

AC/DC Fundamentals Course Content: 32HR Workforce Training

AC/DC Fundamentals Scholastic Content: 12HR

Hands on application: 20HR

2 Fluke Certifications: Digital Multimeter Basics and Electrical Measurement Safety

2 Amatrol Certifications: Lockout/Tagout and Basic Electrical Fabrication

Scholastic Overview

Basic Electrical Load Calculation

Segment 1 - Fundamentals of Amp Load

- Objective 1 - Define Electrical Load and Give an Application
- Objective 2 - Identify Wire Size (14GA-6GA)
- Objective 3 - Define Wire Insulation and Regulations
- Objective 4 - Define Operating Amperage Ratings for Listed Wire Gauge (14GA-6GA)
- Objective 5 - Determine Amp load for HIGH/ LOW Electrical Circuits
- Objective 6 - Describe Where and When to use Proper Electrical Safety Devices
- Objective 7 - Define Inrush (Cause and Effects)
- Objective 8 - Describe How to Translate Watts in to AMPS
- Skill 1 - Utilize Reference Charts for Amp Loads Verses Wire Size
- Skill 2 - Use Wire Gauge to Verify Wire Size
- Skill 3 - Use the National Electrical Code (NEC) 310.4 and 310.104 Wire Insulation Verification
- Skill 4 - Build and Calculate Loads on Electrical Circuits
- Skill 5 - Select Electrical Safety Devices for Electrical Circuits
- Skill 6 - Analyze Amp Overload Scenarios to Determine Cause and Effect
- Self-Review 1

Basic Electrical Circuits

Segment 1 - Fundamentals of Electricity

- Objective 1 - Define Electricity and Give an Application
- Objective 2 - Describe the Two Types of Electrical Current and Give an Application of Each
- Objective 3 - Describe the Function and Operation of a Circuit Tester
- Skill 1 - Use an AC Tester to Check a Wall Outlet for Electricity
- Self-Review 1

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Segment 2 - Electrical Circuit Components

- Objective 4 - Describe the Function of the Four Basic Components of an Electrical Circuit
- Objective 5 - Describe the Operation of Two Types of Power Supplies and Give Their Schematic Symbols
- Objective 6 - Describe the Function of an Electrical Schematic
- Skill 2 - Connect and Operate a Power Supply
- Self-Review 2

Segment 3 - Manual Input Devices

- Objective 7 - Describe the Operation of a Manual Switch
- Objective 8 - Describe the Operation of N.O. and N.C. Contacts and Give Their Schematic Symbols
- Objective 9 - Describe the Function of Three Types of Manual Switch Operators and Give an Application of Each
- Objective 10 - Describe the Operation of Three Types of Manual Switch Operators and Give Their Schematic Symbols
- Skill 3 - Connect and Operate a Circuit Using Three Types of Manual Switches
- Self-Review 3

Segment 4 - Output Devices

- Objective 11 - Describe the Function of Five Types of Electrical Output Devices and Give an Application of Each
- Objective 12 - Describe the Operation of Five Types of Electrical Output Devices and Give Their Schematic Symbols
- Skill 4 - Connect and Operate an Electrical Circuit with a Resistor
- Skill 5 - Connect and Operate an Electrical Circuit with a Buzzer
- Skill 6 - Connect and Operate an Electrical Circuit with a Solenoid
- Skill 7 - Connect and Operate an Electrical Circuit with a Motor
- Self-Review 4

Electrical Measurements

Segment 1 - Voltage Measurement

- Objective 1 - Define Voltage and Give Its Units of Measurement
- Objective 2 - Describe the Function of a Voltmeter and Give Its Schematic Symbol
- Objective 3 - Describe How to Use a Voltmeter to Measure Voltage
- Objective 4 - Describe the Function of Two Multimeters: Analog and Digital
- Skill 1 - Use an Analog Voltmeter to Measure the Voltage at a Point Referenced to Ground

