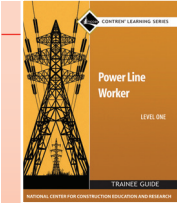


L1 POWER LINE WORKER



LEVEL 1

Curriculum Notes

- 407.5 Hours
 - Includes 97.5 hours of *Power Industry Fundamentals*, which is a prerequisite for Level One completion and must be purchased separately.
 - Hardcover: \$79.99, ISBN 978-0-13-466829-1
 - Published: 2011
 - Downloadable instructor resources are available.

PAPERBACK

Trainee Guide: \$74.99

ISBN

978-0-13-257109-8

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Power Line Worker Safety (22.5 Hours)

ISBN 978-0-13-266327-4

(Module ID 49102-11) Covers the safety equipment and safety practices associated with the special hazards of power line work, including electrical and arc flash hazards; traffic control; trenching; horizontal directional drilling; working in confined spaces; and safe entry into a substation.

Introduction to Electrical Circuits (7.5 Hours)

ISBN 978-0-13-266328-1

(Module ID 49103-11) Provides a general introduction to electricity and DC circuits, including theory of voltage, current and resistance, basic DC circuits, and Ohm's law. Also introduces the test equipment used in power line work.

Introduction to Electrical Theory (7.5 Hours)

ISBN 978-0-13-266329-8

(Module ID 49104-11) Describes how to calculate voltage, current, and resistance values in series, parallel, and combination DC circuits using Ohm's law. Also includes a basic description of grounding and bonding.

To address the need for one standardized and nationally recognized Power Line Worker curriculum, NCCER has developed *Power Line Worker Level One*. Common to transmission, distribution, and substation, *Power Line Worker Level One* addresses the fundamental aspects of power line work to include safety, electrical theory, climbing techniques, aerial framing and rigging, and operating utility service equipment. After Level One, the training program diverges into the three specialty areas (transmission, distribution, and substation) for two additional years of skills training.

Climbing Wooden Poles (80 Hours)

ISBN 978-0-13-266330-4

(Module ID 49105-11) Describes how to safely climb a wooden utility pole. Covers climbing equipment, inspection of equipment, pole inspection, climbing techniques, and pole-top rescue.

Climbing Structures Other Than Wood (40 Hours)

ISBN 978-0-13-266331-1

(Module ID 49106-11) Explains the equipment, safety practices, and climbing techniques required to climb towers. Hazards associated with the environment, such as snakes, birds, insects, and weather hazards, are also covered.

Tools of the Trade (10 Hours)

ISBN 978-0-13-266332-8

(Module ID 49107-11) Covers the specialized tools used by line workers, including hot sticks, as well as universal tool accessories. Also covers ladders and work platforms; crimpers; cable cutters; pneumatic tools; and powder-actuated tools.

Aerial Framing and Associated Hardware (80 Hours)

ISBN 978-0-13-266333-5

(Module ID 49108-11) Explains how to install guys to support a utility pole, as well as how to install the equipment on the pole to support conductors. Includes procedures for the installation of cross-arms, transformers, and conductors.

Utility Service Equipment (15 Hours)

ISBN 978-0-13-266334-2

(Module ID 49109-11) Provides descriptions and operations instructions for use of the digger derrick, bucket truck, crane truck, and aerial lift. Also covers safety requirements; inspection and maintenance; driving and setup operations; and emergency procedures.

Rigging (12.5 Hours)

ISBN 978-0-13-266335-9

(Module ID 49110-11) Explains how to select and use rigging equipment. Covers common rigging equipment and rigging methods that are likely to be used by power line workers. Also covers hand signals and other methods of communication between the rigger and the crane operator.

Setting and Pulling Poles (20 Hours)

ISBN 978-0-13-266336-6

(Module ID 49111-11) Provides instructions for the storage, loading, and transport of wooden utility poles. Includes use of the digger derrick to dig the hole and install the pole. Also covers pole removal using a hydraulic jacking device.

