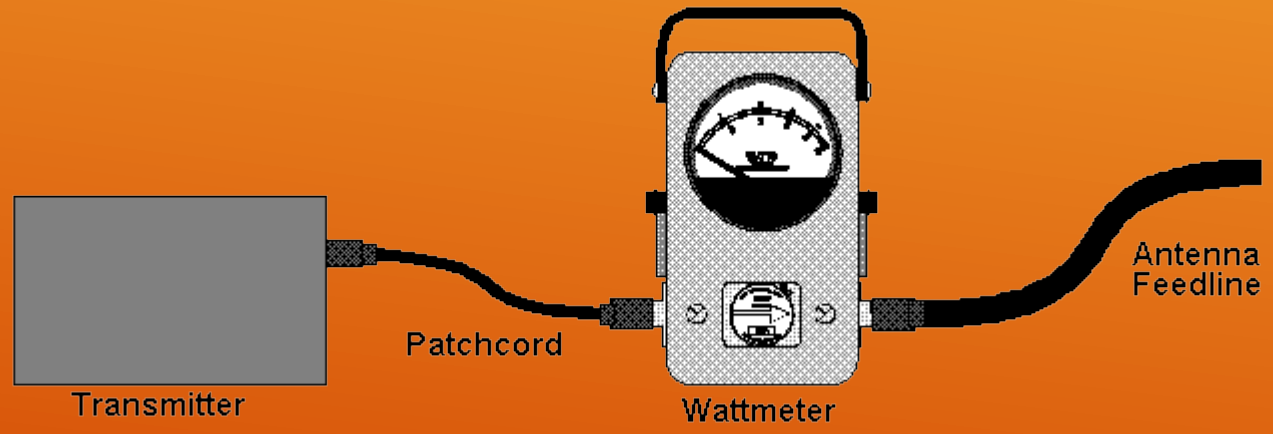
D. Directional wattmeter

PREPPERNET

A directional wattmeter can be connected in-line to measure how much power (in watts) is flowing in a certain direction through a feedline. If the feedline and antenna are perfectly matched, you should have full power (whatever the transmitter is capable of) forward, with little or none reflected.

This is because forward power indicates the power from the radio, and reverse or reflected power is the power that bounces back when it hits the improperly matched antenna.

Iambic pentameter is a commonly used type of metrical line in traditional English poetry and verse drama.



PREPPERNET

T7C09
WHICH OF THE FOLLOWING IS THE MOST COMMON CAUSE FOR FAILURE OF COAXIAL CABLES?

A. Moisture contamination

B. Gamma rays

C. The velocity factor exceeds 1.0

D. Overloading

PREPPERNET

Moisture in coaxial RF cables will cause impedance changes that cause feedline failure. Water can short out the conductors at the cable ends and connectors. It can corrode the connections which increase the resistance or even open the circuit. Water in the cable can also change the capacitance of the coax which directly changes the impedance.

PREPPERNET

Seal your connectors and cable terminations to prevent moisture contamination and cable failure.

Electrical tape is asking for trouble…

Always use stretchable, self-sealing silicone tape (Rescue Tape)!!!

PREPPERNET

T7C10
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

PREPPERNET

If you've ever seen something that got left out in the sun and turned hard and brittle, you can understand why that could be harmful for a coax cable. Any coax cable connected to an outside antenna will be exposed to sunlight, ultraviolet light resistance will significantly delay (or even prevent) the cable from becoming brittle and cracked.

If the cable jacket becomes brittle and cracked, water could enter the cable, causing it to fail. You can also use electrical conduit to protect the cable from damage.

PREPPERNET

T7C11
WHAT IS A DISADVANTAGE OF AIR CORE COAXIAL CABLE WHEN COMPARED TO FOAM OR SOLID DIELECTRIC TYPES?

