

# ELECTRICAL TROUBLESHOOTING



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# General Notes

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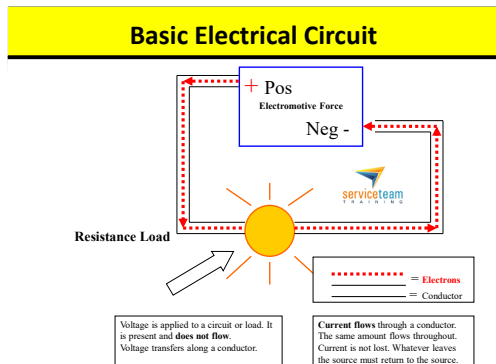
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## General Notes

3 requirements for a circuit

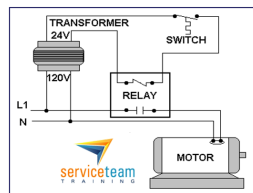
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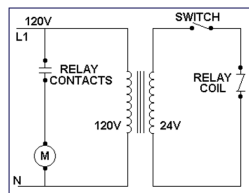
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### Pictorial diagrams

Show how components are **actually wired**.

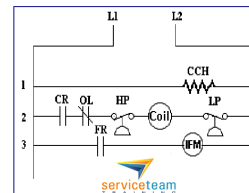
However, they become cumbersome when too many components are involved.



### Schematic diagrams

Present the logic of the circuit in an organized fashion.

Schematic diagrams are less cluttered because **they use symbols** to represent components.



### A ladder diagram

is arranged with the power supply lines drawn vertical as the legs of a ladder.

**Each horizontal line contains one load** and its control switches.

## 3 types of diagrams

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## What specifically are you troubleshooting?

You must know before you start—Fill in below

**Time**

**Fault – specific of non-specific**

**Airflow**

**Frequency of the fault**

**Water Flow**

**Point of origin**

**Energy**

**Point of termination**

**A Function**

**Electrical**

**Operator Error**

**Mechanical**

**Other considerations for same fault**

**Overall Performance**

**Overall success rates**


**Write what you are troubleshooting below:**

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## Multimeters



### Front Panel Symbols

Symbol	Meaning
V	V DC
V	V AC
mV	millivolts (.001V or 1/1,000V)
A	Amps
mA	milliamps (.001A or 1/1,000A)
μA	microA (.000001A or 1/1,000,000A)
Ω	Resistance (Ohms)
k Ω , M Ω	kilo-Ohms, Megohms
)))	Continuity beeper

Symbols	Measurement Functions	Descriptions
V	AC Voltage	Measures amount of AC Electrical Pressure
V	DC Voltage	Measures amount of DC Electrical Pressure
mV	Milli Volts	.00V or 1/1000V
A	Ampere	Measures amount of electron flow
mA	Milli Amperes	.001 or 1/1000A
Ω	Ohms	Measurement of resistance to the flow of electron
	Diode	Device used to control direction of electron flow
	Audible Continuity	Audible indication of continuity for low resistance
	Capacitance	Device used to store electrical potential

## General Notes:

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**Symbol**

**Write in the meaning of each symbol**

V

V

mV

A

mA

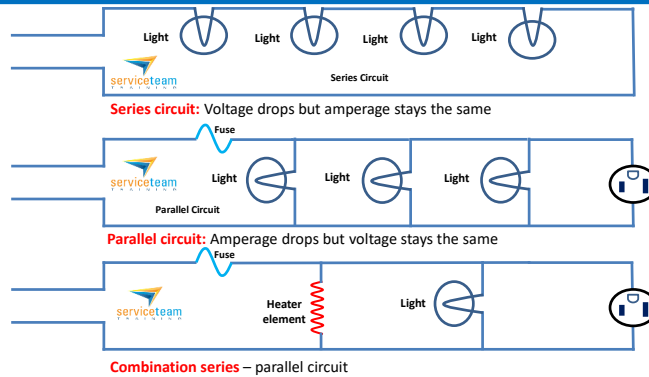
μA

Ω

k Ω , M Ω

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## Types of Circuits



## General Notes:

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## Search Methods:

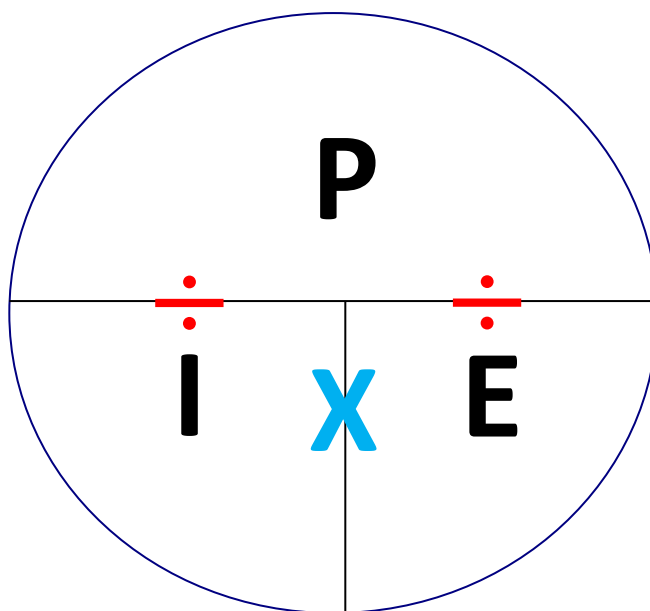
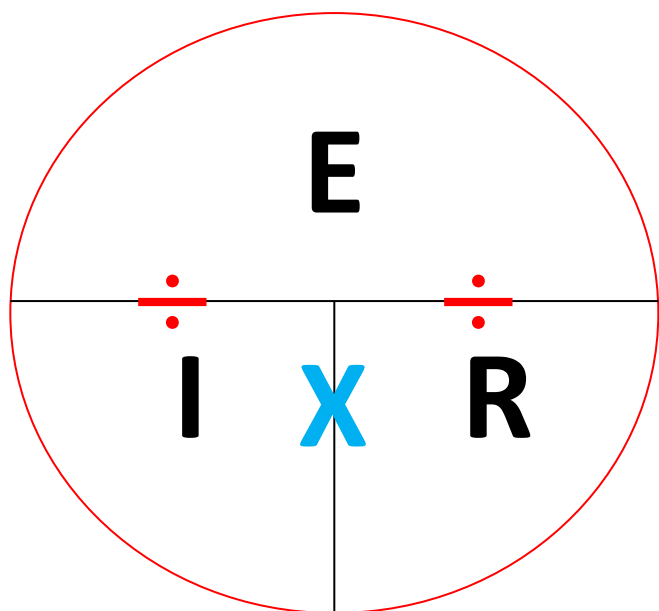
1. 

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2. 

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- **Voltage** is the pressure or force
- **Amperage** is the flow of electrons
- **Ohms** is the measurement of resistance
- **Watts** is the amount of power an electric device consumes.
- **A watt-hour** (Wh) is the amount of energy consumed when a device uses one watt of power for one hour.

## Illustration of Ohm's Law



**E (Voltage)**  
(Volts)

= \_\_\_\_\_ **x** \_\_\_\_\_

**I (Current)**  
(Amps)

= \_\_\_\_\_ / \_\_\_\_\_

**R (Resistance)**  
(Ohms)

= \_\_\_\_\_ / \_\_\_\_\_

**P (Power)**  
(Watts)

= \_\_\_\_\_ **x** \_\_\_\_\_

## General Notes:

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### Summary

- Have the correct test equipment
- Build your skills with using meters
- Know what type of circuit you are testing
- Know how each component works correctly
- Match all ratings on components and equipment
- Follow codes
- Your safety is your responsibility first
- Don't take unnecessary risks
- Trust the process of troubleshooting
- Go home safe 😊



### General Notes

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## Technical Courses

Effective Service Operations  
 CFC/HVAC Certification (EPA 608)  
 CPO Certification (National) 2 day  
 CPO Certifications (local) 1 day  
 HVAC Fundamentals and Troubleshooting  
 HVAC Intermediate Troubleshooting  
 HVAC Advanced  
 Electrical Fundamentals and Troubleshooting (basic)  
 Electrical Intermediate Troubleshooting and Repairs  
 Basic Plumbing Repairs  
 Basic Appliance Repairs  
 Advanced Appliance Repairs  
 Advanced Troubleshooting – some experience is required  
 Service Technician Development



## Other Courses for Leasing and Service Teams

Leadership for Service Managers and Supervisors  
 Leadership for Life  
 Maintenance for Managers  
 Maintenance for Leasing Agents  
 Leasing for Service Teams  
 Communication Performance  
 What every Manager Needs to Know  
 Customer Service and Work order Management  
 Creating Leverage and Vendor Management  
 DIY - Start Saving Money Tomorrow – best practices, products, and services  
**Take Action** - Personal Safety and Assault Prevention

**Custom Courses are made upon request**

**Other Courses are available**

**Additional Instructor are available upon request**

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