Module Overview

A power line worker’s primary duty is to safely install and maintain electrical transmission and distribution systems. Power line workers are exposed to hazards, including exposure to high voltages, confined space work, working in trenches, working underground, and working at heights. As a line worker, it is your responsibility to perform your duties safely and to ensure that your co-workers perform their jobs safely. This module establishes and explains the minimum safety standards that you are required to meet.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify, inspect, maintain, and use craft-specific PPE and identify its limitations.
2. Inspect rubber insulating blankets, line hoses, covers, and guards.
3. Describe the safety practices associated with high-voltage work, including:
   - Step and touch potential
   - Minimum approach distance
   - Protection from arc flash and arc blast
   - Procedures for entering substations
4. Explain work zone safety requirements.
5. Describe traffic control methods.
6. Identify the signs and causes of unstable trenches and describe the safety practices associated with trench work.
7. Identify hazards related to working near horizontal drilling operations.
8. Identify hazards and safeguards associated with confined-space work.
9. Explain the purposes of, and differences between, job safety analyses and task safety analyses.
10. Describe how to mitigate environmental impacts.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Inspect and put on craft-specific PPE.
2. Inspect rubber insulating blankets, line hoses, covers, and guards, and install them on deactivated power lines.

Materials and Equipment

Multimedia projector and screen
Power Line Worker Level 1 PowerPoint®
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Access to a variety of PPE, including:
   - Hard hats
   - Footwear
   - Chaps
   - Eye protection
   - Hearing protection
   - Hand and arm protection
   - Flame-resistant clothing
   - Face protection
   - Access to a variety of TTC equipment, including:
      - Barricades, cones, and signs
      - Traffic signaling devices, such as paddles or flags
      - High-visibility safety apparel
      - Approved flashlight or battery-powered lantern
Access to a variety of safety equipment and tools, including:
- Lockout/tagout devices
- Temporary protective grounds
- Live-line tools
- Rubber insulating equipment
- Protective shields
- Physical or mechanical barriers
- Rubber line hoses, covers, and guards
- Non-conductive clamps
- Copy of MUTCD (if available)
- Module Examinations*
- Performance Profile Sheets*

*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

**Safety Considerations**

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with accomplishing performance tasks. Emphasize the importance of proper housekeeping.

**Additional Resources**

This module presents thorough resources for task training. The following resource material is suggested for further study.

- **ASTM F1505**, Standards for Insulated Electrical Tools.
- **ASTM F479**, Standard Specification for In-Service Care of Insulating Blankets.
- **NFPA 70°**, National Electrical Code® (NEC®).
- **NFPA 70E°**, Standard for Electrical Safety in the Workplace.
- **OSHA Standard 29, Part 1910, Subpart R, Section 269.**
- **National Electrical Safety Code® (NESC®)**, supplied by the IEEE provides requirements for electrical installations.
- **ASTM Z87.1 Standards for Safety Glasses.**
- **OSHA Standard 29, Section 1910.147** identifies conditions for simple lockout procedures for non-electrical work.

**Teaching Time for This Module**

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 22½ hours are suggested to cover Power Line Worker Safety. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.
### Session I. Introduction; Introduction to Electrical Power and Hazards; Electrical Safety

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>A. Introduction</td>
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<tr>
<td>1. Industry Standards</td>
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<tr>
<td>2. Line Worker Safety</td>
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<tr>
<td>B. Introduction to Electrical Power and Hazards</td>
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<tr>
<td>1. Electrical Power</td>
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<td>2. Electrical Hazards</td>
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<tr>
<td>C. Electrical Safety</td>
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<tr>
<td>1. Hazard Boundaries</td>
<td></td>
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<tr>
<td>2. De-Energized Equipment</td>
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<tr>
<td>3. Substation Entry</td>
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</table>

### Sessions II and III. Protective Equipment

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>A. Protective Equipment</td>
<td></td>
</tr>
<tr>
<td>1. Personal Protective Equipment</td>
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<tr>
<td>B. Laboratory</td>
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<tr>
<td>1. Have trainees inspect and correctly put on PPE. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td>C. Lockout/Tagout Devices</td>
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<tr>
<td>D. Temporary Protective Grounds</td>
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<tr>
<td>E. Live-Line Tools</td>
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<tr>
<td>F. Other Tools and Protective Equipment</td>
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<tr>
<td>G. Laboratory</td>
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<tr>
<td>1. Have trainees inspect and correctly install protective equipment on deactivated power lines. This laboratory corresponds to Performance Task 2.</td>
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### Session IV. Traffic Control

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<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>A. Traffic Control</td>
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### Session V. Trenching Safety

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>A. Trenching Safety</td>
<td></td>
</tr>
<tr>
<td>1. Preparation</td>
<td></td>
</tr>
<tr>
<td>2. Trenching Hazards</td>
<td></td>
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<tr>
<td>3. Trenching Safety Guidelines</td>
<td></td>
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<tr>
<td>4. Indications of an Unstable Trench</td>
<td></td>
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<tr>
<td>5. Making the Trench Safe</td>
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<td>6. Soil Hazards</td>
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</table>

### Session VI. Horizontal Directional Drilling

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Horizontal Directional Drilling</td>
<td></td>
</tr>
<tr>
<td>1. Setting up the Drilling Site and Equipment</td>
<td></td>
</tr>
<tr>
<td>2. Boring Operations Safety</td>
<td></td>
</tr>
</tbody>
</table>

### Session VII. Confined Spaces

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Confined Spaces</td>
<td></td>
</tr>
<tr>
<td>1. Confined-Space Classification</td>
<td></td>
</tr>
<tr>
<td>2. Entry Permits</td>
<td></td>
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<tr>
<td>3. Confined Space Hazards</td>
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<td>4. Responsibilities and Duties</td>
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<td>5. Safeguards</td>
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<td>6. Substation Entry</td>
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</tbody>
</table>
Topic

Session VIII. Environmental Concerns; Job Safety Analyses and Task Safety Analyses; Work Zone and Personal Safety

A. Environmental Concerns
   1. Clean Water Act
   2. Endangered Species Act
   3. Good Housekeeping Practices
B. Job and Task Safety Analyses
C. Work-Zone and Personal Safety
   1. Work-Zone Safety
   2. Emergency Response
   3. Personal Safety

Session IX. Review and Testing

A. Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module introduces the trainee to electrical circuits. It offers a general introduction to electrical concepts used in Ohm’s law, including atomic theory, electromagnetic force, resistance, and electric power equations. It also covers series, parallel, and series-parallel circuits.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Module 49102-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Explain the difference between conductors and insulators.
2. Define voltage and identify the ways that it can be produced.
3. Define the units of measurement that are used to measure the properties of electricity.
4. Explain the basic characteristics of series and parallel circuits.
5. Identify the meters used to measure voltage, current, and resistance.
6. Identify specialized test instruments used by power line workers.

