AIR FORCE

QUALIFICATION TRAINING PACKAGE (AFQTP)

FOR

ELECTRICAL SYSTEMS
(3E0X1)

MODULE 25

TOOLS AND EQUIPMENT

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Career Field Education and Training Plan (CFETP) references from 1 Jul 02 version.

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Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

AIR FORCE QUALIFICATION TRAINING PACKAGES
FOR
ELECTRICAL SYSTEMS
(3E0X1)

INTRODUCTION

Before starting this AFQTP, refer to and read the "**AFQTP Trainer/Trainee Guide**."

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. ***It is important for the trainer and trainee to understand*** that an AFQTP ***does not*** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:
AFQTP completion
Hands-on certification

Diamond task:
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training when equipment becomes available either at home station or at a TDY location*.

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOF revised this AFQTP. If you have any recommendations for improving this document, please contact the Electrical Career Field Manager at the address below.

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TOOLS AND EQUIPMENT

MAINTAIN

MODULE 25 **AFQTP UNIT 1**

HOTLINE TOOLS (25.1.1.)

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MAINTAIN HOTLINE TOOLS

Task Training Guide

STS Reference Number/Title:	25.1.1., Maintain hotline tools.
Training References:	1. Career Development Course (CDC) Electrical Systems 3E051B, Vol. 1, Unit 2, Section 2-2: Hotline Tools. 2. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 3. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety.* 4. Manufacturer's Instructions (A.B. Chance LS-80 Hot-sticks Tester). 5. American National Standards Institute (ANSI) or American Society for Testing Materials (ASTM) Standards.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. CDC Electrical Systems 3E051B, Vol. 1, Unit 2, Section 2-2. 2.2. AFI 32-1064. 2.3. AFMAN 32-1185. 2.4. ANSI/ASTM Standards. 2.5. Manufacturer's Instructions.
Equipment/Tools Required:	1. Personnel protective equipment (PPE). 2. Hotline tools. 3. Dry tarpaulins. 4. Clean rags. 5. Nonconductive hot-stick pole cleaner. 6. Hot-stick wax. 7. Methyl ethyl kettle (MEK) or acetone. 8. Epoxyglas bond.
Learning Objective:	Given equipment, maintain hotline tools.
Samples of Behavior:	1. Identify defects. 2. Follow approved methods to maintain hotline tools. 3. Know safety requirements to maintain hotline tools.
Notes:	
Any safety violation will result in an automatic failure.	

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MAINTAIN HOTLINE TOOLS

1. Background: Hotline tools can be used in a great variety of jobs on overhead power lines. Used properly, they let you work safely without interrupting power. Only employees who have the necessary training and experience may do live line work using hotline tools and equipment.

1.1. The purpose of hotline tools is to minimize the number of power interruptions or outages. The tools are used for maintenance, not for construction. Maintenance of energized, or "hot," high-voltage lines may appear hazardous, especially when you compare it with maintenance on de-energized or on low-voltage lines with rubber gloves and other rubber protective equipment. However, the work can be just as safe if linemen are always conscious of the fact that the lines are energized.

1.2. Only hot-sticks with manufacturer's certification to withstand this minimum test may be used: 75,000 volts AC per foot for three minutes on wooden sticks and 100,000 volts AC per foot for five minutes on fiberglass and epoxy sticks. Efforts should be made to replace all wooden hotline tools with epoxy sticks. When a hotline tool is received, you assume a certain degree of responsibility for its continued safe condition. Epoxyglas hotline tools are safe, dependable, and made to take demanding use.

2. ***To perform these tasks, follow these steps:***

2.1. Care of Hotline Tools. To get peak tool performance and ensure safety, follow these basic guidelines in storing, transporting, and handling tools.

Step 1: Store tools in bins or on racks, and set aside trailers or special areas on trucks for tool transport.

Step 2: Always make sure tools are dry. Long exposure to moisture, dirt, or ultraviolet attack can affect the tool adversely.

Step 3: On the job site, place tools on portable racks or lay them on clean, dry tarpaulins or plastic sheeting.

Step 4: Wipe all tools with a clean cloth before sending them up the pole.

Step 5: Avoid rough handling, such as banging the tools against the pole or other hardware as they are raised and lowered.

