5.0 TRAINING GUIDE

OVERVIEW

Purpose Of This Guide

The purpose of this guide is to serve as a training aid to your Utility. It does not reflect the complete training you should receive during a four-year period.

Who developed it?

The information in this guide was developed by the Texas Electric Cooperatives and coincides with Introduction/Overhead/Underground and Advance Line Construction schools.

In This Chapter You Will Find The Following Five Sections:

Section	Description	Page
A	Apprentice Lineman I (1000 Hours)	
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D	Apprentice Lineman III (2000 Hours)	
E	Apprentice Lineman IV (2000 Hours)	

SECTION A
APPRENTICE LINEMAN I

OVERVIEW OF TRAINING LEVEL

Goals Of First 1000 Hours:

- To determine if you want to enter training in line work.
- Enables the Cooperative to determine whether you have the basic skills, interests, and abilities for Lineman training.

Your Working Conditions:

- You will work only on the ground. You are not expected toparticipate in any type of construction or maintenar
- You will, under no conditions, have a work assignment that will place you in contact with a "hot" line, regardless of the voltage.
- If you are used for any work off your home system, you shall not be permitted to climb energized poles or structures and shall only perform Lineman I (Groundman) responsibilities.

Supervisor

- You will work under the general supervision of the Superintendent and the direction of an assigned Crew Leader. Your Crew Leader is responsible for your personal safety and your training activities.

Length Of Training

- You will remain in the Lineman I (Groundman) classification for six months.
- Exception: Credit for work hours could possibly be granted based on prior work experience.

How You Will Progress

At the end of the six-month period, the Superintendent will decide if you will be advanced to the next training level--Apprentice Lineman I (Climbing). Before advancement, you will demonstrate that you have developed the skills and acquired the knowledge expected of an Apprentice I (Groundman).

OVERVIEW OF WHAT YOU WILL LEARN

Materials And Equipment

You will be introduced to the:

- Utility Safety Manual
- Overhead and Underground Distribution Specifications Manuals

You will be expected to work with all basic materials and equipment used in line construction. You will be responsible for learning how to:

- Properly care for all equipment used by your assigned crews
- Use personal protective equipment (PPE)
- Frame poles properly on the ground
- Install poles, anchors, and guys
- Cut and clean right-of-way properly, using power equipment as necessary
- Assist other crew members, as requested and directed
- Use radio appropriately (especially in emergency situations)
- Climb poles (practice poles) only under the direction of a crew leader

Safety Practices And Training

You will receive training in safe practices of performing all of the above duties and of handling all tools and equipment which you use. This will include but not be limited to training in:

- First aid
- CPR

You will receive a copy of the Utility Safety Manual. The Utility is responsible for explaining the contents of the Safety Manual to you.

Electrical Theory

You will begin learning:

- Basic electrical theory
- Voltages of lines worked on
- Distribution system layout

Records, Reports, And Related Information

You will learn:

- Basic work order procedures
- The Cooperative's basic residential and commercial rates
- The Utility’s service rules and operating procedures

JOB COMPETENCY/DEMONSTRATION FORM (First 1000 Hours)

_____ (Name of apprentice) is competent in or has demonstrated the ability to, or understanding of:	**Approving supervisor's signature and date**
Utility Safety Manual regulations/procedures	
Identify and demonstrate how to use and care for tools a Lineman I will be using	
Store tools on the truck	
Install an anchor	
Assemble and install guys on a pole before it is erected	
Pull and attach guy to anchor	
Place warning and safety devices to protect the public and workers at the job site	
Load and bind poles on a pole trailer	
Identify the types and sizes of ropes and coil properly for storage	
Has been introduced to pole top and bucket rescue procedures	
Name various electrical devices used on the job	
String out wire on the ground and make splices	
Work on the ground to serve Lineman on pole	
Standard First Aid	
Disassemble material taken from a pole	
Name the different types of fire extinguishers and types of fires they are to be used on	
Assemble cross arms to be installed on poles	
Emergency use of Communication System (radio)	
Climb poles (only under the direction of a crew leader)	
Use and care of personal protective equipment	
Familiar with construction Specifications (overhead and underground)	
Properly inspect and explain the use of rubber glove and sleeves	
Ground a line and bucket truck	
Inspect and properly set up a ladder	
Tie the various knots used in the line trade	

SECTION B
APPRENTICE LINEMAN I
(SECOND 1000 HOURS)

OVERVIEW OF TRAINING LEVEL

Goal Of The Second 1000 Hours

The goal of the second 1000 hours is active training in line work, focusing on line construction.

Your Working Conditions

You will climb in a learning situation on a regular basis but only when another qualified Lineman is present.

You will never work on a pole that has energized lines. Pole work should be limited to new construction and completely de-energized poles.

