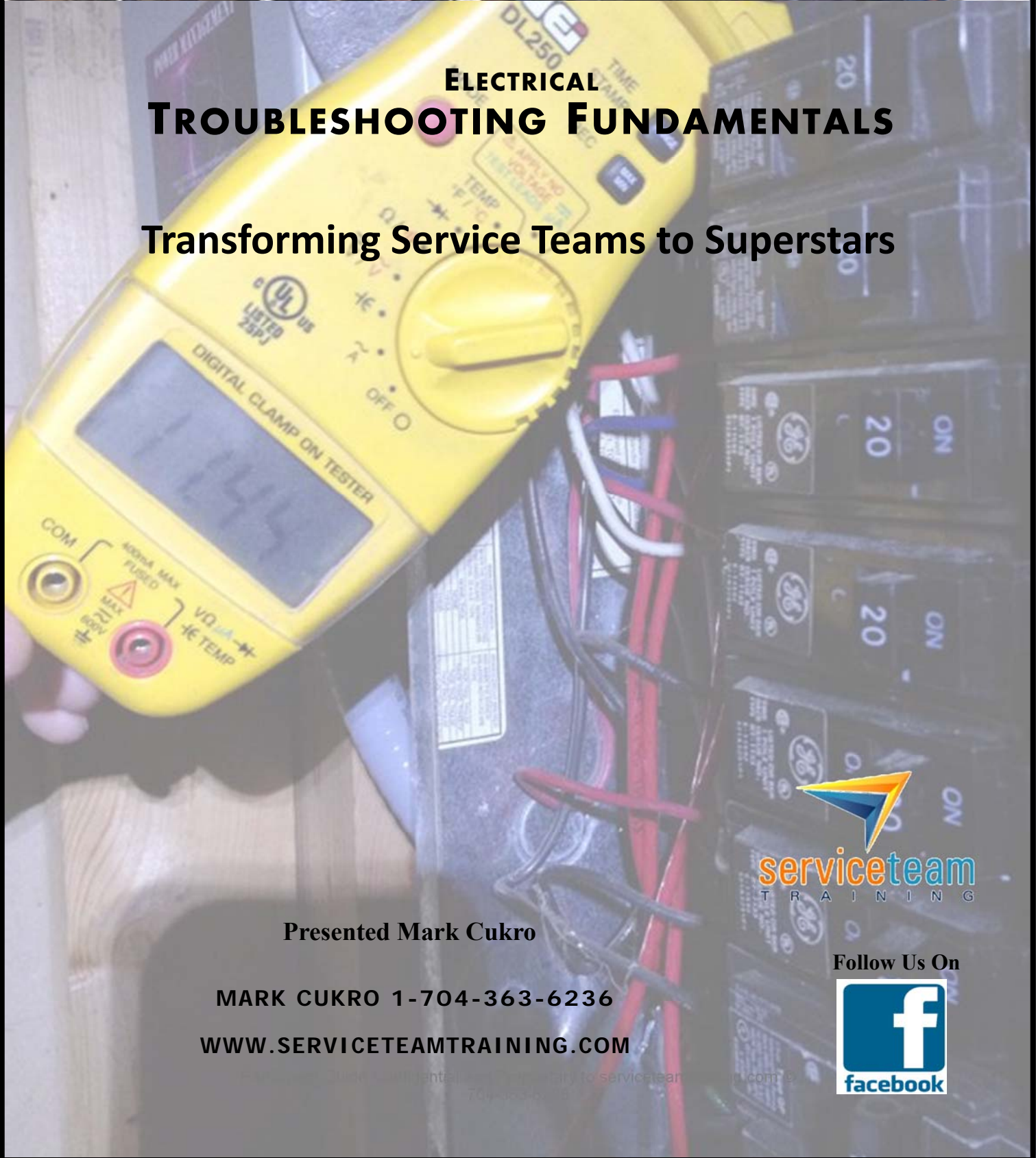




ELECTRICAL TROUBLESHOOTING FUNDAMENTALS

Transforming Service Teams to Superstars



Presented Mark Cukro

MARK CUKRO 1-704-363-6236

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For more information, please contact Mark Cukro at 1-704-363-6236 or mark@serviceteamtraining.com

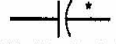

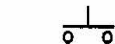






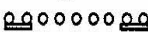
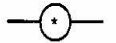

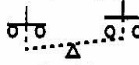



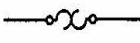
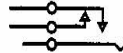







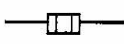


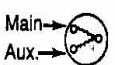



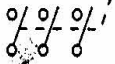





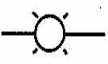
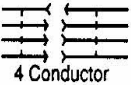


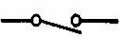

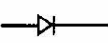
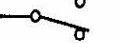


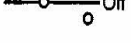


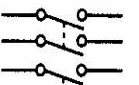
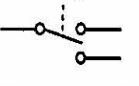




