EE 302
Electronic Equipment Repair

4.0 Diagnosis techniques

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Fault analyzed techniques

Fast fault tracking:
- Visual technique. (Eye)
  - Track for crack, burn spot
- Hearing technique. (Ear)
  - Track for necessary and unnecessary sound
- Sniff/Smell. (Nose)
  - Track for burning smell
- Feel/Touch. (Finger)
  - Track for unnecessary heat

Advance fault tracking:
- Injection techniques.
  - Use signal generator (Audio, Function Generator or RF Generator)
- Signal tracing techniques.
  - Use oscilloscope or spectrum analyzer
- Voltage, current and resistance measurement technique.
  - Use digital or analogue meter

Note: For advance fault tracking, you probably need a schematic diagram or an advance knowledge about the selected circuits.
Passive and Active Components Fault

- **Passive Component**
  - Resistor, capacitor, inductor

- **Active Component**
  - Transistor, SCR, FET

Note:
The main difference between active and passive components is that active ones require to be powered in some way to make them work. Active components can also be used to amplify signals.

Passive components are those that do not require electrical power to operate.

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Test Passive Component

- Use/refer to colour code (e.g. colour code for resistor).
- Use/refer to label printed on component. (e.g. 2K2 for resistor mean 2.2KΩ, or 104 mean 100nF for ceramic capacitor)
- Use/refer to schematic diagram as a reference. (if provided).
- Use multimeter.

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Passive and Active Components Fault

- **Capacitors**
- Here are some of the various types of capacitors and how they are used.
  - Air - Often used in radio tuning circuits
  - Mylar - Most commonly used for timer circuits like clocks, alarms and counters
  - Glass - Good for high voltage applications
  - Ceramic - Used for high frequency purposes like antennas, X-ray and MRI machines
  - Super capacitor - Powers electric and hybrid cars

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Passive and Active Components Fault

Use your multimeter as an ohmmeter to test capacitor.

- Discharge the capacitor by shortening its leads. That is - use a wire and connect the leads of the capacitor together. This will discharge it.
- Put your multimeter in the high ranges 10K-1M
- CONNECT MULTIMETER TO CAPACITOR LEADS(OBSERVE THE POLARITY IF ELECTROLYTIC). At soon as the leads make contact, the meter will swing near zero. It will then move slowly toward infinity. Finally the meter would come to be infinite ohms because the capacitor is being charged by the battery of the multimeter.
- If the capacitor is bad, it will go to zero ohms and remain there. This is called a shortened capacitor
- In the case of an open capacitor there will be no ohmmeter indication.
- some capacitors have a low dielectric leakage. You will know this if the ohmmeter comes to rest at a point lower than infinite. Test a known good capacitor of the same type to be sure

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Passive and Active Components Fault

- Use your multimeter to test continuity of:
  - Inductors
  - Transformers
  - Relays
  - Speakers
  - Fuses
  - Switches

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Passive and Active Components Fault

- Identify forward and reverse resistance of:
  - Diode
  - Zener diode
  - Transistor (Bipolar transistor)
  - SCR

Note:
For active component, please refer to component’s data sheet for exact data information.

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