Performance Tasks

This is a knowledge-based module; there are no performance tasks.

Materials and Equipment

Multimedia projector and screen
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Basic electrical circuit, including:
  Battery/power source
  Wiring
  Loads
  Switches
Samples of conductors, insulators, and resistors
Magnets/electromagnet
Metal sheet
Iron filings
Battery
Simple schematic
Color-coded resistors
Various meters, including:
  Multimeter
  Voltmeter/voltage tester
  Clamp-on ammeter
  Ohmmeter
  Continuity tester
  Secondary service tester
  Phase rotation tester
  Non-contact high-voltage tester
  Transformer tester
Module Examinations*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees may work with electrical test equipment. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize electrical safety.
Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7½ hours are suggested to cover Introduction to Electrical Circuits. You will need to adjust the time required for testing based on your class size and resources.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Introduction; Atomic Theory; Electrical Power Generation and Distribution; Electric Charge and Current</td>
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<tr>
<td>A. Introduction</td>
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<td>B. Atomic Theory</td>
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<td>2. Conductors and Insulators</td>
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<tr>
<td>3. Magnetism</td>
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<tr>
<td>C. Electrical Power Generation and Distribution</td>
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<td>D. Electric Charge and Current</td>
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<tr>
<td>1. Current Flow</td>
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<td>2. Voltage</td>
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<td>3. Resistance</td>
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<tr>
<td>Ohm’s Law; Schematic Representation of Circuit Elements; Resistors; Electrical Circuits; Electrical Measuring Instruments; Specialized Power Transmission and Distribution System Test Instruments</td>
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<tr>
<td>A. Ohm’s Law</td>
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<td>B. Schematic Representation of Circuit Elements</td>
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<td>C. Resistors</td>
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<td>D. Electrical Circuits</td>
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<td>1. Series Circuits</td>
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<td>2. Parallel Circuits</td>
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<td>3. Series-Parallel Circuits</td>
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<tr>
<td>E. Electrical Measuring Instruments</td>
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<tr>
<td>1. Measuring Current</td>
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<td>2. Measuring Voltage</td>
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<td>3. Measuring Resistance</td>
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<tr>
<td>4. Voltage Testers</td>
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<tr>
<td>F. Specialized Power Transmission and Distribution Test Instruments</td>
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<tr>
<td>1. Secondary Service Conductor Tester</td>
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<td>2. Phase Sequence Rotation Tester</td>
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<td>3. Non-Contact High-Voltage Detector</td>
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<td>4. Transformer Tester</td>
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</tbody>
</table>
Topic

Session III. Electrical Power; Review and Testing

A. Electrical Power
   1. Power Equation
   2. Power Rating of Resistors

B. Review

C. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview
This module introduces trainees to circuit calculations involving the application of Ohm’s and Kirchhoff’s laws. Bonding and grounding are also covered.

Prerequisites
Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 and 49103-11.

Objectives
Upon completion of this module, the trainee will be able to do the following:
1. Explain the basic characteristics of series, parallel, and combination circuits.
2. Using Ohm’s law, find the unknown values in series, parallel, and series-parallel circuits.
3. Explain the purpose of bonding and grounding.

Performance Tasks
This is a performance-based module; there are no performance tasks.

Materials and Equipment
Multimedia projector and screen
Power Line Worker Level 1
PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Handheld advanced function calculator
Module Examinations*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations
Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees may work with electrical test equipment. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize electrical safety.

Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7½ hours are suggested to cover *Introduction to Electrical Theory*. You will need to adjust the time required for testing based on your class size and resources.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Sessions I and II. Introduction; Resistive Circuits</strong></td>
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<td>A. Introduction</td>
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<tr>
<td>B. Resistive Circuits</td>
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<tr>
<td>1. Resistances in Series</td>
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<td>2. Resistances in Parallel</td>
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<tr>
<td>3. Series-Parallel Circuits</td>
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<tr>
<td>4. Applying Ohm’s Law</td>
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<tr>
<td><strong>Session III. Kirchhoff’s Laws; Grounding and Bonding; Review and Testing</strong></td>
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<tr>
<td>A. Kirchhoff’s Laws</td>
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<td>B. Grounding and Bonding</td>
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<tr>
<td>1. Protective Grounding</td>
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<td>C. Review</td>
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<td>D. Module Examination</td>
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<tr>
<td>1. Trainees must score 70 percent or higher to receive recognition from NCCER.</td>
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<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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</table>
Climbing Wooden Poles
Annotated Instructor’s Guide

