

S.E.R. FAQ **NotTaR of Television Sets** : [Safety guidelines](#)

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Safety guidelines

These guidelines are to protect you from potentially deadly electrical shock hazards as well as the equipment from accidental damage.

Note that the danger to you is not only in your body providing a conducting path, particularly through your heart. Any involuntary muscle contractions caused by a shock, while perhaps harmless in themselves, may cause collateral damage - there are many sharp edges inside this type of equipment as well as other electrically live parts you may contact accidentally.

The purpose of this set of guidelines is not to frighten you but rather to make you aware of the appropriate precautions. Repair of TVs, monitors, microwave ovens, and other consumer and industrial equipment can be both rewarding and economical. Just be sure that it is also safe!

- Don't work alone - in the event of an emergency another person's presence may be essential.
- Always keep one hand in your pocket when anywhere around a powered line-connected or high voltage system.
- Wear rubber bottom shoes or sneakers.
- Don't wear any jewelry or other articles that could accidentally contact circuitry and conduct current, or get caught in moving parts.
- Set up your work area away from possible grounds that you may accidentally contact.
- Know your equipment: TVs and monitors may use parts of the metal chassis as ground return yet the chassis may be electrically live with respect to the earth ground of the AC line. Microwave ovens use the chassis as ground return for the high voltage. In addition, do not assume that the chassis is a suitable ground for your test equipment!
- If circuit boards need to be removed from their mountings, put insulating material between the boards and anything they may short to. Hold them in place with string or electrical tape. Prop them up with insulation sticks - plastic or wood.
- If you need to probe, solder, or otherwise touch circuits with power off, discharge (across) large power supply filter capacitors with a 2 W or greater resistor of 100 to 500 ohms/V approximate value (e.g., for a 200 V capacitor, use a 20K to 100K ohm resistor). Monitor while discharging and verify that there is no residual charge with a suitable voltmeter. In a TV or monitor, if you are removing the high voltage

connection to the CRT (to replace the flyback transformer for example) first discharge the CRT contact (under the suction cup at the end of the fat HV wire). Use a 1M to 10M ohm 5 W or greater wattage (for its voltage holdoff capability, not power dissipation) resistor on the end of an insulating stick or the probe of a high voltage meter. Discharge to the metal frame which is connected to the outside of the CRT.

- For TVs and monitors in particular, there is the additional danger of CRT implosion - take care not to bang the CRT envelope with your tools. An implosion will scatter shards of glass at high velocity in every direction. There are several tons of force attempting to crush the typical CRT. While implosion is not really likely even with modest abuse, why take chances? However, the CRT neck is relatively thin and fragile and breaking it would be very embarrassing and costly. Always wear eye protection when working around the back side of a CRT.
- Connect/disconnect any test leads with the equipment unpowered and unplugged. Use clip leads or solder temporary wires to reach cramped locations or difficult to access locations.
- If you must probe live, put electrical tape over all but the last 1/16" of the test probes to avoid the possibility of an accidental short which could cause damage to various components. Clip the reference end of the meter or scope to the appropriate ground return so that you need to only probe with one hand.
- Perform as many tests as possible with power off and the equipment unplugged. For example, the semiconductors in the power supply section of a TV or monitor can be tested for short circuits with an ohmmeter.
- Use an isolation transformer if there is any chance of contacting line connected circuits. A Variac(tm) is not an isolation transformer! The use of a GFCI (Ground Fault Circuit Interrupter) protected outlet is a good idea but will not protect you from shock from many points in a line connected TV or monitor, or the high voltage side of a microwave oven, for example. (Note however, that, a GFCI may nuisance trip at power-on or at other random times due to leakage paths (like your scope probe ground) or the highly capacitive or inductive input characteristics of line powered equipment.) A fuse or circuit breaker is too slow and insensitive to provide any protection for you or in many cases, your equipment. However, these devices may save your scope probe ground wire should you accidentally connect it to a live chassis.
- Don't attempt repair work when you are tired. Not only will you be more careless, but your primary diagnostic tool - deductive reasoning - will not be operating at full capacity.
- Finally, never assume anything without checking it out for yourself! Don't take shortcuts!

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