Trenching, Excavating, and Boring Equipment (7.5 Hours)

ISBN 978-0-13-266337-3

(Module ID 49112-11) Covers the use and maintenance of trenching equipment, backhoe/loaders, and horizontal directional drilling equipment for the installation of direct-buried power lines. Includes a review of safety guidelines related to buried utilities.

Introduction to Electrical Test Equipment (7.5 Hours)

ISBN 978-0-13-266338-0

(Module ID 49113-11) Introduces the basic test equipment used by electrical workers to test and troubleshoot electrical circuits. Also covers specialized line worker test equipment, including the high-voltage detector, phase rotation tester, megohmmeter, phasing stick, and hi-pot tester.

Continued on following page

L2 POWER LINE WORKER: DISTRIBUTION	
LEVEL 2	
Curriculum Notes	
<ul style="list-style-type: none"> • 157.5 Hours • Published: 2011 • Downloadable instructor resources are available. 	
PAPERBACK	ISBN
Trainee Guide: \$99.99	978-0-13-273034-1

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Alternating Current and Three-Phase Systems

(17.5 Hours)

ISBN 978-0-13-274259-7

(Module ID 80201-11) Introduces the development of both single- and three-phase alternating current. Analyzes the relationship of AC phases and introduces key components used to refine AC power. Discusses the operation of transformers and introduces advanced AC concepts such as reactive power and the power factor.

Aerial Distribution Equipment (25 Hours)

ISBN 978-0-13-274260-3

(Module ID 80202-11) Identifies the various equipment components found on overhead distribution system poles and describes the function of each, including transformers, reclosers, fuses, sectionalizers, capacitor banks, and voltage regulators.

Cable and Conductor Installation and Removal

(20 Hours)

ISBN 978-0-13-274261-0

(Module ID 80203-11) Describes the types of conductors and cables used in overhead and underground residential distribution systems and the equipment and procedures used to install and remove them. Includes methods used to splice conductors.

Underground Residential Distribution (URD) Systems (30 Hours)

ISBN 978-0-13-274263-4

(Module ID 80204-11) Describes the methods used to distribute power in residential and commercial subdivisions, including the equipment used in the process, such as pad-mount transformers and switchgear. Covers the components and methods used to connect primary and secondary power, as well as the protective devices used in URD systems and methods used to locate and repair buried cables.

Overhead and URD Service Installations

(15 Hours)

ISBN 978-0-13-274264-1

(Module ID 80205-11) Describes the methods and procedures used in terminating single-phase and three-phase aerial and URD systems at residential and commercial customer locations. Includes coverage of revenue meters and street light connections.

Distribution Line Maintenance (50 Hours)

ISBN 978-0-13-274265-8

(Module ID 80206-11) Describes the inspection process and the methods and procedures used to inspect and maintain poles, conductors, and equipment used in aerial and URD systems. Includes coverage of transformer testing; location and correction of faults in URD systems; load management systems; and protective device coordination.

L3 POWER LINE WORKER: DISTRIBUTION	
LEVEL 3	
Curriculum Notes	
<ul style="list-style-type: none"> • 145 Hours • Published: 2012 • Downloadable instructor resources are available. 	
PAPERBACK	ISBN
Trainee Guide: \$99.99	978-0-13-294865-4

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Introduction to Substations (10 Hours)

ISBN 978-0-13-296779-2

(Module ID 82201-12; from *Power Line Worker: Substation Level Two*) Provides an overview of the different types and functions of substations. Identifies the various voltage classes and introduces the primary equipment and components found in substations. Safe work practices and access issues related to substations are presented, as well as an introduction to one-line diagrams.

Live-Line Work (40 Hours)

ISBN 978-0-13-296759-4

(Module ID 80301-12) Covers tools such as hot sticks, shotgun sticks, and wire tongs, along with the PPE and safe work practices that are critical elements of live line and bare hand work. Includes coverage of various live-line tasks such as different methods of moving conductors and replacing insulators, cross-arms, and poles.

Three-Phase URD Systems (25 Hours)

ISBN 978-0-13-296760-0

(Module ID 80302-12) Covers safety practices associated with three-phase URD systems; describes vault and manhole applications; and explains different transformer configurations and sectionalizing equipment used in three-phase URD systems. Also covers three-phase cables and how cable is pulled through conduit.