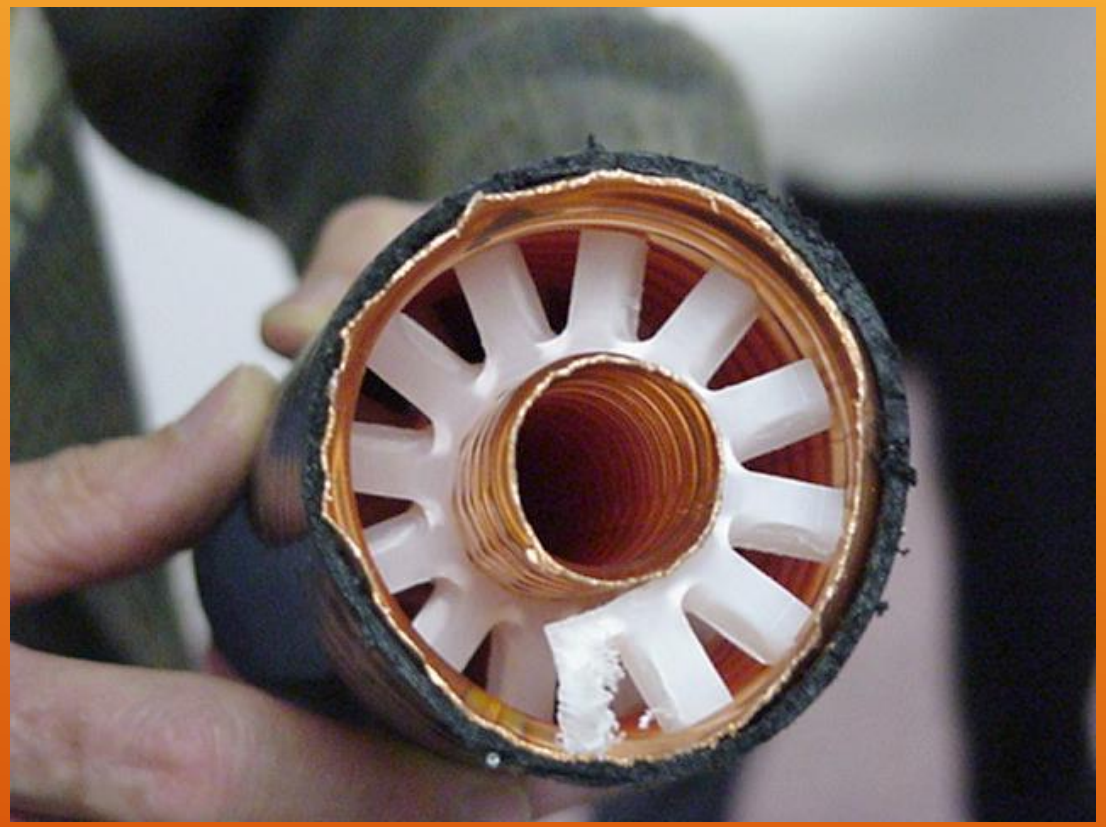
A. It has more loss per foot

B. It cannot be used for VHF or UHF antennas

C. It requires special techniques to prevent water absorption

D. It cannot be used at below freezing temperatures

"Air core" coax can have very low loss even at high frequencies, however unlike other dielectrics used in coax, air is very easily displaced by water, should there be any leaks or problems with the coax jacket.



PREPPERNET

T7C12
WHAT DOES A DUMMY LOAD CONSIST OF?

A. A high-gain amplifier and a TR switch

B. A non-inductive resistor and a heat sink

C. A low-voltage power supply and a DC relay

D. A 50 ohm reactance used to terminate a transmission line

PREPPERNET

So a dummy load usually consists of a composite resistor, one with a resistive material, but no coils (so no inductance), or non-inductive. It usually contains a heat sink, or some way to dissipate the heat, so the resistors don't burn up.

Yes, most dummy loads are made to match the 50 ohm impedance of an antenna or transmitter, so they can substitute for the antenna and maximize the flow of power from the transmitter into the dummy load.

And yes, you can use a dummy load to terminate a transmission line instead of an antenna. But that choice, the "50 ohm reactance one," is just a distractor - remember that they're asking what a dummy load consists of, not what it does. Just forget the rest of the choices.

PREPPERNET

Some dummy loads place the resistors in an oil bath and use the energy to heat up the oil. Some use copper plates on both sides of the resistors in order to let the copper plates dissipate the heat.

PREPPERNET

T7D01
WHICH INSTRUMENT WOULD YOU USE TO MEASURE ELECTRIC POTENTIAL OR ELECTROMOTIVE FORCE?

A. An ammeter

B. A voltmeter

C. A wavemeter

D. An ohmmeter

PREPPERNET

Electric potential and electromotive force are alternate names for voltage.