Module Overview

Utility workers frequently install and maintain equipment on top of power poles. The worker must be able to climb the poles safely and be comfortable working at heights. This module introduces the trainee to climbing wooden poles.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 through 49104-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify all required and recommended safety equipment.
2. Demonstrate the knowledge and proper use of required climbing equipment.
3. Demonstrate the ability to inspect climbing equipment prior to climbing.
4. Identify the hazards associated with climbing wooden poles.
5. Demonstrate the ability to inspect a wooden pole for defects prior to climbing.
6. Identify and demonstrate proper climbing ascent, descent, and lateral positioning techniques.
7. Demonstrate the ability to safely climb over obstructions.
8. Demonstrate the ability to withstand working at heights above 32 feet.
9. Demonstrate the ability to perform pole-top rescue with and without the presence of a cross arm.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Demonstrate the ability to inspect climbing equipment prior to climbing.
2. Demonstrate the ability to inspect a wooden pole for defects and hazards prior to climbing.
3. Demonstrate proper climbing ascent, descent, and lateral positioning techniques.
4. Demonstrate the ability to safely climb over obstructions.
5. Demonstrate the ability to withstand working at heights above 32 feet.
6. Demonstrate the ability to perform pole-top rescue with and without the presence of a cross arm.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Pair of pole-climbing gaffs
- Gaff gauge
- Body belt with D-rings
- Fall restraint belt
- Fall arrest belt
- Positioning lanyards
- Sufficient number of climbers and gaffs in good condition
- Worn or damaged climbers and gaffs
- Worn webbing
- Selection of D-rings and O-rings, some damaged and some in good condition
- Damaged or otherwise unsafe pole
- Rescue rope
- Pulley
- 8- to 10-inch screwdriver
- Module Examinations*
- Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with climbing wooden poles. Emphasize the importance of proper technique.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 80 hours are suggested to cover Climbing Wooden Poles. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Session I. Introduction; Safety Equipment; Climbing Equipment</td>
<td></td>
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<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. Safety Equipment</td>
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<tr>
<td>1. Additional Safety Gear</td>
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<tr>
<td>2. Additional Safety Concerns</td>
<td></td>
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<tr>
<td>C. Climbing Equipment</td>
<td></td>
</tr>
<tr>
<td>1. Pole-Climbing Gaffs</td>
<td></td>
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<tr>
<td>2. Body Belt</td>
<td></td>
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<tr>
<td>3. Safety Belts</td>
<td></td>
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<tr>
<td>4. Positioning Lanyards</td>
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<tr>
<td>D. Laboratory</td>
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</tr>
<tr>
<td>Have the trainees identify all required and recommended safety equipment.</td>
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<tr>
<td>Sessions II and III. Pre-Climb Equipment Inspection; Checking the Pole Condition Before Climbing</td>
<td></td>
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<tr>
<td>A. Pre-Climb Equipment Inspection</td>
<td></td>
</tr>
<tr>
<td>1. Pole-Climbing Gaffs</td>
<td></td>
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<tr>
<td>2. Belts and Lanyards</td>
<td></td>
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<tr>
<td>B. Laboratory</td>
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</tr>
<tr>
<td>Have the trainees demonstrate the ability to inspect climbing equipment prior to climbing. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td>C. Checking the Pole Condition Before Climbing</td>
<td></td>
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<tr>
<td>1. Inspecting the Pole</td>
<td></td>
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<tr>
<td>D. Laboratory</td>
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</tr>
<tr>
<td>Have the trainees demonstrate the ability to inspect a wooden pole for defects and hazards prior to climbing. This laboratory corresponds to Performance Task 2.</td>
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<td>Topic</td>
<td>Planned Time</td>
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<tr>
<td><strong>Sessions IV through XVII. Climbing the Pole</strong></td>
<td></td>
</tr>
<tr>
<td>A. Climbing the Pole</td>
<td></td>
</tr>
<tr>
<td>1. Putting on the Climbing Gaffs</td>
<td></td>
</tr>
<tr>
<td>2. Ascending the Pole</td>
<td></td>
</tr>
<tr>
<td>3. Maneuvering Laterally on the Pole</td>
<td></td>
</tr>
<tr>
<td>4. Climbing over Obstructions</td>
<td></td>
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<tr>
<td>5. Descending the Pole</td>
<td></td>
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<td>6. Pole Steps</td>
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<tr>
<td>B. Laboratory</td>
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</tr>
<tr>
<td>1. Have the trainees demonstrate proper climbing ascent, descent, and lateral positioning techniques. This laboratory corresponds to Performance Task 3.</td>
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<tr>
<td>2. Have the trainees demonstrate the ability to safely climb over obstructions. This laboratory corresponds to Performance Task 4.</td>
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<tr>
<td>3. Have the trainees demonstrate the ability to withstand working at heights above 32 feet. This laboratory corresponds to Performance Task 5.</td>
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<tr>
<td><strong>Sessions XVIII through XXXI. Pole-Top Rescue</strong></td>
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<td>A. Pole-Top Rescue</td>
<td></td>
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<td>1. Rescue Equipment</td>
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<td>B. Laboratory</td>
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<td>Have the trainees demonstrate the ability to perform pole-top rescue with and without the presence of a cross arm. This laboratory corresponds to Performance Task 6.</td>
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<tr>
<td><strong>Session XXXII. Review and Testing</strong></td>
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<tr>
<td>A. Review</td>
<td></td>
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<tr>
<td>B. Module Examination</td>
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<tr>
<td>1. Trainees must score 70 percent or higher to receive recognition from NCCER.</td>
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<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
<td></td>
</tr>
<tr>
<td>C. Performance Testing</td>
<td></td>
</tr>
<tr>
<td>1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.</td>
<td></td>
</tr>
<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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</tbody>
</table>
Module Overview

Transmission line workers are frequently required to climb poles and towers to install and repair conductor and components. The workers must know how to do it safely. This module introduces the trainee to the proper climbing procedures and safety requirements for climbing steel poles and towers.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 through 49105-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify the required safety equipment for proper climbing.
2. Demonstrate the ability to inspect required safety equipment before use.
3. Identify the various environmental hazards requiring consistent attention from the worker.
4. Conduct a proper pre-climb inspection of steel poles and towers and the surrounding area.
5. Identify the appropriate climbing routes of various structures.
6. State the practices for safely ascending and descending steel poles and towers.
7. Demonstrate the physical and mental ability to endure the unique stresses of working at high elevations.
8. Safely ascend and descend a steel tower.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Demonstrate the ability to inspect required safety equipment before use.
2. Identify the various environmental hazards requiring consistent attention from the worker.
3. Conduct a proper pre-climb inspection of steel poles and towers and the surrounding area.
4. Identify the appropriate climbing routes of various structures.
5. Demonstrate the physical and mental ability to endure the unique stresses of working at high elevations.
6. Safely ascend and descend a steel tower.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Sufficient number of full body harnesses
- A low structure with anchor points for practice
- Access to a typical structure with anchor points
- Sufficient selection of hooks and carabiners with safety gates
- Assortment of D-rings
- Selection of lanyards, shock absorbing and non-shock absorbing
- Several lengths of wire or aircraft cable for padding lanyards
- Anchor points
- Y-configured lanyard
- Self-retracting lanyard
- Section of cable for routing climbing path on structure
- Sliding puck installed on structure
- Cable grab installed on structure
- Temporary vertical lines
- Rope grabs
- Worn webbing
- Selection of fall protection equipment for inspection
- Selection of worn, frayed, or damaged fall protection equipment for inspection
Access to a typical tower for inspection purposes
Standard blank form for documenting a pre-climb meeting
Actual filled-in form documenting a pre-climb meeting

Access to a tower for identifying climbing routes
Access to a structure for climbing
Module Examinations*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

### Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with climbing structures other than wood. Emphasize the importance of proper housekeeping.

### Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.

- **108 Ft Tower Install** Video. (1:03 minutes) [www.youtube.com](http://www.youtube.com).
- **What’s the Fall Distance?** Video. (22 minutes) [www.osha.gov](http://www.osha.gov).

### Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 40 hours are suggested to cover *Climbing Structures Other Than Wood*. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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</thead>
<tbody>
<tr>
<td><strong>Sessions I and II. Introduction; Safety Equipment</strong></td>
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<tr>
<td>Topic</td>
<td>Planned Time</td>
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<tr>
<td>4. Other Safety Gear</td>
<td>________</td>
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<tr>
<td>5. Equipment Inspection</td>
<td>________</td>
</tr>
<tr>
<td>a. Laboratory</td>
<td>________</td>
</tr>
<tr>
<td>Provide a selection of fall protection equipment and have the trainees practice inspecting it.</td>
<td>________</td>
</tr>
<tr>
<td>C. Laboratory</td>
<td>________</td>
</tr>
<tr>
<td>Have trainees demonstrate the ability to inspect required safety equipment before use. This laboratory corresponds to Performance Task 1.</td>
<td>________</td>
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</tbody>
</table>

**Session III. Hazards of the Environment**

A. Hazards of the Environment

1. Noise and Communication
2. Living Dangers
3. Weather

B. Laboratory

Have trainees identify the various environmental hazards requiring consistent attention from the worker. This laboratory corresponds to Performance Task 2.

**Sessions IV and V. Climb Preparations**

A. Climb Preparations

1. Site and Tower Assessment
2. The Pre-Climb Meeting

B. Laboratory

Have trainees conduct a proper pre-climb inspection of steel poles and towers and the surrounding area. This laboratory corresponds to Performance Task 3.

**Sessions VI and VII. Basic Climbing Skills, Part One**

A. Basic Climbing Skills

1. Preliminary Considerations
   a. Laboratory
   Have the trainees practice identifying appropriate climbing routes.

B. Laboratory

Have trainees identify the appropriate climbing routes of various structures. This laboratory corresponds to Performance Task 4.

**Sessions VIII through XV. Basic Climbing Skills, Part Two**

A. Basic Climbing Skills

1. Ascent
2. Maneuvering and Positioning
   a. Laboratory
   Have the trainees climb a short distance and practice maneuvering and positioning at a specific location.
3. Descent
   a. Laboratory
   Allow the trainees to practice ascending and descending a steel tower.

B. Laboratory

Have trainees safely ascend and descend a steel tower and demonstrate the physical and mental ability to endure the unique stresses of working at high elevations. This laboratory corresponds to Performance Tasks 5 and 6.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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</thead>
<tbody>
<tr>
<td><strong>Session XVI. Review and Testing</strong></td>
<td></td>
</tr>
<tr>
<td>A. Review</td>
<td></td>
</tr>
<tr>
<td>B. Module Examination</td>
<td></td>
</tr>
<tr>
<td>1. Trainees must score 70 percent or higher to receive recognition from NCCER.</td>
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<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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<tr>
<td>C. Performance Testing</td>
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</tr>
<tr>
<td>1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.</td>
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<tr>
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</tbody>
</table>
Module Overview

Every day, the line worker uses many tools to install and maintain power lines, and it is important that those tools be inspected and maintained properly. Line workers must also be able to use those tools effectively. This module introduces the trainee to many of the tools used on a job site.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 through 49106-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify and explain the use of common insulated hand tools.
2. Identify and explain the use of line workers’ ladders.
3. Identify and explain the use of line workers’ specialty tools.
4. Demonstrate the ability to use line workers’ tools specified by the instructor.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Demonstrate the ability to use five line worker tools specified by the instructor. These tools may include the following:
   - Clamp stick
   - Loadbuster®
   - Web hoist (Jack strap)
   - Hand line
   - Crimping tool

Materials and Equipment

Multimedia projector and screen
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Hot stick with universal tool head
Clamp stick with hook
Extendo stick
Selection of tool head adaptors for clamp sticks:
   - Quick-change adapter
   - Universal adapter
   - Grip-all adapter
Selection of tool heads for clamp sticks:
   - Disconnect tool
   - Chuck blank
   - Fixed-prong tie stick head
   - Ratchet wrench
   - Pointed disconnect tool
   - Spiral disconnect
   - Fixed-blade tie stick head
   - Flexible wrench head
   - Rotary-prong tie stick head
   - Stationary blade tie stick head
   - Skinning knife
   - Conductor-cleaning brush
   - Tubular line cleaner
   - Blanket pin tool
   - Pruning saw
   - Tree pruner
   - Loadbuster®
   - Access to an insulated aerial platform
   - Hook ladder
   - Three-rail ladder
   - Spliced ladder
   - Battery-powered crimper
   - Cable cutters
   - Hole-Hog®
AMPACT™ tool
Web hoist

Module Examinations*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with working with tools of the line workers’ trade. Emphasize the importance of proper housekeeping.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover Tools of the Trade. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Session I. Introduction; Insulated Tools</td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Insulated Tools</td>
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<tr>
<td>1. Hot Sticks</td>
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<tr>
<td>2. Grab-All Hot Stick (Shotgun Stick)</td>
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<tr>
<td>3. Extendo Stick</td>
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<td>4. Telescoping Measuring Sticks</td>
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<tr>
<td>5. Insulated Rescue Hook</td>
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<tr>
<td>6. Universal Tool Accessories</td>
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</tr>
<tr>
<td>7. Loadbuster® Tool</td>
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<tr>
<td>C. Laboratory</td>
<td></td>
</tr>
<tr>
<td>1. Have trainees practice inspecting and using line worker tools.</td>
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<tr>
<td>Session II. Ladders and Work Platforms</td>
<td></td>
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<tr>
<td>A. Ladders and Work Platforms</td>
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<tr>
<td>1. Work Platforms</td>
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<tr>
<td>2. Hook Ladders</td>
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<tr>
<td>3. Three-Rail Ladders</td>
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<tr>
<td>4. Spliced Ladders</td>
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<tr>
<td>B. Laboratory</td>
<td></td>
</tr>
<tr>
<td>1. Have trainees practice inspecting and using ladders.</td>
<td></td>
</tr>
</tbody>
</table>
### Session III. Specialty Tools

**A. Specialty Tools**
1. Battery-Powered Tools
2. Pneumatic-Powered Tools
3. Hydraulic-Powered Tools
4. Powder-Actuated Tools
5. Capstan Winch
6. Strap Hoists
7. Chain Saws
8. Hand Lines

**B. Laboratory**

Have trainees demonstrate the ability to use five line worker tools specified by the instructor. These tools may include the following:

- Clamp stick
- Loadbuster®
- Web hoist (jack strap)
- Hand line
- Crimping tool

This laboratory corresponds to Performance Task 1.

