

TROUBLESHOOTING GUIDE

The purpose of this guide is to provide some guidance in the troubleshooting of simple electronics circuits. This guide will not troubleshoot the circuit for you. It will simply present to you 3 rules to follow into 5 possible trouble areas.

The rules are:

- Be Patient
- Develop a hypothesis
- Prove or disprove your hypothesis

The possible trouble areas are:

- Power Source
- Connections
- Test Equipment
- Components
- Circuit Design

Let us say that you have built a circuit that is supposed to perform some function. The function apparently does not happen! What do you do?!

...well, before you completely disassemble your circuit in frustration, STOP! Sit back and patiently develop a hypothesis and prove it to be correct or incorrect.

A hypothesis for your circuit may be, "My circuit does not work because it has a power source problem". The next step is to test this hypothesis with the questions in the Power Source section.

One more hypothesis could be, "My circuit does not work because it has faulty connections". Now, test this hypothesis with the questions in the Connections section.

Another hypothesis for your circuit not producing a function may be, "My circuit does not work because my test equipment is broken". Test this hypothesis with the questions in the Test Equipment section.

Still, another hypothesis could be, "My circuit does not work because the circuit has a bad part in it". Well, test this hypothesis with the questions in the Components section.

A final hypothesis might be, "My circuit does not work because it is improperly 'designed'". **Test this** hypothesis with the questions in the circuit design section.

Remember be patient!

POWER SOURCE

- Have you read the operator's manual on the power source?
- Is the proper power applied to the power source?
- Does the power source meet the requirements of the circuit?
- Are the outputs of the power source properly adjusted to meet the circuit's voltage requirements?
- Are the outputs of the power source properly adjusted to meet the circuit's current requirements?
- Does your power source work independent of your circuit?

CONNECTIONS

- Are you using an accurate schematic?
- Are all grounds connected according to your schematic?
- Are all supply voltages connected according to your schematic?
- Are all inputs connected according to your schematic?
- Are all outputs connected according to your schematic?
- Are all the connections between devices in your circuit properly made according to your schematic?
- Is there continuity between all the points called for in your schematic?

TEST EQUIPMENT

- Have you read the manufacturer's operator's manual on the test equipment that you are using?
- Is the proper power applied to the test equipment?
- Is the test equipment turned on?
- Are you certain that the inputs to the measurement test equipment fall within the manufacturer's specifications?
- Are you certain that the outputs of your test equipment can provide the necessary voltage to drive your circuit?
- Are you certain that the outputs of your test equipment can provide the necessary current to drive your circuit?
- Is the test equipment configured properly?
- Have you checked all connections between the test equipment for shorts or opens?
- Does the test equipment work independent of your circuit according to the operator's manual?

- Have you read the manufacturer's specifications on the devices that are in your circuit?
- Are the devices in your circuit the same devices specified in your schematic?
- Is the power applied to all of the devices within the manufacturer's specifications for those devices?
- Is the power consumed by the devices in your circuit within the manufacturer's specifications for those devices?
- Are the inputs to all of the devices within the manufacturer's specifications for those devices?
- Are the outputs of the devices within the manufacturer's specifications for those devices?

CIRCUIT DESIGN

- Do you have an accurate schematic and parts breakdown for your circuit?
- Does the circuit use the proper components?
- Is your circuit layout neat and proper for the components that are used?
- Does your circuit need special bypass capacitors?
- Have you verified the manufacturer's specifications on any substituted parts?
- Do all passive elements have the correct values?
- Do all active elements have the part number called for in your parts breakdown?
- Have you reviewed any applications notes published by the manufacturer on the components that you are using?
- Have you contacted the technical services operation of the manufacturer on any technical questions that you might have about their product?