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tech tips

Why Your SC61 Waveform Analyzer Should Always Be Connected To Earth Ground

All modern oscilloscopes reference their common leads to earth ground. The SC61 Waveform Analyzer is no exception. This tech tip explains why an earth ground is necesssary and why you should take extra precaution when working on a hot chassis.

Grounding Insures Safe Operation

Your SC61 is wired for use on a 105-130 VAC, 50 or 60 Hz AC line when shipped from the factory. It is important that the SC61 be connected to a properly grounded AC outlet. The ground connection insures safe operation in the event of a circuit failure inside the SC61, or if the ground of the SC61 is connected to a test point that has a potentially dangerous voltage. In either case, the ground connection insures that the metal parts of the SC61 do not become a source of a shock hazard.

Proper Grounding Provides Return Path For Interference

The ground connection on the SC61 also provides a return path for interference when the unit is used in electrically noisy environments. This is especially important when the SC61 is used close to a high power RF transmitter. An ungrounded SC61 case may pick up noise and cause unstable operation.

An Isolation Transformer Is Needed When Working On Hot Chassis

Extra care must be taken when working on a device, such as a TV or VCR, that does not have an internal isolation transformer. This type of device has what is called a ''hot chassis''.

Chassis ground in hot chassis devices are not referenced at ground potential as in old transformer sets. The hot chassis is floated above ground, typically at 67 VAC. There are three types of hot chassis:

The half wave rectifier chassis: One side of the AC line is connected directly to the chassis in a half-wave, hot ground power supply.

Bridge rectifier chassis: There is half of the AC line potential between the TV chassis and earth ground in today's bridge rectifier power supplies.

Switching power supply: Similar to a bridge rectifier chassis except the switching transistor converts the bridge's DC output into a square wave which is in turn filtered for a DC output. Switching power supplies are found in many new TV and VCR chassis.

You MUST use an isolation transformer such as the PR57 ''POWERITE''™ when using the SC61 on these types of chassis. The device being tested, not the SC61, must be plugged into the isolation transformer. The isolation transformer breaks the circuit path formed by the 3-wire ground system to allow the ''hot chassis'' to float in reference to earth ground.

Connecting your SC61, or any other grounded test instrument, to a hot chassis shorts out half of the power supply of the device under test. This will damage the chassis' power supply, namely the input

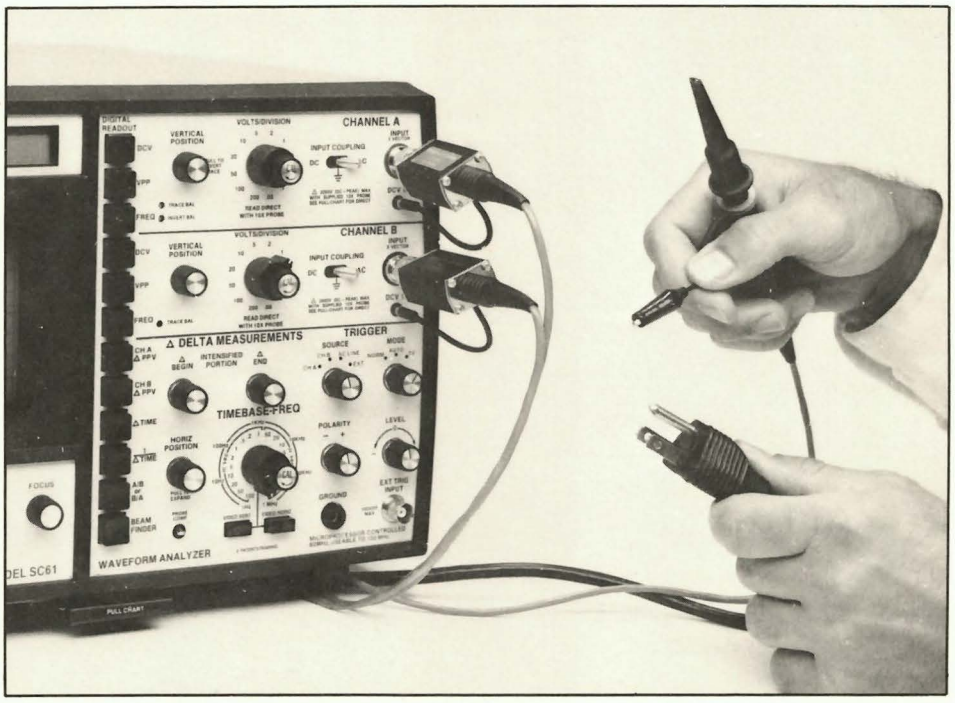

Fig. 1: The ground lead of the SC61's probes and the line cord's third wire ground are at the same potential for safety and better shielding.

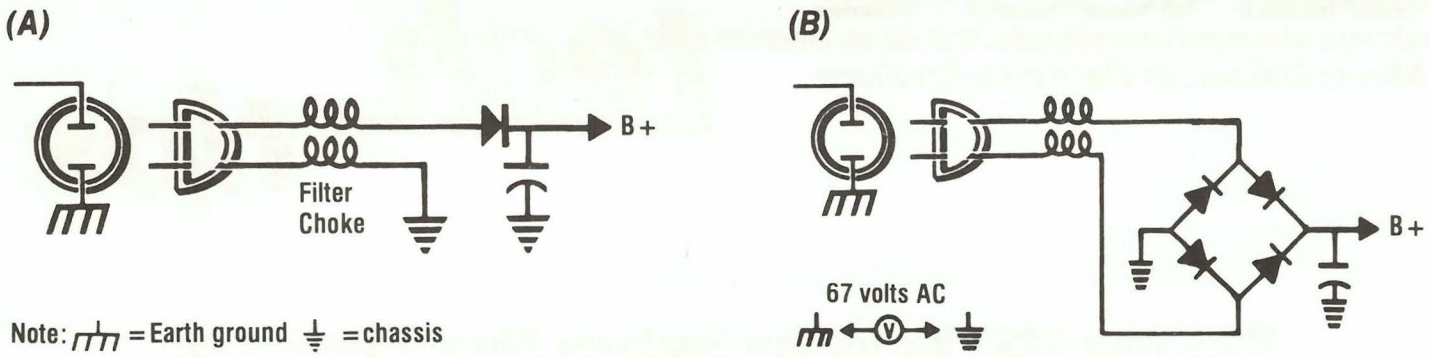

Fig. 2: (a) Half wave rectifier power supply. (B) Bridge rectifier power supply. An isolation transformer must always be used when servicing chassis with these types of power supplies.

choke or the rectifier diodes. The SC61's ground test lead and the scope probe may also be damaged because of excessive current flow.

In either event, you may see sparks when you hook up your SC61 ground lead to a hot chassis that is not plugged into an isolation transformer. Remember, THIS IS NOT THE FAULT OF THE SCOPE. The hot chassis must be isolated before any kind of earth ground connection is made to the chassis.

WARNING

The SC61 must be used with a properly grounded 3-wire AC system for safe operation and minimum pickup of external interference. Always use an isolation transformer on any piece of equipment (such as a TV or VCR) that is AC operated and does not have an internal isolation transformer. Failure to do so may result in damage to the unit under test and/or the SC61.

for more information

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