### Session IV. Review and Testing

**A. Review**

**B. Module Examination**
1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

**C. Performance Testing**
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

The installation of equipment on power poles is called aerial framing. Line workers must be able to install the support hardware and the components, and install conductor. This module introduces the trainee to aerial framing and its associated hardware.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 through 49107-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Describe the difference between single-phase and three-phase construction.
2. Identify the hardware used in aerial framing.
3. Using the standards manual, identify materials, assorted pole hardware, and support arms needed to perform aerial framing on:
   - A single cross-arm
   - A double cross-arm
   - A dead triple cross-arm set
   - An outrig arm
   - An alley arm
4. Describe, assemble, and install guys.
5. Perform an aerial framing procedure as defined by the instructor.
6. Hand-pull single-phase and three-phase primary conductors, dead end, and sag.
7. Explain how to install a transformer and connect conductors.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Assemble and install guys.
2. Perform an aerial framing procedure as defined by the instructor.
   - Single cross-arm
   - Double cross-arm
   - Triple dead-end cross-arm
   - Double alley arm
3. Hand-pull single-phase and three-phase primary conductors, sag, and dead end.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Wood utility poles

Selection of commonly used bolts:
- Easy-out
- Gimlet
- Pilot carriage
- Double-arm
- Flat washer
- Insulator pin
- Automatic splice
- Crimping tool
Wire mesh
Sufficient number of cross-arms:
  Single
  Double
  Dead triple cross-arm
  Outrig arm
  Alley arm
Insulators
Lightning arrestor
Sufficient number of guy clamps and anchors
Helically wound wire wrap
Section of damaged primary conductor
Sufficient short lengths of conductor
Dead-end clamp
Cross-arm
Pair of bulldog grips

Variables sizes of wire mesh grips
Various sizes of conductor in short lengths
If available, a bullwheel tensioner with a tensioner indicator
Drum puller
Dynamometer and pull tension chart
Sufficient selection of ties:
  Single-arm side
  Straight
  Double-arm top
A sufficient number of grooves for wrapping ties
Metal gin pole
Fiberglass gin pole
Hot stick
Module Examinations*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have pur-
chased the perfect-bound version of this title, download these materials from the IRC using your access
code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how
to use it properly. Review safety guidelines associated with performing aerial framing. Emphasize the
importance of proper housekeeping.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested
for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in
the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours.
This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute
break during the session. Approximately 80 hours are suggested to cover Aerial Framing and Associated
Hardware. You will need to adjust the time required for testing based on your class size and resources.
Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted
during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Sessions I–XI. Introduction; Safety; Aerial Framing Hardware; Aerial Framing Components; Cross-Arms</td>
<td></td>
</tr>
</tbody>
</table>
Topic                              Planned Time
C. Aerial Framing Hardware
   1. Attaching Hardware
   2. Mounting Hardware
   3. Supporting Hardware
   4. Repair Hardware
   5. Laboratory
      a. Have trainees practice making compression and automatic splices using
         a length of conductor, a crimping tool, and wire mesh.

D. Aerial Framing Components
F. Cross-Arms
   1. Laboratory
      a. Provide a sufficient number of poles and cross-arms, including single,
         double, triple, dead triple, and alley arms. Allow the trainees to practice
         installing the cross-arms on the ground.

G. Laboratory
   1. Under your supervision, have trainees perform an aerial framing
      procedure, including the following:
      • Single cross-arms
      • Double cross-arms
      • Triple dead-end cross-arms
      • Double alley arms
      Note the proficiency of each trainee. This laboratory corresponds
      to Performance Task 2.

Sessions XII–XVIII. Guys
A. Guys
   1. Guy Anchors
   2. Installing Guys
B. Laboratory
   1. Have the trainees assemble and install guys. This laboratory corresponds
      to Performance Task 1.

Sessions XIX–XXX. Installing Primary Conductors
A. Installing Primary Conductors
   1. Slack/Layout Method
   2. Laboratory
      a. Give each trainee a length of conductor and allow them to practice
         securing the end to the cross-arm.
      b. Allow the trainees to practice stringing conductor using the
         slack/layout method.
   3. Tension Method
   4. Laboratory
      a. Allow the trainees to practice gripping conductor with the wire mesh
         grips.
      b. Allow the trainees to practice stringing conductors using the tension
         method.
   5. Tensioning and Sagging Conductors
<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>6. Laboratory</td>
<td></td>
</tr>
<tr>
<td>a. Allow the trainees to practice tensioning conductor on the pre-set poles.</td>
<td></td>
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<tr>
<td>b. Allow the trainees to practice over-tensioning the conductor.</td>
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<tr>
<td>7. Tying in the Conductors</td>
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<tr>
<td>8. Laboratory</td>
<td></td>
</tr>
<tr>
<td>a. Provide each trainee with a tie and have them wrap a groove.</td>
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<tr>
<td>9. Connecting the Conductors</td>
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<tr>
<td>10. Neutral Line</td>
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<tr>
<td>B. Laboratory</td>
<td></td>
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<tr>
<td>Have the trainees pull single-phase and three-phase primary conductors, sag, and dead end. This laboratory corresponds to Performance Task 3.</td>
<td></td>
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</tbody>
</table>

**Session XXXI. Transformers**

A. Transformers

1. Installing a Single-Phase Transformer with a Gin Pole

2. Connecting the Transformer

3. Connecting Secondary Conductors

**Session XXXII. Review and Testing**

A. Review

B. Module Examination

1. Trainees must score 70 percent or higher to receive recognition from NCCER.

2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.

2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module introduces the trainee to bucket trucks, crane trucks, and aerial lifts that allow line workers to access overhead transmission and distribution lines. It also introduces trainees to digger derricks, which are used to place and erect power poles.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 through 49108-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify the types of bucket trucks and digger derricks used by power line workers.
2. Identify the operator safety requirements that must be followed when operating a bucket truck or digger derrick.
3. Explain how to perform a pre-start inspection on a service vehicle.
4. Describe the safety considerations associated with setting up a service vehicle at a job site.
5. Describe the safety considerations and basic operations procedures associated with using a bucket truck at a job site.
6. Describe the safety considerations and basic operations procedures associated with using a digger derrick at a job site.
7. Describe ways that a crew can prepare for and react to a bucket truck or digger derrick related emergency.
8. Inspect, set up, and operate utility service equipment:
   • Bucket truck
   • Digger derrick
   • Crane truck
   • Aerial lift

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Inspect, set up, and operate a bucket truck.
2. Inspect, set up, and operate a digger derrick.
3. Inspect, set up, and operate a crane truck.
4. Inspect, set up, and operate an aerial lift.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Manufacturer’s manual with PM inspections and checks
- Manufacturer’s manual showing hydraulic inspections and checks
- Auger manufacturer’s operating procedure
- Bucket manufacturer’s instructions for emergency bucket evacuation
- Length of hydraulic hose
- Crane manufacturer’s operating instructions
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with working on or around utility equipment and power lines.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.