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TRAINING

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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 1/2 Times Larger Than Relay Coil  *Indicate Use
Conductors  Crossing  Junction	Terminal 	Pressure  N.O.  N.C.	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 	
Meters  *Denote Usage	Switches Single Throw 	Flow Activated Open On Increase 	
Rectifier 	Double Throw 	Liquid Level Close On Rising 	
Resistor 	3 Position  Off	Liquid Level Open On Rising 	
Shielded Cable 	Double Pole Single Throw (DPST)  Double Pole Double Throw (DPDT) 	Alarms Sound Bell Horn  	— Electrical Symbols — for Refrigeration & Air Conditioning Electrical Diagrams

Common Electrical Symbols




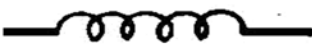

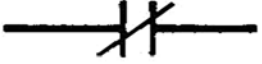

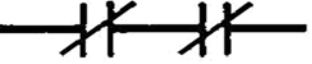




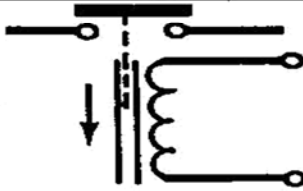







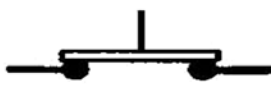

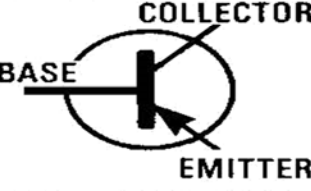

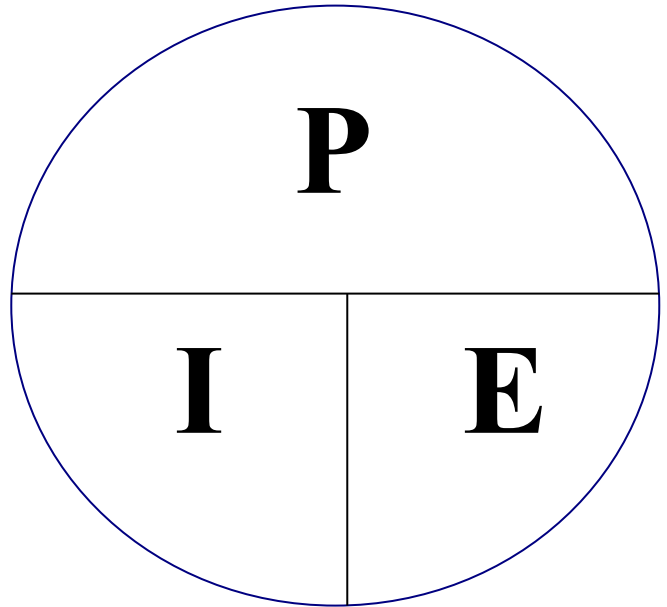
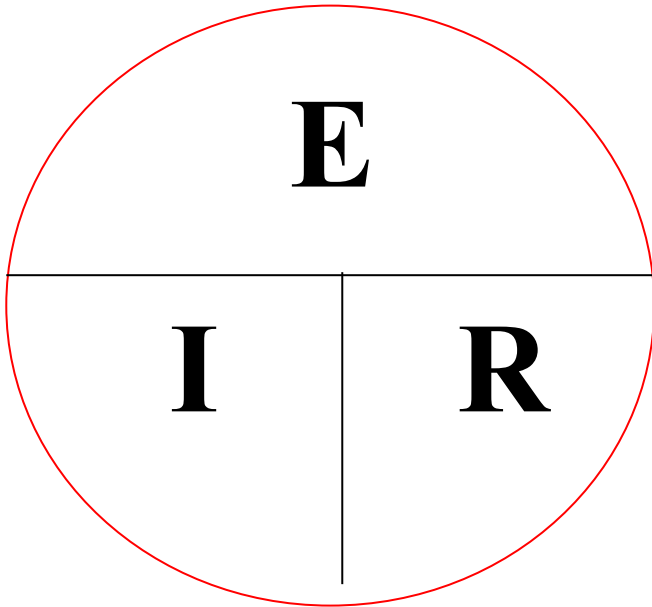
LEGEND OF SYMBOLS			
			
BATTERY	RESISTOR	GROUND	RESISTANCE HEATER
			
CONTACT SPST N/O	CONTACT SPST N/C	CONTACT SPDT	HL (HI-LO) PRESSURE SW
			
SWITCH	TRANSFORMER	MOTOR COMPONENT	COIL SOL CONTACTOR OR RELAY
			
SOL ACTUATOR	THERMOSTAT CONTACT	ELECTRICAL WIRING	ALTERNATE WIRING
			
ELECTRICAL JUNCTION	NO CONNECTION	TERMINAL	DIODE
			
PUSH BUTTON SWITCH	THERMISTOR	COLLECTOR BASE EMITTER "N" TRANSISTOR	ANODE CATHODE GATE SCR

Illustration of Ohm's Law



E (Voltage)
(Volts)

= _____ x _____

I (Current)
(Amps)

= _____ / _____

R (Resistance)
(Ohms)

= _____ / _____

P (Power)
(Watts)

= _____ x _____



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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