

UNITED STATES MARINE CORPS
Utilities Instruction Company
Marine Corps Engineer School
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U-07A01
JAN 00

STUDENT HANDOUT

POWER POLES

1. LEARNING OBJECTIVES:

a. Terminal Learning Objective:

(1) Provided a field electrical power generation and distribution system plan, MEPDIS system, generator sets, floodlight sets, general illumination set, an installation crew equipped with a lineman's tool set, material for constructing a bus bar, tents, and references, install a field electrical power generation and distribution system. The system must satisfy power requirements in accordance with the field electrical power generation and distribution system plan. (1141.03.04)

b. Enabling Learning Objectives:

(1) Provided a climbers set, gloves, safety belt, safety strap, helmet, and a designated height, without the aid of reference, climb a power pole to the designated height, in accordance with FM 5-424. (1141.03.04x)

(2) Provided a climbers set, gloves, safety belt, safety strap, helmet, and a designated height, without the aid of reference, move 360° around the pole at the designated height, in accordance with FM 5-424 (1141.03.04y).

(3) Provided a climbers set, gloves, safety belt, safety strap, helmet and a designated height, without the aid of reference, descend the power pole from the designated height, in accordance with FM 5-424, (1141.03.04z).

(4) Provided a pole line training kit, without the aid of reference, as a member of a team erect a 35' power pole in accordance with FM 5-424 (1141.03.04aa).

1. CLIMBING THE POWER POLE TO THE DESIGNATED HEIGHT:

a. The top strap is called the leg strap and it is used to keep the top of the climbers from sliding while on the pole.

b. The top pad is called the upper pad and it is used to keep the top of the metal climber from poking into your leg.

c. Climbers are of two types, adjustable and fixed. The Marine Corps utilizes the adjustable climbers-which will adjust from 14" to 20" in steps 1/2" each.

d. Next is the gaff. There are two types, fixed and replaceable. The Marine Corps utilizes the replaceable gaffs. Tree or pole gaff can be placed on these climbers. We will be utilizing the pole gaffs only. When you get to the FMF you may use tree gaffs when necessary.

e. The bottom of the climber is marked L or R, to tell you which leg each climber should be placed on. The upper pad may also be marked.

f. The ankle strap is used to keep your foot from sliding out of the climbers.

g. Adjustment.

(1) Place your hand on the bottom portion of your leg, feel the point on your leg one inch below where the shin bone begins to get larger. This is where the top of the climber should come to. If it is adjusted above or below this point, your knee or shin will be subject to a lot of unnecessary pain and pressure.

(2) The upper pad serves it's purpose best when the leg strap is placed above the calf muscle and adjusted snug. The knee should be at a 90° angle when putting the strap on. Notice when I stand that the strap constantly pulls up on the pad keeping the beveled edge of the climber from poking into the leg.

(3) The lower strap is brought behind the boot, in between the boot and the climber, with a 360° wrap around the climber, keeping the strap as low as possible to the buckle and buckled snugly.

(4) Body belt. When putting on the body belt, it should be put on loose for ease of adjustment on the pole, but not so loose that you can pull it down and step out of it. The tape holder on the body belt should be at a natural hang when the belt has been put on correctly.

(5) Safety strap.

(a) The safety strap should be worn on the right side if right handed, and on the left side if left handed. When the strap is hanging, the lower clip hook will be clipped from the inboard to outboard direction. The upper clip hook will be from the outboard to inboard direction. This allows the strap to hang without any twists in it.

(b) To adjust the strap, you should mount the pole at the base, straighten your body and extend your arms parallel to the deck, palms inboard. Your palms should touch the side of the pole. If they don't, loosen or tighten your safety strap until your palms touch the side of the pole.

(c) NO ONE AT ANY TIME WILL CLIMB OR DESCEND A POLE WITH THE SAFETY STRAP AROUND THE POLE.

(d) The safety strap is used only while working at the work height. All students working on or around poles will wear gloves, hard hat, and keep their blouse sleeves rolled down.

h. Guidelines for Climbing power poles.

The object while climbing is to be comfortable. That is why there are guidelines. Depending on the individual these guidelines may vary somewhat.

(1) The body should be bent forward at the waist.

(2) The arms should be fully extended.

(3) The shins should be kept at a 30° angle while placing the gaffs into the pole and keeping the knees away from the pole.

(4) Climbing steps should be natural, about 6 to 8 inches for each step, while locking the knee.

(5) While climbing the pole you should keep your heels in towards the pole and your toes out. When your right leg comes up, so should your left arm. When your left leg comes up, so should your right arm. This should be done just like you are climbing a ladder.

(6) While climbing, your eyes should be looking at an imaginary line between your gaffs, aiming each gaff into the pole.

(7) Use of the safety strap. When placing the safety strap around the pole, the following steps constitute the best procedure.

(a) Place both gaffs in the pole at or near the same level.

(b) Keep your knees and hips away from the pole and unsnap the upper snap hook, hanging onto the pole with you free hand.

(c) Pass the single end of the safety strap behind the pole to the other correctly if the buckle tongue is away from the pole.

(d) Never depend on the sound of the snap keeper to ensure that the strap

2. Moving 360° Around the Power Pole:

a. Performing a 360° rotation to the right.

(1) Grasp the safety strap with each hand placing your hands 2 to 3 inches above the hooks on the safety strap.

(2) Pull with your left hand and push with your right hand to make the belt shift 3-4 inches around the pole.

(3) Keeping your left leg locked, remove the right gaff and let the shift in the belt swing you to the right, then gaff your right gaff back in locking out the leg.

(4) Now that the right leg has moved remove your left gaff and re-gaff it next to your right foot.