- OSHA 1917.45, Cranes and Derricks.
- ANSI A92.2, Vehicle Mounted Elevating and Rotating Aerial Devices.
- www.buckettrucks.org for information and safety updates on bucket trucks.
- www.diggerderricks.org for information and safety updates on digger derrick trucks.
- www.photolibrary.fema.gov for examples of where line workers may have to work.
- www.genielift.com for miscellaneous types of lifts.
- www.jlg.com for miscellaneous types of lifts.

Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover Utility Service Equipment. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Session 1. Introduction; Bucket Truck Overview; Digger Derrick Truck Overview; Operator Safety Requirements; Inspection and Maintenance; Driving and Setting Up at Worksites; Bucket Truck Operations</strong></td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
</tr>
<tr>
<td>B. Bucket Truck Overview</td>
<td></td>
</tr>
<tr>
<td>1. Telescopic Boom Bucket Trucks</td>
<td></td>
</tr>
<tr>
<td>2. Articulating Boom Bucket Trucks</td>
<td></td>
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<tr>
<td>3. Combination Boom Bucket Trucks</td>
<td></td>
</tr>
<tr>
<td>C. Digger Derrick Truck Overview</td>
<td></td>
</tr>
<tr>
<td>D. Operator Safety Requirements</td>
<td></td>
</tr>
<tr>
<td>1. Federally Mandated Training Requirements</td>
<td></td>
</tr>
<tr>
<td>2. Bucket Truck Operator Safety Requirements</td>
<td></td>
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<tr>
<td>3. Digger Derrick Operator Safety Requirements</td>
<td></td>
</tr>
</tbody>
</table>
### Topic

**E. Inspection and Maintenance**
1. Daily Prestart Vehicle Inspections
2. Periodic Vehicle Inspections
3. Hydraulic Systems Inspections

**F. Driving and Setting Up at Worksites**
1. Worksite Preparation
2. Stabilize the Vehicle for Operation
3. Installing the Vehicle Ground
4. Final Walk-Around Inspection

**G. Bucket Truck Operations**
1. Weight Limitations
2. Boarding the Truck and Bucket Properly
3. Using a Fall Arrest System
4. Operating the Bucket

### Session II. Digger Derrick Operations; Job Completion and Preparation for Transport; In Case of Emergency; Other Utility Service Equipment

**A. Digger Derrick Operations**
1. Locate Underground Utilities
2. Rupturing Underground Utilities
3. Digger Derrick Controls
4. Operating the Auger
5. Lifting a Load Safely
6. Installing Poles and Anchors
7. Pulling Existing Poles from Ground

**B. Job Completion and Preparation for Transport**
1. Bucket Truck Preparations
2. Digger Derrick Preparations

**C. In Case of Emergency**
1. Exiting Raised Inoperable Bucket
2. Emergency Bucket Truck Rescue
3. Performing First Aid

**D. Other Utility Service Equipment**
1. Crane Trucks
2. Aerial Lifts

### Sessions III – V. Laboratory

**A. Laboratory**
1. Have trainees inspect, set up, and operate a bucket truck.  
   This laboratory corresponds to Performance Task 1.
2. Have trainees inspect, set up, and operate a digger derrick.  
   This laboratory corresponds to Performance Task 2.
3. Have trainees inspect, set up, and operate a crane truck.  
   This laboratory corresponds to Performance Task 3.
4. Have trainees inspect, set up, and operate an aerial lift.  
   This laboratory corresponds to Performance Task 4.
Session VI. Review and Testing

A. Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

A rigger must be able to safely attach lifting equipment and communicate instructions to other workers. This module introduces the trainee to rigging safety considerations, knot-tying techniques, and lifting procedures that may be used on a work site.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 through 49109-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:
1. Describe and demonstrate hand signals and other communication methods used in rigging work.
2. Describe safety hazards and safety practices associated with rigging work.
3. Identify safety procedures associated with the use of cranes in rigging work.
4. Describe how cranes are used to lift and move loads.
5. Tie knots used in rigging:
   • Square
   • Figure 8
   • Clove hitch
   • Double half hitch
   • Bowline
   • Bowline on a bight
   • Timber hitch
   • Sheet bend
   • Running bowline
   • Back splice
   • Sheep shank
6. Reeve a set of blocks.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:
1. Demonstrate hand signals and other communication methods used in rigging work.
2. Tie a minimum of six of the following knots:
   • Square
   • Figure 8
   • Clove hitch
   • Double half hitch
   • Bowline
   • Bowline on a bight
   • Timber hitch
   • Sheet bend
   • Running bowline
   • Back splice
   • Sheep shank
3. Reeve a set of blocks.
Materials and Equipment

Multimedia projector and screen
Power Line Worker Level 1 PowerPoint®
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Samples of worn rigging equipment:
   Ropes
   Slings
   Belts
Samples of electronic communication devices:
   Microphone
   Headphones
   Radio system devices
Sample signal flags
Gloves, high-visibility
Sound device, such as horn or siren
Safe-load indicator
Sample of manufacturer’s literature
Tag line, standard
Tag line, nonconductive
Knot samples:
   Square
   Figure 8
   Clove hitch
   Double half hitch
   Bowline
   Bowline on a bight
   Timber hitch
   Sheet bend
   Running bowline
   Back splice
   Sheep shank
   Lengths of rope for tying knots
   Bridle sling with master link
   Bridle sling with shackle
   Block and tackle, simple
   Block and tackle, compound
   Slings
   Rigging signalschart handouts (if available)
   Module Examinations*
   Performance Profile Sheets*

*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with working on or around rigging equipment. Emphasize the importance of proper housekeeping.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.

Bob’s Overhead Crane and Rigging Handbook, Pellow Engineering Services, Leawood, KS.

Refer to the Associated General Contractors web site for a list of training materials and video programs on crane safety. www.agc.org.

Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 12½ hours are suggested to cover Rigging. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Methods and Modes of Communication; General Rigging Safety, Part One</strong></td>
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<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. Methods and Modes of Communication</td>
<td></td>
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<tr>
<td>1. Verbal Modes of Communication</td>
<td></td>
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<td>2. Nonverbal Modes of Communication</td>
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<tr>
<td>C. Laboratory</td>
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<tr>
<td>1. Have the trainees read and demonstrate hand signals and other communication methods. This laboratory corresponds to Performance Task 1.</td>
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<td>D. General Rigging Safety</td>
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<tr>
<td>1. Personal Protection</td>
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<tr>
<td>2. Equipment and Supervision</td>
<td></td>
</tr>
<tr>
<td>3. Rigging Precautions</td>
<td></td>
</tr>
<tr>
<td><strong>Session II. General Rigging Safety, Part Two; Working Around Power Lines; Site Safety</strong></td>
<td></td>
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<tr>
<td>A. General Rigging Safety</td>
<td></td>
</tr>
<tr>
<td>1. Load Control</td>
<td></td>
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<tr>
<td>2. Barricades</td>
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<tr>
<td>3. Load-Handling Safety</td>
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<td>B. Laboratory</td>
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<tr>
<td>Have the trainees identify and tie rigging knots. This laboratory corresponds to Performance Task 2.</td>
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<tr>
<td>C. Working Around Power Lines</td>
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<tr>
<td>D. Site Safety</td>
<td></td>
</tr>
<tr>
<td>1. Site Hazards and Restrictions</td>
<td></td>
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<tr>
<td><strong>Session III. Emergency Response; Using Cranes to Lift Personnel</strong></td>
<td></td>
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<tr>
<td>A. Emergency Response</td>
<td></td>
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<tr>
<td>1. Fire</td>
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<tr>
<td>2. Malfunctions During Lifting Operations</td>
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<tr>
<td>3. Hazardous Weather</td>
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<tr>
<td>B. Using Cranes to Lift Personnel</td>
<td></td>
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<tr>
<td>1. Personnel Platform Loading</td>
<td></td>
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<tr>
<td>2. Personnel Platform Rigging</td>
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</tbody>
</table>
Session IV. Block and Tackle; Guidelines for Unloading and Yarding Materials

A. Block and Tackle
   1. Simple Block and Tackle
   2. Compound Block and Tackle
   3. Reieving a Block and Tackle

B. Laboratory
   Have the trainees reeve a set of blocks. This laboratory corresponds to Performance Task 3.

C. Guidelines for Unloading and Yarding Materials
   1. Unloading
   2. Using Slings

Session V. Review and Testing

A. Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Setting and Pulling Poles
Annotated Instructor’s Guide

Module Overview

Power line workers must install and maintain the wood utility poles that carry overhead power lines. New poles are needed for new customers, and damaged or weakened power poles must be replaced. This module introduces the trainee to methods and procedures for setting new poles and pulling old ones.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 through 49110-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Describe and demonstrate how to load and unload wood poles in preparation for installation.
2. Explain and demonstrate the importance of using the proper hand signals when setting a pole.
3. Describe and demonstrate how to set a wood utility pole using a digger derrick.
4. Describe and demonstrate how to set a wood utility pole by hand.
5. Describe and demonstrate how to pull a wood utility pole from the ground.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Load and unload wood poles in preparation for installation.
2. Demonstrate the proper use of ASME hand signals.
3. Pull a wood pole with a hydraulic pole puller.
4. Set a wood pole with a digger derrick.

Materials and Equipment

<table>
<thead>
<tr>
<th>Multimedia projector and screen</th>
<th>Digger derrick and auger</th>
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</thead>
<tbody>
<tr>
<td>Power Line Worker Level 1 PowerPoint®</td>
<td>Hydraulic pole puller</td>
</tr>
<tr>
<td>Computer</td>
<td>Chocks</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Plumb bob</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Manual digging tools</td>
</tr>
<tr>
<td>Pencils and scratch paper</td>
<td>Hydraulic tamper</td>
</tr>
<tr>
<td>Appropriate personal protective equipment</td>
<td>Module Examinations*</td>
</tr>
<tr>
<td>Lift chart</td>
<td>Performance Profile Sheets*</td>
</tr>
</tbody>
</table>

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with installing and pulling wood utility poles.
Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.

www.diggerderricks.org.

Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 20 hours are suggested to cover Setting and Pulling Poles. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Sessions I and II. Introduction; Safety; Storage of Wood Poles</strong></td>
<td></td>
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<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. Safety</td>
<td></td>
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<tr>
<td>C. Storage of Wood Poles</td>
<td></td>
</tr>
<tr>
<td>1. Loading Wood Poles for Transport</td>
<td></td>
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<tr>
<td>2. Unloading Wood Poles</td>
<td></td>
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<tr>
<td>D. Laboratory</td>
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<tr>
<td>Have the trainees load and unload wood poles in preparation for installation. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td><strong>Session III. Setting Wood Poles with Mechanized Equipment; Load Control</strong></td>
<td></td>
</tr>
<tr>
<td>A. Setting Wood Poles with Mechanized Equipment</td>
<td></td>
</tr>
<tr>
<td>1. Digger Derrick Operation</td>
<td></td>
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<tr>
<td>B. Load Control</td>
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<tr>
<td>1. American Society of Mechanical Engineers (ASME) Hand Signals</td>
<td></td>
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<td>2. Load Handling Safety</td>
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<tr>
<td>C. Laboratory</td>
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<tr>
<td>Have the trainees demonstrate the proper use of ASME hand signals. This laboratory corresponds to Performance Task 2.</td>
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<tr>
<td><strong>Session IV. Site Preparation</strong></td>
<td></td>
</tr>
<tr>
<td>A. Site Preparation</td>
<td></td>
</tr>
<tr>
<td>1. Placement and Sizing of the Hole</td>
<td></td>
</tr>
<tr>
<td>2. Digging the Hole</td>
<td></td>
</tr>
</tbody>
</table>
Sessions V–VII. Setting the Pole with A Digger Derrick; Setting the Pole by Hand (Piking Method); Setting the Pole by Hand (Block and Tackle Method)
A. Setting the Pole with a Digger Derrick
B. Setting the Pole by Hand (Piking Method)
C. Setting the Pole by Hand (Block and Tackle Method)
D. Laboratory
   1. Have the trainees pull a wood pole with a hydraulic pole puller. This laboratory corresponds to Performance Task 3.
   2. Have the trainees set a wood pole with a digger derrick. This laboratory corresponds to Performance Task 4.