If you are used for any work off your home system, you shall not be permitted to climb energized poles or structures and shall only perform Lineman I (Groundman) responsibilities.

Supervisor

You will work under the direction of the Crew Leader to which you are assigned. Your Crew Leader is responsible for your personal safety and your training activities.

Length Of Training

You will remain in the Lineman I (Climbing) classification for six months. (Exception: Credit for work hours could possibly be granted based on prior work experience.)

How You Will Progress

At the end of the six-month period, the Superintendent will decide if you will be advanced to the next training level—Apprentice Lineman II. Before advancement, you will demonstrate that you have developed the skills and acquired the knowledge expected of an Apprentice I (Climbing).

OVERVIEW OF WHAT YOU WILL LEARN

Materials And Equipment

You will obtain a complete set of lineman's personal tools.

You will be responsible for learning how to:

- Frame erected poles and install guys on the poles
- Make service connections, transformer connections, and other equipment connections on cold poles
- String and tie-in conductor

Safety Practices And Training

You will receive training in safe practices to perform all of the above duties and to handle all tools and equipment safely. This will include but not be limited to:

- Use of hot line tools
- Use of grounds and personal protective equipment

Electrical Theory

You will receive additional instruction in basic electrical theory, including:

- Circuits
- Grounding connections

Records, Reports, And Related Information

You will learn to read staking sheets to determine types of construction and needed materials.

JOB COMPETENCY/DEMONSTRATION FORM
(Second 1000 Hours)

_____ (Name of apprentice) is competent in or has demonstrated the ability to, or understanding of:	**Approving supervisor's signature and date**
Identify lines and where they are to be used	
Take information from electrical devices needed to complete records	
Make up a hand line	
Coil a hand line for storage	
Perform the necessary work on the ground to serve a Lineman working on a pole	
Good housekeeping at the job site	
Apply Standard First Aid to a victim of injury or illness	
Use of a two-way radio	
Prepare a transformer for hoisting up a pole	
Install ground rod at a pole and make the connections	
Perform pole top and bucket rescue procedure	
Introductory underground systems	
APPA Safety Manual procedures	
Basic electrical theory	
Understands what materials are required to make up a personal protective ground	
Safely operate right-of-way tools (axe, bush axe, chain saw, etc.)	
Properly inspect personal climbing tools	
Safely climb wooden poles	
Frame the following poles: 12.5/7.2 kv Primary, Single-phase, Single Primary Support 12.5/7.2 kv, Single-phase, Double Primary Support 12.5/7.2 kv, Single-phase, Primary 12.5/7.2 kv, Single-phase, 60° to 90° Angle 12.5/7.2 kv, Single-phase, Deadend (Single)	
Knowledge of electricity from generation until it reaches the consumers	

SECTION C
APPRENTICE LINEMAN II (SECOND 2000 HOURS)

OVERVIEW OF TRAINING LEVEL

Goal Of Second 2000 Hours
The goal of the second 2000 hours is for you to make your first planned contacts with energized secondary lines. You will receive progressively more challenging assignments toward achieving the skills and knowledge necessary for a Lineman.

Your Working Conditions
You will continue to climb on a regular basis in a learning situation but still only with another qualified Lineman.

You will do some work on secondary voltages under the close supervision of a qualified Lineman, but the major part of your work will be on cold construction work.

If you are used for any work off your home system, you shall not be permitted to climb energized poles or structures and shall only perform Lineman I (Groundman) responsibilities.

Supervisor
You will work under the direction of the Crew Leader of the crew to which you are assigned for work and training activities. Your Crew Leader is responsible for your personal safety and your training activities.

Length Of Training
You will remain in the Lineman II classification for twelve months. (Exception: Credit for work hours could possibly be granted based on prior work experience.)

How You Will Progress
At the end of the twelve-month period, the superintendent will decide if you will be advanced to the next training level—Apprentice Lineman III. Before advancement, you will demonstrate that you have developed the skills and acquired the knowledge expected of an Apprentice Lineman II.

OVERVIEW OF WHAT YOU WILL LEARN

Materials And Equipment

You will continue to develop skills in the handling of safety equipment and the various materials used in line construct

Safety Practices And Training

Your safety training will include techniques of working on hot lines and continuing practice in:

- Pole top/bucket rescue
- Emergency use of radio
- Use of personal protective equipment
- Proper grounding of single-and three-phase lines (both overhead and underground)

Electrical Theory

You will gain basic working knowledge of the following:

- Feeds throughout a district and the directions in which each section can be fed
- Theory relating to low voltage connections
- Distribution substations
- Underground distribution systems
- Two-way feeds on an entire system

Records, Reports, And Related

You will gain additional knowledge and skill in understanding and using the information from previous training levels. In addition, you will learn the most important provisions of construction specifications for:

- Single-phase line construction
- Three-phase line construction
- Maintenance during this training period

JOB COMPETENCY/DEMONSTRATION FORM
(Second 2000 Hours)

_____ (Name of apprentice) is competent in or has demonstrated the ability to, or understanding of:	Approving supervisor's signature and date
Inspect, set up, and operate a line truck	
Select proper tension sleeves and tools to splice conductors	
Check voltage at member's meter base	
At a designated pole, identify the various circuits or other installations such as telephone wire and cables	
State the proper ground clearance for wires over a highway, bodies of water, driveway or railroad crossings	
Install a member's meter and record the Information	
Install personal protective grounds on a line that has been de-energized (both overhead and underground)	
Frame a pole and identify the installation that is to be made on it	
Use hand signals for loading or unloading poles on or from a trailer	
Fill out an injury report	
Place lights or flags on a trailer when hauling poles	
Identify types of single-phase transformers (conventional, CSP or pad mount)	
Use of an amp meter	
Identify primary voltages on distribution circuit	
Safely handle a capacitor	
Adult CPR (re-certified)	
Safety Manual procedures	
REA Specifications (overhead and underground)	
Chain saw safety	
Frame the following poles: 12.5/7.2 kv Two-phase, Single Primary Support 12.5/7.2 kv Two-phase, Double Primary Support 12.5/7.2 kv Three-phase, Single Primary Support 12.5/7.2 kv Three-phase, Double Primary Support, Large Conductors 12.5/7.5 kv Three-phase, Vertical Construction 12.5/7.5 kv Three-phase, Dead End (Single)	
Properly set up warning signs when working beside a highway	
Install wrap lock ties	
Tie-in poles using tie-wire	
Sag primary wire off the pole	
Hang transformers off the pole	
Use and inspect all hot line tools	
Install armor rods	

SECTION D
APPRENTICE LINEMAN III
(THIRD 2000 HOURS)

OVERVIEW OF TRAINING LEVEL

Goals Of The Third 2000 Hours

The goals of the third 2000 hours are for you to:

- Take on more responsibility for the construction and
- Maintenance of the Utility's distribution system
- Perform work on both secondary and primary voltages on
- Energized lines
- Develop the skills necessary to use most of the equipment utilized by a Lineman

Your Working Conditions

You will continue to work at all times with another qualified Lineman. You will work routinely on
secondary voltages and occasionally on primary voltages on energized lines. You may also be assigned to an On-Call crew with a qualified Lineman.

As an Apprentice Lineman III, you will be expected to work regularly on secondary voltages under the direction of a qualified Lineman.

If you are used for any work off your home system, you shall not be permitted to climb energized poles or structures and shall only perform Lineman II responsibilities. (Groundman--can climb deenergized poles.)

Supervisor

You will work under the direction of the Crew Leader of the crew to which you are assigned for work and training activities. Your Crew Leader is responsible for your personal safety and your training activities.

Length Of Training

You will remain in the Lineman III classification for twelve months. (Exception: Credit for work hours
could possibly be granted based on prior work experience.)

How You Will Progress

At the end of the twelve-month period, the Superintendent will decide if you will be advanced to the next training level--Apprentice IV. Before advancement, you will demonstrate that you have developed the skills and acquired the knowledge expected of an Apprentice 111.

OVERVIEW OF WHAT YOU WILL LEARN

Materials And Equipment

You will be responsible for learning how to:

- Install transformers and reclosers
- Make connections on transformers under the close supervision of a qualified Lineman
- Operate and work from an aerial bucket on energized lines only
- Under the supervision of the Crew Leader
- Properly operate and maintain all types of vehicles used in line work

Safety Practices And Training

You will gain continued skill in the:

- Use of safe practices in all line work
- Use of all protective equipment

Electrical Theory

You will receive advanced training in electrical theory such that you will understand:

- Transformers
- Transformer bank connections
- Substations and underground distribution systems

Records, Reports, And Related Information

During this training period, you will become familiar with:

- Important provisions of construction specifications for three phase line construction and maintenance
- Electrical codes which apply to the work of the distribution system

You will become competent in:

- Reading and following system maps
- Preparing and maintaining all necessary transformer and meter records

JOB COMPETENCY/DEMONSTRATION FORM
(Third 2000 Hours)

