

Introduction to Circuit Troubleshooting

ET 150

Troubleshooting Learning Objectives

- **In this lesson you will:**
- define troubleshooting
- learn a six step process for successful troubleshooting
- identify typical faults that occur in projects and experiments
- learn to locate faulty components and wiring errors

Troubleshooting

What is troubleshooting?

Troubleshooting – finding and repairing malfunctions and errors in circuits and equipment by using systematic analysis and tests.

Most newly constructed circuits do not work properly due to minor wiring error rather than defective components

Effective troubleshooting requires a systematic method.

Six-Step Method for Troubleshooting

• Step 1: Recognize the Symptoms

- What is the circuit or system suppose to do according to theory or design?

- Are measurements being taken properly?

- Check DVM and Scope against known sources to verify their operation

- Circuit malfunction verses operator error
bad readings could be due to instrument miss-use.
Check signal sources and power supplies (Is it on?)

Six-Step Method for Troubleshooting

• Step 2: Determine Possible Faults

- Use circuit schematic or block diagram to determine location of possible fault
 - Inspect all connections-have others review

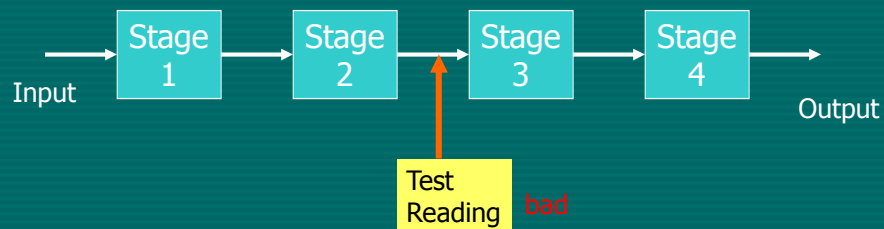
Typical Errors

Battery or Power Supply Connections
 Incorrect Input Signal Level or Frequency
 Output Not Connected
 Wiring Error

Six-Step Method for Troubleshooting

• Step 3: Locate Possible Faults

For complex circuits use "Half-Split Method"



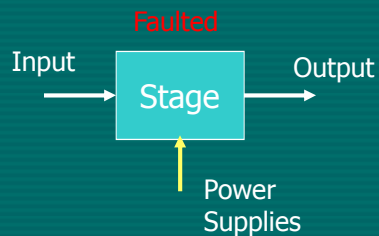
Good

If first reading is good,
 split stages 3-4.

Stage 1 likely faulted

Six-Step Method for Troubleshooting

• Step 4: Find Fault in Stage



Check for correct power supply values

Replace IC or Transistor

Check actual circuit against schematic

Check all connections
re-solder, tighten

Check component values

Six-Step Method for Troubleshooting

• Step 5: Find and Replace Component

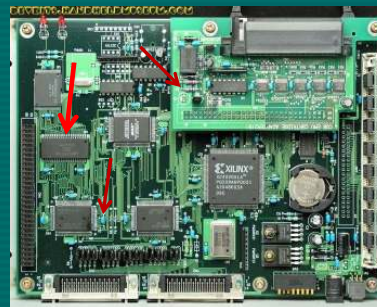
Level of Replacement

Board-level Substitution

Replace entire subsystems of
Electronic devices –Example
personal computer repair

Component-level Substitution

Replace individual devices to
such as IC's transistors, diodes



Small prototypes require component
level substitution

Six-Step Method for Troubleshooting

- Step 6: Replace/correct and Document

Replace defective part and/or correct wiring error

Carefully replace IC's in SEB to prevent mechanical and electrical damage

Un-solder and re-solder devices Use Heat Sinks

Dispose of defective devices

Update design schematic as necessary

Always work from schematic and keep it current as designs change

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COMING NEXT:

**ELECTRONIC WAVEFORMS AND THE
FUNCTION GENERATOR**