Session VIII. Review and Testing
A. Review
B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview
This module introduces the trainee to the trenching, excavating, and boring equipment that may be used on a site when installing power lines underground.

Prerequisites
Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 through 49111-11.

Objectives
Upon completion of this module, the trainee will be able to do the following:
1. Identify the trenching, excavating, and boring safety guidelines.
2. Identify and explain the use and operation of compact and pedestrian trenchers.
3. Identify and explain the use and operation of a backhoe.
4. Identify and explain the use and operation of a horizontal directional drilling machine.

Performance Tasks
This is a knowledge-based module; there are no performance tasks.

Materials and Equipment
Multimedia projector and screen
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment

AEM safety manuals for trenching equipment and backhoe
Manufacturer’s operating manuals for trencher and backhoe/loader
Trencher lube chart
HDD rig warning sign
Module Examinations*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations
Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Review safety guidelines associated with working on or around trenching, excavating, and boring equipment. Emphasize the importance of proper housekeeping.

Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study.

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7½ hours are suggested to cover *Trenching, Excavating, and Boring Equipment*. You will need to adjust the time required for testing based on your class size and resources.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Trenching, Excavating, and Boring Safety Guidelines; Trenchers</strong></td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
</tr>
<tr>
<td>B. Trenching, Excavating, and Boring Safety Guidelines</td>
<td></td>
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<tr>
<td>1. General Safety Guidelines</td>
<td></td>
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<tr>
<td>2. Locate Underground Utilities</td>
<td></td>
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<tr>
<td>3. In Case of a Rupture</td>
<td></td>
</tr>
<tr>
<td>C. Trenchers</td>
<td></td>
</tr>
<tr>
<td>1. Trencher Assemblies</td>
<td></td>
</tr>
<tr>
<td>2. Trencher Operator Qualifications</td>
<td></td>
</tr>
<tr>
<td>3. Typical Trencher Controls</td>
<td></td>
</tr>
<tr>
<td>4. Trencher Safety Precautions</td>
<td></td>
</tr>
<tr>
<td>5. Pedestrian Trencher Operating Procedure</td>
<td></td>
</tr>
<tr>
<td>6. Trencher Operator’s Maintenance Responsibility</td>
<td></td>
</tr>
<tr>
<td><strong>Session II. Backhoe/Loader; Directional Boring Equipment</strong></td>
<td></td>
</tr>
<tr>
<td>A. Backhoe/Loader</td>
<td></td>
</tr>
<tr>
<td>1. Backhoe/Loader Operator Qualifications</td>
<td></td>
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<tr>
<td>2. Backhoe/Loader Controls</td>
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<tr>
<td>3. Backhoe/Loader Safety Precautions</td>
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<tr>
<td>4. Backhoe/Loader Operating Guidelines</td>
<td></td>
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<tr>
<td>5. Backhoe/Loader Maintenance</td>
<td></td>
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<tr>
<td>B. Directional Boring Equipment</td>
<td></td>
</tr>
<tr>
<td>1. Directional Boring Process</td>
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<td>2. Directional Boring Safety Precautions</td>
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<tr>
<td><strong>Session III. Review and Testing</strong></td>
<td></td>
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<tr>
<td>A. Review</td>
<td></td>
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<tr>
<td>B. Module Examination</td>
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<tr>
<td>1. Trainees must score 70 percent or higher to receive recognition from NCCER.</td>
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<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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</table>
Module Overview

This module describes the function and operation of voltmeters, high-voltage detectors, ohmmeters, clamp-on ammeters, multimeters, megohmmeters, motor and phase rotation testers, and phasing sticks. It also covers test equipment safety precautions and explains category ratings.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Power Industry Fundamentals and Power Line Worker Level One, Modules 49102-11 through 49112-11.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Describe the following pieces of test equipment and explain their purpose:
   - Voltmeter
   - Ohmmeter
   - Clamp-on ammeter
   - Multimeter
   - Megohmmeter
   - Hi-pot tester (dielectric strength tester)
   - Motor and phase rotation testers
   - Recording instruments
   - High-voltage detector
   - Phasing sticks

2. Select the appropriate meter for a given work environment based on category ratings.
3. Identify the safety hazards associated with various types of test equipment.

Performance Task

Under the supervision of the instructor, the trainee should be able to do the following:

1. Select the appropriate meter for a given work environment based on category ratings.

Materials and Equipment

Multimedia projector and screen
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Analog meter
Voltmeter and operator’s manual
Voltage tester and operator’s manual
Ohmmeter and operator’s manual
Continuity tester
Clamp-on ammeter and operator’s manual
Multimeter and operator’s manual
Megohmmeter and operator’s manual
Motor and phase rotation testers and operator’s manuals
High-voltage detector and operator’s manual
Phasing sticks and operator’s manual
Resistors
Safety video/DVD (optional)
TV/Video/DVD player (optional)
Module Examinations*
Performance Profile Sheets*

*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
**Safety Considerations**

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with electrical test equipment. Make sure that all trainees are briefed on appropriate safety procedures. Emphasize electrical safety.

**Additional Resources**

This module presents thorough resources for task training. The following resource material is suggested for further study.

- *Clamp Meter ABCs.* Everett, WA: Fluke Corporation.
- Fluke Corporation: [www.us.fluke.com](http://www.us.fluke.com).

**Teaching Time for This Module**

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7½ hours are suggested to cover *Introduction to Electrical Test Equipment*. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Sessions I and II. Introduction; Meters; Category Ratings; Safety</strong></td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. Meters</td>
<td></td>
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<tr>
<td>1. Voltmeter</td>
<td></td>
</tr>
<tr>
<td>2. High-Voltage Detectors</td>
<td></td>
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<tr>
<td>3. Ohmmeter</td>
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<td>4. Ammeter</td>
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<tr>
<td>5. Multimeter</td>
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<td>6. Megohmmeter</td>
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<td>7. Motor and Phase Rotation Testers</td>
<td></td>
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<tr>
<td>8. Phasing Sticks</td>
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<tr>
<td>9. Recording Instruments</td>
<td></td>
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<tr>
<td>10. Hi-Pot Tester</td>
<td></td>
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<tr>
<td>C. Category Ratings</td>
<td></td>
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<td>D. Safety</td>
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<td>E. Laboratory</td>
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</table>

Have the trainees select the appropriate meter for a given work environment based on category ratings. This laboratory corresponds to Performance Task 1.
Session III. Review and Testing

A. Review

B. Module Examination
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.