



# HVAC TROUBLESHOOTING

*Transforming Service Teams to Superstars*














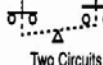

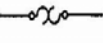






















**Presented Mark Cukro**

**MARK CUKRO 1-704-363-6236**  
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## Common Electrical Symbols

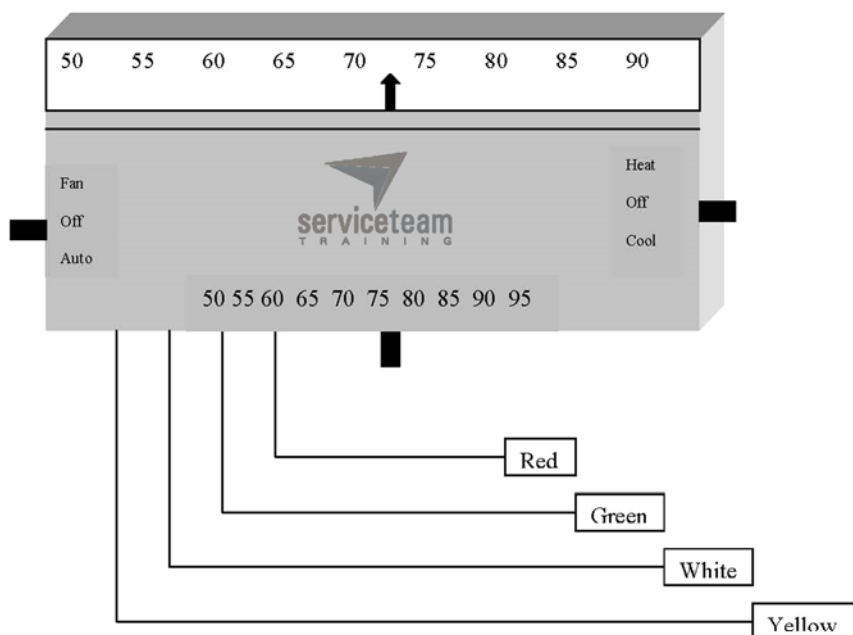
Capacitors  * Identifying Terminal (Nearest Ground)	Multiple Conductor Cable 	Switches Cont. Push Button Circuit Closing (Make) 	General Selector Switch Any Number of Transmission Paths May Be Shown 
Circuit Breakers  Thermal  Magnetic	Thermocouple 	Push Button Circuit Opening (Break) 	Segment Contact or 
Coils Relays Timers Solenoids, etc. * Designate Device 	Transformer 	Push Button Two Circuits 	Thermal Relay 
Contacts Open Closed TC TO	Thermal Overload Coil 	Make before Break 	Motors Symbol to Be 1 1/2 Times Larger Than Relay Coil * Indicate Use 
Conductors Crossing Junction	Terminal 	N.O. N.C. Pressure 	Squirrel Cage Induction 
Fuse 	Thermistor 	Temperature Close On Rising 	Single Phase Main Aux. 
Fusible Link 	Connectors Male Female	Disconnect 	Conductors Power (Factory Wired) Control (Factory Wired) Power (Field Installed) Control (Field Installed)
Ground Connection 	Engaged 	Temperature Open On Rising 	Transistors PNP Type NPN Type
Light 	4 Conductor 	Flow Activated Close On Increase Open On Increase	PNP Type 
Meters * Denote Usage 	Switches Single Throw Double Throw 3 Position Off	Flow Activated Open On Increase Liquid Level Close On Rising Open On Rising	NPN Type 
Rectifier 	Double Pole Single Throw (DPST) Double Pole Double Throw (DPDT)	Liquid Level Open On Rising Alarms Sound Bell Horn	Electrical Symbols for Refrigeration & Air Conditioning Electrical Diagrams
Resistor 			
Shielded Cable 			





## Wiring a Thermostat

### Typical Wiring Diagram of a Thermostat



What does each color control?

Red \_\_\_\_\_

Green \_\_\_\_\_

White \_\_\_\_\_

Yellow \_\_\_\_\_



## Technical Courses

Effective Service Operations  
 CFC/HVAC Certification (EPA 608)  
 R-410a Certification  
 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  
 Train the Trainer Workshop ½ day  
 Train the Trainer Workshop Full day  
 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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 Service Team Training*