Remember that voltage is present even if no current is flowing; a battery may be a 9 volt battery even though it is not connected to anything. Thus, it is referred to as electric potential, or electromotive force.

And, as you may guess, voltage is measured with a voltmeter.

PREPPERNET

T7D02
WHAT IS THE CORRECT WAY TO CONNECT A VOLTMETER TO A CIRCUIT?

A. In series with the circuit

B. In parallel with the circuit

C. In quadrature with the circuit

D. In phase with the circuit

PREPPERNET

A voltmeter is used to measure potential difference across two points in an electrical circuit.

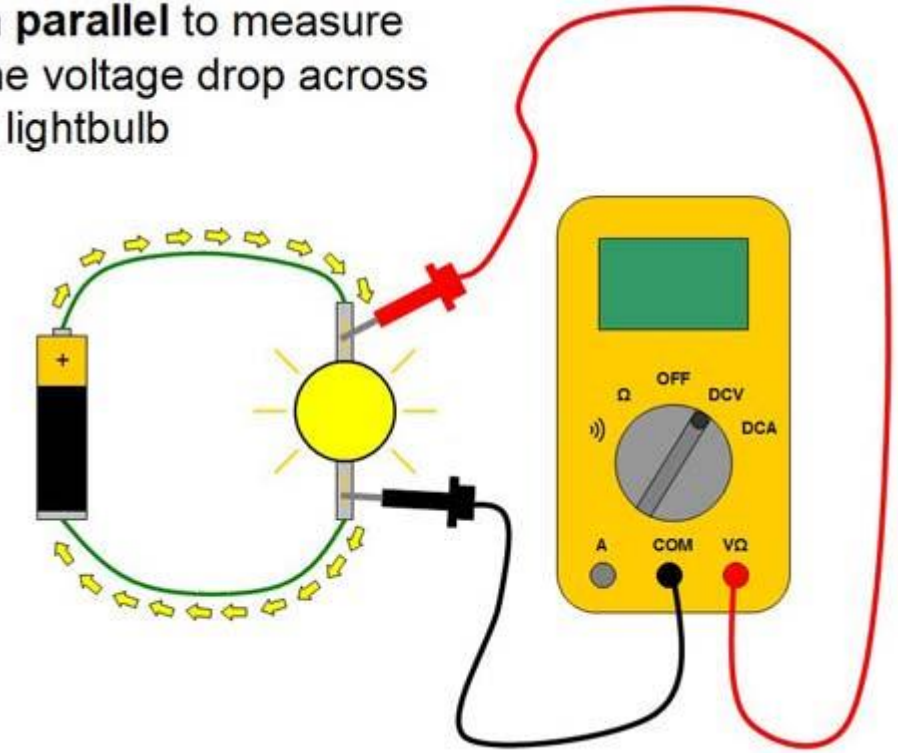
The voltmeter is connected in parallel at the points that you wish to measure voltage drop between, which usually means connecting it on each side of a given load (which has resistance and thus voltage drop).

A theoretically ideal voltmeter has infinite resistance; an "ideal" voltmeter thus has no effect on a circuit if connected in parallel but in series would entirely prevent the flow of electricity.

Ammeters are connected in series to the circuit element you want to measure. (Series means that the circuit is changed to go through the ammeter rather than merely connecting it to existing points without otherwise changing the circuit)