System Protection and Monitoring (7.5 Hours)

ISBN 978-0-13-296761-7

(Module ID 80303-12) Presents an overview of monitoring and protection systems and reviews the key components that make them work. Describes feeder diagrams and their use in locating and identifying components.

Troubleshooting (40 Hours)

ISBN 978-0-13-296762-4

(Module ID 80304-12) Focuses on the methods used to safely locate and correct faults in aerial and URD systems. Includes troubleshooting methods as well as work site preparation.

Introduction to Smart Grids (2.5 Hours)

ISBN 978-0-13-296763-1

(Module ID 80305-12) Describes the network of transmission and distribution lines that delivers electricity between generating sources and consumers, and explains how the smart grid overlays this network to maintain a balance between power availability and demand.

Fundamentals of Crew Leadership (20 Hours)

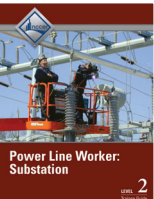
ISBN 978-0-13-292245-6

(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader's role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

Continued on following page

L2 POWER LINE WORKER: SUBSTATION

LEVEL 2



Curriculum Notes

- 180 Hours
- Published: 2012
- Downloadable instructor resources are available.

PAPERBACK ISBN
 Trainee Guide: \$99.99 978-0-13-295343-6

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Introduction to Substations (10 Hours)

ISBN 978-0-13-296779-2

(Module ID 82201-12) Provides an overview of the different types and functions of substations. Identifies the various voltage classes and introduces the primary equipment and components found in substations. Safe work practices and access issues related to substations are presented, as well as an introduction to one-line diagrams.

Managing Electrical Hazards (12.5 Hours)

ISBN 978-0-13-294869-2

(Module ID 26501-12; from *Electrical, Second Edition*) Introduces electrical hazards in the workplace and describes how to avoid them. Explains how to analyze and document shock and arc flash hazards, and how to plan and conduct work around them. Includes examples of how to complete an energized electrical work permit, and how to select the specialized personal protective equipment required for electrical work.

Alternating Current and Three-Phase Systems

(17.5 Hours)

ISBN 978-0-13-274259-7

(Module ID 80201-12; from *Power Line Worker: Distribution Level Two*) Introduces the development of both single- and three-phase alternating current. Analyzes the relationship of AC phases and introduces key components used to refine AC power. Discusses the operation of transformers and introduces advanced AC concepts such as reactive power and the power factor.

Conductors and Cables (10 Hours)

ISBN 978-0-13-296780-8

(Module ID 82202-12) Identifies the many types, sizes, and applications of conductors and cables. Fiber-optic cable is also introduced. Reviews the use of cable drawings and schedules. Provides coverage of the methods of routing cables underground in the substation environment.

Cable Tray (7.5 Hours)

ISBN 978-0-13-266136-2

(Module ID 26207-11; from *Electrical Level Two, Seventh Edition*) Focuses on NEC® installation requirements for cable tray, including cable installations.

Conduit Bending (15 Hours)

ISBN 978-0-13-266133-1

(Module ID 26204-11; from *Electrical Level Two, Seventh Edition*) Covers bends in conduit up to 6 inches. Focuses on mechanical, hydraulic, and electrical benders.

Conductor Installations (10 Hours)

ISBN 978-0-13-266135-5

(Module ID 26206-11; from *Electrical Level Two, Seventh Edition*) Covers the transportation, storage, and setup of cable reels; methods of rigging; and procedures for complete cable pulls in raceways and cable trays.

Conductor Terminations and Splicing (7.5 Hours)

ISBN 978-0-13-266137-9

(Module ID 26208-11; from *Electrical Level Two, Seventh Edition*) Describes methods of terminating and splicing conductors, including preparing and taping conductors.