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- Activity 1 - Identification of Digital Multimeter Components
- Skill 2 - Use a DMM to Measure the Voltage of a Point Referenced to Ground
- Self-Review 1

Segment 2 - Introduction to Series and Parallel Circuits

- Objective 5 - Define Series and Parallel Circuits
- Objective 6 - Describe the Voltage Characteristics in Series and Parallel Circuits
- Activity 2 - Voltage Characteristics of Series and Parallel Circuits
- Skill 3 - Use a DMM to Measure Voltage Drops in Series and Parallel Circuits
- Self-Review 2

Segment 3 - Current Measurement

- Objective 7 - Define Current and Give Its Units of Measurement
- Objective 8 - Describe the Function of Two Types of Ammeters and Give Their Schematic Symbol
- Objective 9 - Describe How to Use an Ammeter to Measure Current
- Skill 4 - Use a DMM to Measure the Electrical Current
- Skill 5 - Use a DMM to Measure Current in Series and Parallel Circuits
- Objective 10 - Describe the Current Characteristics in Series and Parallel Circuits
- Activity 3 - Characteristics in Series and Parallel Circuits
- Self-Review 3

Segment 4 - Resistance Measurement

- Objective 11 - Define Resistance and Give Its Units of Measurement
- Objective 12 - Describe the Function of Two Types of Ohmmeters and Give Their Schematic Symbol
- Objective 13 - Describe How to Use an Ohmmeter to Measure Resistance
- Skill 6 - Use a DMM to Measure the Resistance of a Component
- Objective 14 - Describe the Resistance Characteristics in Series and Parallel Circuits
- Skill 7 - Measure the Resistance in Series and Parallel Circuits
- Objective 15 - Describe Two Methods of Measuring Continuity

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- Skill 8 - Test the Continuity of Wires Using a DMM
- Self-Review 4

Hands on panel with Digital multi-meter (2hrs)

- Check voltage with meter
- Check resistance
- Check continuity (bad fuses)

Circuit Analysis (8hrs)

Control Relays and Motor Starters

Segment 1 – Control Relays

- Objective 1 - Describe the function of a control relay and give an application
- Objective 2 - Describe the operation of a control relay and give its schematic symbol
- Objective 3 - Describe the operation of two types of control relays and give an application of each
- Objective 4 - Describe how detached symbology is used to show a control relay on a ladder diagram
- Objective 5 - Describe the operation of memory logic and give an application
- Self-Review 1

Segment 2 - Magnetic Motor Starters

- Objective 6 - Describe the operation of a magnetic motor starter
- Skill 3 - Connect and operate a magnetic motor starter connected to a three-phase motor
- Self-Review 2

Circuit Analysis

Segment 3 - Circuit Protection Devices

- Objective 8 - Describe the function of two types of circuit protection and give an application of each
- Objective 9 - Describe the operation of a fuse and give its schematic symbol
- Skill 7 - Operate a circuit using a fuse

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- Skill 8 - Test and replace a fuse
- Objective 10 - Describe the operation of two types of circuit breakers and give Their schematic symbols
- Skill 9 - Operate a circuit using a circuit breaker
- Skill 10 - Test and reset a circuit breaker
- Self-Review 3

Introduction to Electrical Control Wiring

Segment 1 - Electrical Prints

- Objective 1 - Describe the function of an electrical print
- Objective 2 - Describe the four basic parts of a ladder diagram
- Objective 3 - Explain six rules for drawing a ladder diagram
- Objective 4 - Describe the function of cross-reference symbols and notes on an electrical print
- Objective 5 - Describe how to interpret a ladder diagram
- Self-Review 1

Relays - Hands on 24vdc control panel

- The way a relay works and its components
- How to wire a relay
- How to interpret the relay diagram
- Timer relays-How they are used

Learn Lab (8hrs)

Learn Lab

- Wire up electrical circuits and have faults installed to troubleshoot. Do multiple exercises.

Learn Lab (8hrs)

Learn Lab

- Wire up remaining exercises, review schematics and troubleshooting techniques.