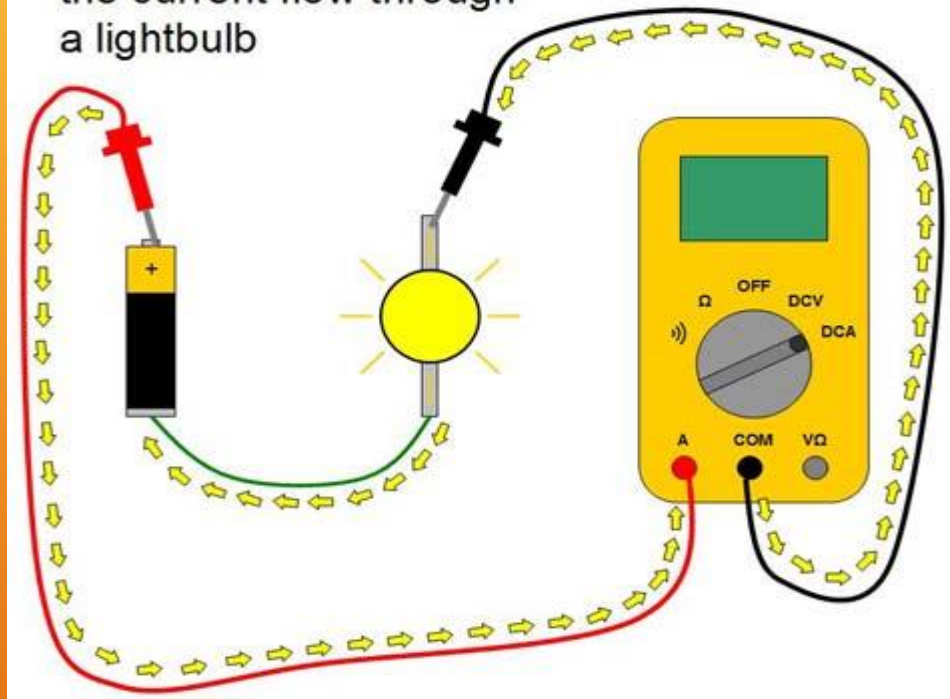
PREPPERNET

Connect a multimeter in **parallel** to measure the voltage drop across a lightbulb



VS.

Connect a multimeter in **series** to measure the current flow through a lightbulb



PREPPERNET

T7D03
HOW IS A SIMPLE AMMETER CONNECTED TO A CIRCUIT?

A. In series with the circuit

B. In parallel with the circuit

C. In quadrature with the circuit

D. In phase with the circuit

PREPPERNET

An ammeter measures current flow. Unlike voltage, which is potential, current represents actual movement of energy and work done through the system.

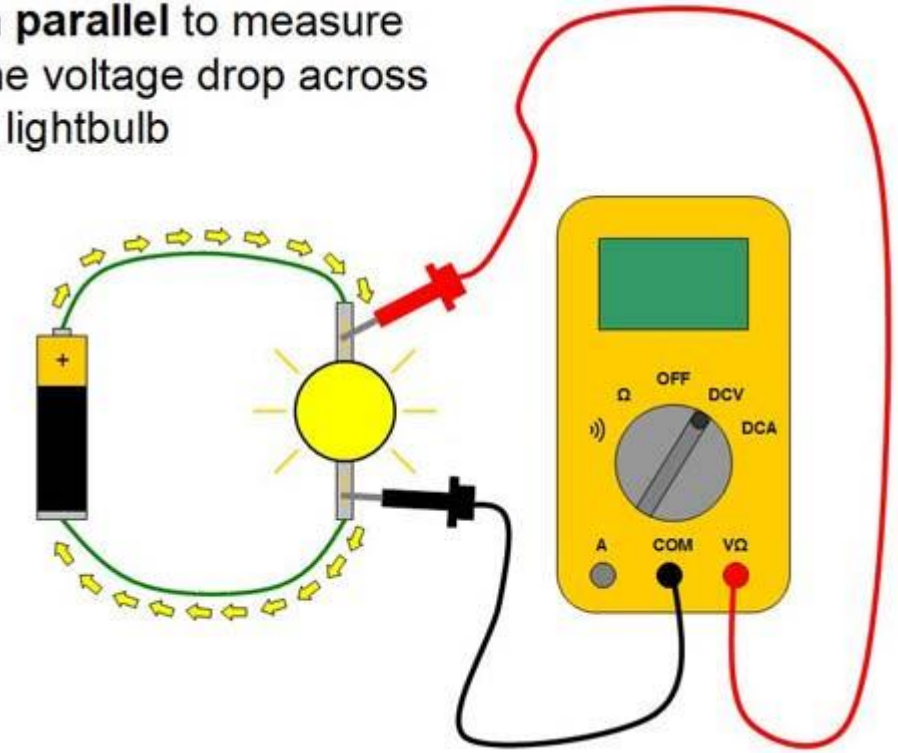
Thus, in order to measure how much of it is flowing, the current must flow through the ammeter. That means that an ammeter must be connected in series with the circuit in order to get an accurate reading and in some cases avoid blowing the fuse in the meter.

Do not connect your ammeter in series with a power source with no load or there will be nothing to limit the current flow and you will blow the fuse in your meter!