Grounding Systems (12.5 Hours)

ISBN 978-0-13-296782-2

(Module ID 82203-12) Describes the purpose and arrangement of grounding systems installed beneath a substation. Covers the materials of construction and the approaches to reliable ground system connections. Introduces safety concerns and precautions associated with substation and grounding grid expansion.

Grades (15 Hours)

ISBN 978-0-13-292311-8

(Module ID 22106-12; from *Heavy Equipment Operations Level One*) Introduces the concept of preparing graded surfaces using heavy equipment. Covers identification of construction stakes and interpretation of marks on each type of stake. Describes the process for grading slopes.

Concrete Work (35 Hours)

ISBN 978-0-13-296783-9

(Module ID 82204-12) Provides comprehensive coverage of concrete pouring and finishing techniques. Includes detailed information on concrete types and their uses. Form layout and construction, along with basic surveying skills, is presented. Also provides detailed coverage of rebar types and their common geometric forms.

Mechanical Construction Methods and Materials

(17.5 Hours)

ISBN 978-0-13-296784-6

(Module ID 82205-12) Covers the diverse types of substation structures and their composition. Identifies components commonly supported by structures and the various bus forms and materials of construction. Includes thorough coverage of threaded fasteners along with mechanical torquing tools and procedures.

Intermediate Rigging (10 Hours)

ISBN 978-0-13-266181-2

(Module ID 38201-11; from *Intermediate Rigger, Second Edition*) Describes basic procedures for using various slings in hitches and calculating sling stress. Introduces tools and equipment used for the lateral movement of loads without a crane. Trainees learn how to reeve block and tackle, invert loads with hoists, and drift a load between two hoists.

L3 POWER LINE WORKER: SUBSTATION

LEVEL 3

Curriculum Notes

- 167.5 Hours
- Published: 2012
- Downloadable instructor resources are available.

PAPERBACK ISBN
 Trainee Guide: \$99.99 978-0-13-294866-1

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Temporary Grounding (15 Hours)

ISBN 978-0-13-604738-4

(Module ID 40308-09; from *Industrial Maintenance E&I Level Three*) Covers the methods used to eliminate or reduce electrical shock hazards to personnel working on electrical equipment.

Advanced Drawing Reading (20 Hours)

ISBN 978-0-13-296791-4

(Module ID 82301-12) Covers the drawings typically associated with substations and the skills needed for their interpretation. Provides detailed instruction on elementary, schematic, and general component arrangement drawings. Wiring diagrams and drawing schedules are also covered.

Medium- and High-Voltage Equipment Installation

(25 Hours)

ISBN 978-0-13-296792-1

(Module ID 82302-12) Presents the typical installation procedures for primary substation components. Identifies the common and unique factors related to the proper installation of transformers, circuit breakers, capacitors, reactors, bus systems, and insulators. A discussion of corona and how proper installation techniques can prevent it is also included.

Control House (20 Hours)

ISBN 978-0-13-296793-8

(Module ID 82303-12) Provides an overview of the substation control house and its function in the substation. The components and protective systems generally contained within a control house are examined, including the essential DC power systems and emergency power supplies. Coverage of racking systems and their layout is also included.

Continued on following page

Power Line Worker: Substation Level 3 (continued)

Connectors, Conductor Terminations, and Splicing

(25 Hours)

ISBN 978-0-13-296794-5

(Module ID 82304-12) Describes the procedures and materials required to prepare and complete terminations and splices on insulated and non-insulated conductors and cables. Coverage is provided for both medium- and high-voltage circuits. Hydraulic presses and crimpers are introduced, along with hi-pot testing procedures for terminations and splices.

Equipment Testing and Maintenance (30 Hours)

ISBN 978-0-13-296795-2

(Module ID 82305-12) Identifies the testing procedures required and explains how to properly maintain substation components. Coverage of testing and maintenance procedures is provided for power transformers, potential devices, various circuit breakers, disconnects and switches, capacitors, and reactors.

System Protection and Control (12.5 Hours)

ISBN 978-0-13-296796-9

(Module ID 82306-12) Describes the protective functions required in the substation environment to defend against overloads, fault currents, and other incidents that can disrupt service or damage the system. Offers coverage of the components used to provide both protection and system control. An introduction to the various protective relay schemes used in today's substations is included.

