



**SENIOR ELECTRICAL REVIEW BOARD
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SPURIOUS VOLTAGES IN ISOLATED ELECTRICAL SYSTEMS

Due to the use of high input impedance voltage testers, dealing with spurious voltages has become a real issue. Unnecessary delays in work schedules and procedural confusion are being created by this well-known electrical phenomenon. It is not anything new. But, today, high input impedance instruments are being used more frequently to test for the absence of voltage, and spurious voltages are being more readily detected.

It is not uncommon to detect spurious voltages of 100-volts or more on circuits that have been completely isolated from all power sources.

An electrical conductor within the magnetic influence of another alternating current carrying conductor will have a voltage induced into it. Conductors in DC circuits or subject to DC testing can also have a significant capacitance which allows voltages to be "stored," and even reappear after grounds are removed. Spurious voltages are typically low (less than 50-volts), and the energy level associated with them is also usually low. The source of these voltages is generally of such a low energy level that, although a person might feel a shock, no serious bodily injury will occur.

However, a person must never assume that it is safe to work on a conductor that indicates any voltage potential. Hazardous voltages can exist on any conductor, and the energy level could be high enough to cause injury. Appropriate precautions must be taken when handling exposed conductors. A voltage with an unexpected value might not be from inductive or capacitive action. It could be from a real power source modified by load, from a sneak path, or from some abnormal occurrence in the electrical system. It is necessary to do some

checking to verify the true nature of an unexpected voltage. A good understanding of the concept of spurious voltages is essential for your safety.

So, what are you supposed to do when you have isolated an electrical circuit to the best of your ability, but the voltage test indicated an unexpected voltage at the test point?

As in any unusual condition, the key operative is to think! Double check to be sure that the circuit has been completely isolated. Check both the drawing and field configurations for the possibility that another source of voltage might exist. If no configuration problems exist, proceed as follows:

1. Test the conductor with an approved high impedance voltmeter/tester such as the Tegam 110A. Carefully note the value of the voltage indicated.
2. Test the same point with an approved low impedance tester such as the Tegam 120 or with a Tegam 110/110A while a Wiggie is connected at the same points at the same time. If the voltage indications are significantly attenuated (to approximately 10% or less of the voltage measured with the 110A alone) and less than 50 volts, you are dealing with a very low energy source that may be spurious.
3. Once you have determined that the voltage is spurious, retest with the Tegam 110A. If the voltage is above 50 volts, you must eliminate the voltage before proceeding with the work. This can be accomplished by applying a jumper between the conductor and ground (Reference 8Q-32). The jumper wire should be a # 16 AWG size wire or larger and alligator type clips can be used to connect the jumper.

Be sure to use appropriate protective equipment and test procedures when handling test instruments or probes, and when installing or removing jumpers.

Although not an electrical injury concern, physical reaction to the shock of contact with spurious voltages could be a safety concern. To prevent this, the energized point may be temporarily connected to an electrical ground point with a jumper or other means. If a temporary grounding connection is made, properly document and control it to ensure that it is removed before returning the system to service per the Hazardous Energy Control Procedure in 8Q, 32.

The most important consideration in dealing with spurious voltages is a thorough understanding of the mechanism that creates the condition. If a logical thought process is applied, electrical work can be accomplished in an efficient and safe manner.