An ammeter (or a multimeter with the probes connected in the amp measuring ports) ideally has no resistance and thus no load, similar to a piece of wire. Connecting it in the wrong manner is just like causing a short circuit with a piece of wire.

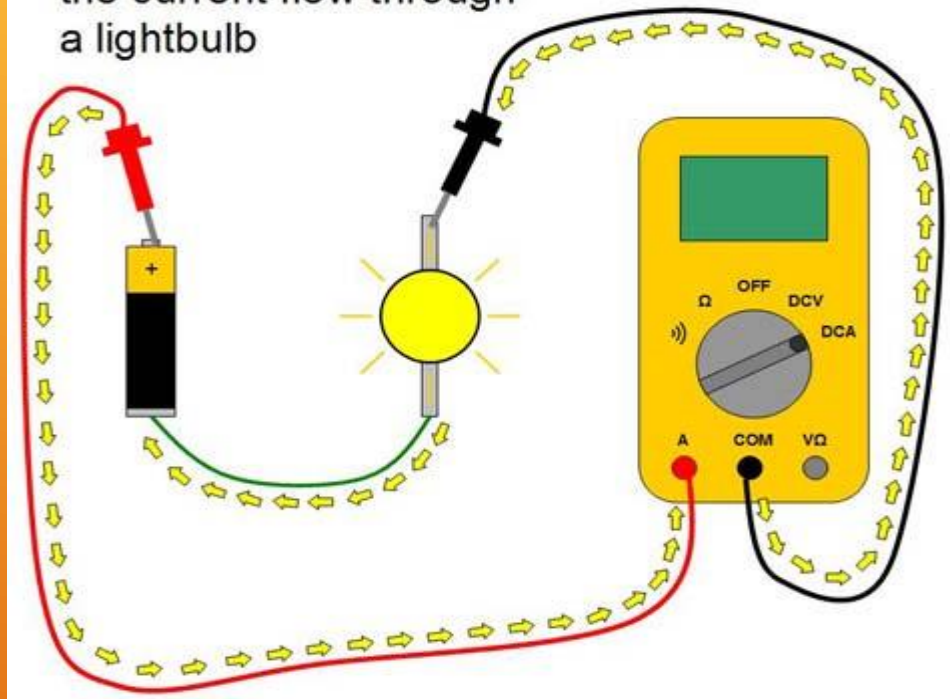
PREPPERNET

Connect a multimeter in **parallel** to measure the voltage drop across a lightbulb



VS.

Connect a multimeter in **series** to measure the current flow through a lightbulb



PREPPERNET

T7D04
WHICH INSTRUMENT IS USED TO MEASURE ELECTRIC CURRENT?

A. An ohmmeter

B. A wavemeter

C. A voltmeter

D. An ammeter

PREPPERNET

Electric current is measured in amps and is measured with an ammeter.

The other meters listed here are:

<u>Ohmmeter</u>: used to measure resistance in ohms

<u>Voltmeter</u>: used to measure voltage

PREPPERNET

T7D05
WHAT INSTRUMENT IS USED TO MEASURE RESISTANCE?

A. An oscilloscope

B. A spectrum analyzer

C. A noise bridge

D. An ohmmeter

PREPPERNET

Resistance is measured in units of Ohms and is measured with an ohmmeter.

T7D06
WHICH OF THE FOLLOWING MIGHT DAMAGE A MULTIMETER?

A. Measuring a voltage too small for the chosen scale

B. Leaving the meter in the milliamps position overnight

C. Attempting to measure voltage when using the resistance setting

D. Not allowing it to warm up properly

PREPPERNET

The resistance setting on a multimeter behaves as an ohmmeter to measure resistance. In general, an ohmmeter measures resistance by applying current through the resistor and measuring the resulting voltage drop.

If you connect an ohmmeter to a voltage source, the resulting external current applied by the voltage source could seriously damage the components of your ohmmeter (in this case, your multimeter in ohm mode).

As good practice, always check the multimeters setting to ensure it is in the correct mode and range for the expected measurement. If in doubt, start at the highest voltage range and lower until you get an in-range reading.

Also, NEVER connect a meter in the Current mode to a voltage circuit as it will short it out and damage the meter, even if this is only blowing the protective fuse inside.