_____ (Name of apprentice) **is competent in or has demonstrated the ability to, or understanding of:**	**Approving supervisor's signature and date**
Install a set of double arms in the buck arm position with the main line energized	
Take ampere readings on a 12 KV line using tong amp meter	
Reading scales of several different types of meters	
Install lightning arrester and cut out on a distribution system	
Use a sag chart; check the sag in a single phase line	
Properly obtain clearance to remove grounds	
Properly discharge a capacitor before removing it from a pole	
Install a single-phase recloser	
Obtain clearance and properly install protective grounds on a three-phase line that has been taken out of service	
Follow proper grounding procedures when splicing a conductor on the ground	
Identify the following types of transformers: • Power • Distribution • Potential • Current • Self-protecting	
Make the proper connections on a three phase bank (types that each cooperative installs)	
Operate distribution protection equipment (i.e., cutouts, single and three-phase breakers)	
The proper makeup of terminators, elbows, splices (bath primary & secondary) and transformers (both single and three phase)	
The proper procedure for rubber cover-ups on energized lines	
Adult CPR (re-certified)	
Inspect, set up, and operate a Bucket truck	
Safety Manual procedures	
Properly inspect and use rubber cover-up	
Change out various line equipment (poles, x-arms, transformers, etc.) using bucket truck on an energized line	
Trouble shoot on both overhead and underground lines	

SECTION E
APPRENTICE LINEMAN IV
(FOURTH 2000 HOURS)

OVERVIEW OF TRAINING LEVEL

Goal Of The Fourth 2000 Hours

The goal of the fourth and final 2000 hours is for you to complete the development of skills and knowledge to be able to perform all types of distribution line construction, operations, and maintenance.

Your Working Conditions

You will assume greater responsibility for competing pole work. While you will continue to work with a qualified Line

You will be expected to perform all kinds of line work on both energized and de-energized lines. Work on energized lines, however, must still be under the close supervision of a qualified Lineman or Crew Leader.

If you are used for any work off your home system, you shall be permitted to climb energized poles or structures but only under the close supervision of a qualified Lineman or Crew Leader.

Supervisor

You will work under the direction of the Crew Leader of the crew to which you are assigned for both work and training activities. Your Crew Leader is responsible for your personal safety and your training activities.

Length Of Training

You will remain in the Lineman IV classification for twelve months. (Exception: Credit for work hours could possibly be granted based on prior work experience.)

How You Will Progress

At the end of the twelve-month period, the Superintendent will decide if you will be advanced to the position of Lineman. Before advancement, you will demonstrate that you have developed the skills and acquired the knowledge expected of an Apprentice Lineman IV.

OVERVIEW OF WHAT YOU WILL LEARN

Materials And Equipment

You will be responsible for learning how to:

- Operate and work from an aerial bucket, performing maintenance work on energized lines under supervision help install capacitors, voltage regulators, and instrument transformers
- Assist in substation installations and maintenance
- Assist in installation, operation, and maintenance of underground distribution system

Safety Practices And Training

You should be able to assist in training activities as an instructor. By your own work practices, you are expected to set an example of safe practices for other Apprentice Linemen.

Electrical Theory

You will continue to receive advanced training in electrical theory.

Records, Reports, And Related Information

You will continue to expand your knowledge of three-phase line construction, maintenance specifications, and electrical codes.

You will become familiar with the:

- Cooperative's billing procedures so that you can explain them
- Complete consumer location procedure

JOB COMPETENCY/DEMONSTRATION FORM
(Fourth 2000 Hours)

_____ (Name of apprentice) is competent in or has demonstrated the ability to, or understanding of:	**Approving supervisor's signature and date**
Read distribution maps	
Properly supervise the loading of poles on a pole trailer and secure the poles and attaching flags	
Plumb and line up a pole prior to back-filling and tamping	
At a substation, identify the following: • Transmission side • Power transformers • P.T.s • Regulators • Recloser and distribution side	
Explain the method of pulling in new wires on re-conductoring projects	
Give the proper clearance required for a primary and service wire, crossing a highway and waterways	
Proper procedure to use when replacing a phase wire that has burned down in mid span on a three-phase line	
Explain what precautions should be taken stringing wire parallel to or in the vicinity of a high voltage line	
De-energize a single-phase line at an oil circuit breaker	
The proper procedure to dispose of a damaged single-phase capacitor	
Make primary cable terminations for underground or pad mount	
Explain the function of a current limited fuse in a CSP transformer	
Check the polarity of transformers used in a three-phase bank	
Explain what is known as the high leg of a three-phase 4-wire 120/240-power bank	
Assist in installing a single-phase step voltage regulator on a pole	
Change a closed delta transformer bank to three-phase open delta if or when one transformer fails	
Explain the correct procedure of removing a step-voltage regulator from service	
Use a phase indicator or tester to check out the phases of a distribution primary circuit at a point that is normally open to determine which wires can be connected together underground fault finding equipment	
Trouble shooting on overhead and underground lines single and three-phase metering equipment	
Standard first aid (re-certified)	
Safety Manual information/procedures	
Take an energized regulator out of service	
Utility policies	
Utility record keeping	

Explain all types of metering used on the distribution system	
Explain where and how C.Ts are used	