(5) Repeat steps 1-4 to keep rotating around until you have traveled 360°. Insure that while you are moving around the pole that you follow a straight line around. You do not want to spiral up or down.

b. Performing a 360° rotation to the left.

(1) The 360° to the left are done in the same manner just reversing all the movements.

(2) Grasp the safety strap with each hand placing your hands 2 to 3 inches above the hooks on the safety strap.

(3) Pull with your right hand and push with your left hand to make the belt shift 3-4 inches around the pole.

(4) Keeping your right leg locked, remove the left gaff and let the shift in the belt swing you to the left, then gaff your left gaff back in locking out the leg.

(5) Now that the left leg has moved remove your right gaff and re-gaff it next to your left foot.

3. Descending the Power Pole:

a. Descending from the pole is accomplished in the following manner.

(1) First lean up and grasp the pole with one hand, with your free hand unhook the safety strap from the D ring and pass it to your hand on the pole. Re-hook the safety strap to the same side as the other hook.

(2) Walk one of your hands down over the other, maintaining your angle.

(3) Remove one of your gaffs from the pole, with one leg hanging and knee locked, aim the gaff at a point 12 to 16 inches down the pole, dropping your body weight to that point.

(4) Keeping that leg locked, repeat the process with your other leg until you have reached the ground. Remember to lock, aim and drop on each descending step.

4. Erect a 35-Foot Power Pole:

a. Digging the hole.

(1) The first thing you must decide before you begin to dig is to determine the size and depth of the hole.

(a) The diameter of the hole is determined by the size of the pole to be set. The hole should be large enough to allow plenty of space on each side of the pole for the free use of the tamping equipment. Which requires at least three inches around the pole.

(b) The length of the pole and the type of soil that the pole will be set in determine the depth of the hole. Usually the depth of the hole will be 10% of the length of the pole plus two feet. For example, a thirty five-foot pole would be set in a hole whose depth was found by taking 10% of 35 feet which is 3.5 feet and adding 2 feet which equals 5.5 feet. So 5.5 feet would be the depth for a thirty five-foot pole.

(c) The hole also needs a trench. The trench should be dug at a 45° angle; half the depth of the hole and extending out the same length as the depth of the hole.

(2) The tools required for digging the hole include:

(a) A D-handled spade or short shovel is used to start the hole for two to three feet.

(b) An 8 foot long straight handled shaper shovel is used to loosen the soil in the bottom of the hole and shape the sides of the hole.

(c) A spoon shovel is utilized to remove the loose soil from the hole.

(d) A digging bar may also be utilized to break earth loose in case of frost, rock or hard clay.

(e) An earth auger will be used to dig the majority of the hole.

b. Preparation for erecting.

(1) The Carrying Tongs must be used to carry the power pole to the location where it is going to be erected.

(2) The Cant Hook is used to roll the pole into position for lifting.

(3) When lifting the pole insure that there are enough Marines to safely erect the pole. 10 Marines with 5 carrying tongs can accomplish this task. The senior Marine will be located in the rear and will give all the commands for lifting and moving the pole. Remember to lift with your legs and not your back.

(4) The butt board must be put into the hole. The board protects the sides of the hole and keeps them from caving in from the butt of the pole as it is sliding into the hole.

(3) The equipment utilized to raise the pole is laid out around the pole.

(a) The Power Pikes are 10 feet long and 10 power pikes will be used during the lift. The tips of the pikes will be facing outboard.

(b) The Guide pikes are 18 feet long and are used to stabilize the pole.

(c) A jenny is given to the Marine designated as the muleman. The muleman is used for lifting and stabilizing the power pole. The Jenny is not made to support the full weight of the power pole it is there just for temporary support and for safety so that Marines may get out of the way in case the power pole falls.

(4) The crews lifting the pole are assigned their jobs.

(a) Two guide pike's are to keep the pole straight.

(b) Power pike's (number decided by the size of the pole) push the pole.

(c) One muleman is utilized to sustain pressure from the pole.

c. Erecting the pole.

(1) The crew except the butt man and muleman line up on the head of the pole and bend down to get a grip on the pole. On command they lift the pole to shoulder height. The muleman will move under the pole with the jenny to help support the pole between lifts. As the crew moves forward, the muleman moves forward, keeping an angle of 30° on the jenny to the ground. This is repeated until the pole is high enough for the use of pikes.

(2) When the proper height is reached the commander will call for the power piker to release the pole at one time, and stab their power pikes into the pole approximately two feet above the muleman. Once all the power pikes are in place, the remaining pikes will be installed in the following order:

(a) The two-side guide pikes.

(b) The rear guides pike.

(3) When all the pikes are in place the commander gives the command to lift. The power pikes push while the guide pikes keep the pole going straight and the muleman moves the jenny forward. When the highest power pike cannot push any higher, he yells "high pike". On that command, pressure is maintained on the pole but the pole is not pushed any higher. The power pikes are then removed, one at a time and repositioned lower on the pole. The command "lift" is given and the process is repeated until the pole is almost all the way up. At this time the front guide pike is used to position the pole. The pole is then pushed until it is straight. The butt board and jenny are then removed.

(4) The pole is then lined up to make sure it is straight. When straight, the guide pike ends are placed on the ground with a foot behind them to keep the pole from moving.

(5) After the pole is set, it must be back filled and tamped utilizing the following method.

(a) After the hole has been partially filled, ensure that the pole is still in the proper position. If the pole has shifted slightly, realign the pole and fill the rest of the hole.

(b) If the pole is not being set in paving, the soil is heaped up around the pole about 6 to 8 inches.

(c) The back fill crew should consist of four men. One shoveling and three tamping.

REFERENCES: FM 5-424