PREPPERNET

T7D07
WHICH OF THE FOLLOWING MEASUREMENTS ARE COMMONLY MADE USING A MULTIMETER?

A. SWR and RF power

B. Signal strength and noise

C. Impedance and reactance

D. Voltage and resistance

A multimeter is thus named because it combines several measurement tools in one device.

Most common multimeters these days provide an ohmmeter, an ammeter, and a voltmeter.

PREPPERNET

T7D08

WHICH OF THE FOLLOWING TYPES OF SOLDER IS BEST FOR RADIO AND ELECTRONIC USE?

A. Acid-core solder

B. Silver solder

C. Rosin-core solder

D. Aluminum solder

PREPPERNET

Rosin-core solder is a particular type of Flux-core solder that makes use of rosin flux. The advantage to rosin-core solder is that as you solder, the rosin in the core of the solder helps eliminate oxidation from the metals being soldered.

Another type of flux core solder that is commonly available is acid core solder which you do not want to use on electronics! This type of flux is for soldering heavy things like copper pipes. The acid can easily destroy thin metal such as circuit board traces.

PREPPERNET

T7D09
WHAT IS THE CHARACTERISTIC APPEARANCE OF A COLD SOLDER JOINT?

A. Dark black spots

B. A bright or shiny surface

C. A grainy or dull surface

D. A greenish tint

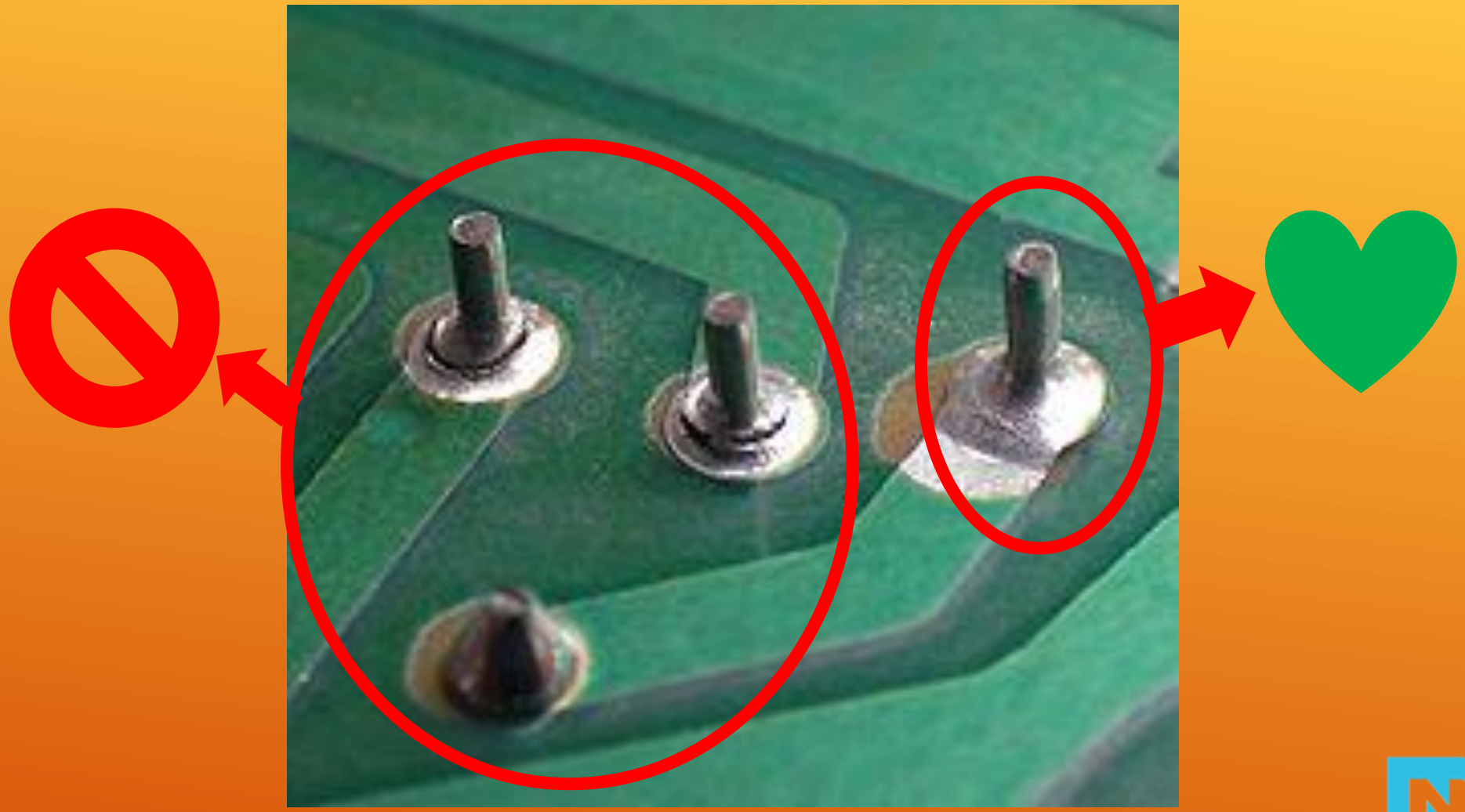
PREPPERNET

A "cold" solder joint results when not all metal surfaces are properly fluxed, brought up to the needed temperature, or if the solder is disturbed during the "plastic phase" as it cools and hardens

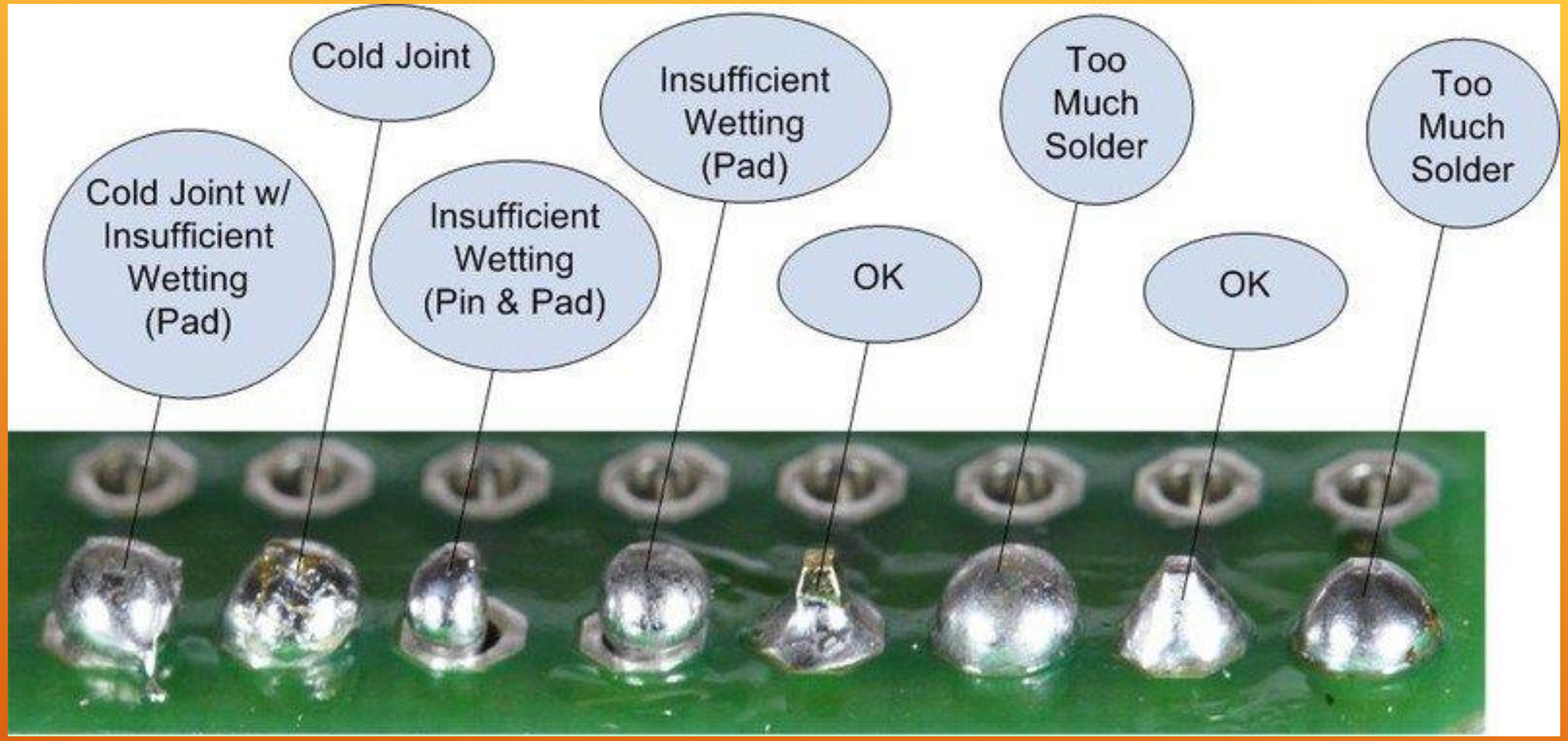
When this happens, the surface of the solder joint will appear dull or grainy instead of bright and shiny. Inspect every solder joint to ensure that the solder flowed smoothly over all conductors being joined.