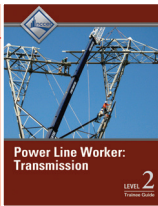
Fundamentals of Crew Leadership (20 Hours)

ISBN 978-0-13-292245-6

(Module ID 46101-11, Second Edition) Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem solving. Jobsite safety and the crew leader's role in safety are discussed, as well as project planning, scheduling, and estimating. Includes performance tasks to assist the learning process.

L2 POWER LINE WORKER: TRANSMISSION

LEVEL 2



Curriculum Notes

- 175 Hours
- Published: 2011
- Downloadable instructor resources are available.

PAPERBACK

Trainee Guide: \$99.99

ISBN

978-0-13-273033-4

Alternating Current and Three-Phase Systems

(17.5 Hours)

ISBN 978-0-13-274259-7

(Module ID 80201-11; from *Power Line Worker: Distribution Level Two*) Introduces the development of both single- and three-phase alternating current. Analyzes the relationship of AC phases and introduces key components used to refine AC power. Discusses the operation of transformers and introduces advanced AC concepts such as reactive power and the power factor.

Transmission Structure Rigging (17.5 Hours)

ISBN 978-0-13-296770-9

(Module ID 81201-11) Covers rigging equipment and practices specific to transmission structures. Coverage includes slings, crane stability, and the safe use of personnel platforms.

Transmission Structure Erection (50 Hours)

ISBN 978-0-13-274276-4

(Module ID 81202-11) Describes the erection requirements for various types of transmission structures, including steel towers, wood structures, and different types of poles. Covers general construction requirements, as well as right-of-way clearing, foundations, framing and erection, guying and anchoring, and grounding and bonding.

Transmission Equipment Installation (50 Hours)

ISBN 978-0-13-274277-1

(Module ID 81203-11) Focuses on the safe installation of insulators and conductors. Coverage includes stringing and splicing of conductors, conductor terminations, conductor sagging, clipping in, and the installation of accessories such as vibration dampers, spacers, warning lights, and day markers.

Transmission System Maintenance (40 Hours)

ISBN 978-0-13-274278-8

(Module ID 81204-11) Coverage includes safety practices related to working with helicopters, as well as inspection of insulators, towers, and poles. Discusses clearance procedures and environmental concerns such as protection of wetlands, waterways, and wildlife.

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

L3 POWER LINE WORKER: TRANSMISSION

LEVEL 3

Curriculum Notes

- 200 Hours
- Published: 2012
- Downloadable instructor resources are available.

PAPERBACK

Trainee Guide: \$99.99

ISBN

978-0-13-294867-8

Construction, Maintenance, and Repair –

Live-Line Barehand (40 Hours)

ISBN 978-0-13-296772-3

(Module ID 81301-12) Describes the methods used to work on live transmission lines by bonding to the line. Covers safety practices and PPE, and includes coverage of bonded buckets, non-conductive suits, insulated ladders, bonding jumpers, and rescue procedures.

Reconductoring Transmission Lines (40 Hours)

ISBN 978-0-13-296775-4

(Module ID 81302-12) Describes the replacement of existing transmission conductors as contrasted with installation of new conductors. Coverage includes pulling equipment setup, guard structures, and permit requirements. Includes live-line replacement as well as use of the existing conductors to pull the replacement conductors.

Construction, Maintenance, and Repair – Hot Stick

(80 Hours)

ISBN 978-0-13-296774-7

(Module ID 81303-12) Covers tools such as hot sticks, shotgun sticks, and wire tongs, along with the PPE and safe work practices that are critical elements of live-line and bare-hand work. Includes coverage of live-line tasks such as replacing insulators, cross-arms, and spacers.

Lift Planning (40 Hours)

ISBN 978-0-13-266190-4

(Module ID 38302-11; from *Advanced Rigger, First Edition*) Discusses lift plan implementation, including reference information, calculations, single- and multiple-crane lifting, critical lifts, and engineering considerations.

MODULES

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.