A small crack in the solder around a large conductor is an indication that it was not heated sufficiently. Remember not to "play" with the solder, just heat up the whole connection until the solder flows freely filling all gaps, then remove the soldering iron and let it cool undisturbed.

PREPPERNET



PREPPERNET


Cold Joint w/ Insufficient Wetting (Pad)
Cold Joint
Insufficient Wetting (Pin & Pad)
Insufficient Wetting (Pad)
OK
Too Much Solder
OK
Too Much Solder

PREPPERNET

T7D10

WHAT IS PROBABLY HAPPENING WHEN AN OHMMETER, CONNECTED ACROSS AN UNPOWERED CIRCUIT, INITIALLY INDICATES A LOW RESISTANCE AND THEN SHOWS INCREASING RESISTANCE WITH TIME?

A. The ohmmeter is defective

B. The circuit contains a large capacitor

C. The circuit contains a large inductor

D. The circuit is a relaxation oscillator

Capacitors oppose a change in voltage; when you start with an unpowered circuit, the voltage is 0.

When you apply a current, to keep the voltage at 0 the capacitor starts charging up and passes the current freely (giving you a low resistance).

As the capacitor charges there is more power stored inside it causing a voltage drop until eventually the capacitor is full and no longer allows any current through at all, until the voltage source is removed at which point the capacitor will try to discharge to keep the voltage at the new "equilibrium" level, that being the top level it finally balanced out at.

PREPPERNET

T7D11

WHICH OF THE FOLLOWING PRECAUTIONS SHOULD BE TAKEN WHEN MEASURING 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

PREPPERNET

An ohmmeter measures resistance, not voltage.

Since resistance is basically a function of the voltage drop across a given portion of a circuit to the current applied across that same portion of the circuit (R=E/I), the ohmmeter applies a small current to the load and then measures the voltage drop across it.

If the circuit is powered, not only will that affect the voltage readings that the ohmmeter will be taking but will likely be so much higher than the ohmmeter is using that it could (probably will) damage the circuitry in the ohmmeter.

PREPPERNET

T7D12
WHICH OF THE FOLLOWING PRECAUTIONS SHOULD BE TAKEN WHEN MEASURING HIGH VOLTAGES WITH A VOLTMETER?

A. Ensure that the voltmeter has very low impedance

B. Ensure that the voltmeter and leads are rated for use at the voltages to be measured

C. Ensure that the circuit is grounded through the voltmeter

D. Ensure that the voltmeter is set to the correct frequency

What they're getting at here, is YOUR SAFETY!

If you're measuring high voltage, you need to make sure the meter probes, leads and insides of the meter can take that high voltage without conducting that voltage to you or burning up. Both of those are undesirable features for a high voltage voltmeter.

Voltmeters have a very high impedance - indeed, the standard for voltmeters used to be 20,000 Ohms/Volt. You want to make sure the voltmeter doesn't affect the circuit that you're measuring, so it has to have a very high impedance. So the choice of low impedance is just wrong.

You always hear that things have to be grounded well. But you don't want to be grounding the high voltage through your meter! You might want to measure the difference in voltage between ground and some circuit, but the intention is not to ground the circuit. If you did that, the difference would be zero, and that measure would only obtain for a short while, the length of time it took to blow up your circuit or the meter.

Voltmeters might be measuring RF energy, but you usually want a voltmeter that will measure a wide range of RF frequencies, not a particular frequency. So setting it to the "correct frequency" is a bit of nonsense.

END OF SUBELEMENT T7

PREPPERNET