Step 6: If it starts to rain, wipe the tools dry before storing them.

2.2. Hotline Tool Inspection.

Step 1: Initially, all wooden hotline tools must be tested for moisture level on receipt from the manufacturer and re-tested at least every six months or when moisture penetration is suspected.

Step 2: Hotline tools must be inspected before each use.

Step 3: Inspect the tool visually for cracked or distorted end fittings, feathered rivets or ferrules that have moved visibly, hairline cracks or scars in the insulation, and blisters in poorly applied coatings that could trap moisture.

Step 4: Hotline tools are tested electrically upon receipt from the manufacturer and retested every six months.

Step 5: The electrical supervisor inspects the tools visually in the field at least every six months to make sure they're maintained properly.

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Step 6: Hotline tools stored for mobility are tested once a year.

Step 7: The supervisor keeps a record of the field inspection date and the six month moisture level and electrical test dates.

> **NOTE:**
> The record must include the next due date for field inspection, moisture, and electrical test.

2.3. Cleaning Fiberglass Tools. Inspect the fiberglass surface of each tool for dirt, creosote, grease, or any other foreign material before and after each use. If you find any of these contaminants, the fiberglass surface must be cleaned. This cleaning process must involve as many of the steps below as are needed:

Step 1: Wipe the fiberglass with a clean rag.

Step 2: Clean the fiberglass surface with hot-stick pole cleaner.

2.1. If Step 2 fails to clean the fiberglass surface (this should be infrequent), take the tool out of use, tag it, and refer it to the supervisor for further evaluation.

> **NOTE:**
> Don't write on the fiberglass surface.

2.2. Don't use household or industrial soap detergents, abrasives, and cleaners (liquid or powdered form) to clean fiberglass tools under field conditions. Cleaning agents leave conductive residue unless they're rinsed off with generous amounts of water (usually not available in the field). Abrasive cleaners destroy the surface gloss on the stick. All fiberglass tools that are subjected to such cleaning agents must be tested electrically to ensure complete removal of residue from soap-type cleaners.

> **NOTE:**
> Don't use this cleaner on painted surfaces. This nonconductive cleaner will also remove surface wax on fiberglass. If Step 2 is successful, Step 3 is a must procedure.

Step 3: Wax the fiberglass surfaces with hot-stick wax.

3.1. Waxing the fiberglass surface of hot-line tools not only protects the glossy surface of the fiberglass, but also adds to the tool's electrical integrity. Wax provides a protective barrier against foreign substances such as dirt and creosote (which is easily removed with hot-stick pole cleaner). Waxing isn't necessary after every use of the tool, but rather as needed to maintain a glossy surface.

> **NOTE:**
> Wax must be applied after every cleaning with hot-stick pole cleaner.

3.2. Use only hot-stick waxes recommended by the hotline tool manufacturer.

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3.3. Silicone cloths may enhance the electrical integrity of hot sticks and help protect the glossy fiberglass surface, but they're not approved for use because silicone may migrate and over a period of time may hamper refinishing. Hot-stick wax has all of the advantages of silicone without the suspected adverse effects.

2.4. Hot-stick Repair.

Step 1: To completely clean and restore fiberglass, remove the old glass by sanding.

Step 2: Wipe the pole clean and refinish with fresh Epoxyglas Glass Restorer.

Step 3: The coating will dry in a few hours, and the tool should be ready for use within 24 hours, but only after an application of hot-stick wax.

Step 4: Small ruptures in the insulation part of the tools can usually be repaired at the shop by removing the damaged fibers, cleaning the void with methyl ethyl ketone (MEK) or acetone, and applying the Epoxyglas Bond.

Step 5: After the patch has set, apply Epoxyglas Glass Restorer.

Step 6: When you're using MEK for this process, you must provide adequate mechanical ventilation or personnel protective equipment.

NOTE:
Consult the Material Safety Data Sheet (MSDS) before each use.

SAFETY:
A TOOL THAT SHOWS SIGNS OF MAJOR DAMAGE SHOULD BE DESTROYED, OR RETURNED TO THE FACTORY FOR EVALUATION AND POSSIBLE REPAIR.

2.5. Hot-stick Test.

Step 1: Clean and wax all hot sticks before electrical testing by people who are thoroughly familiar with hi-pot test equipment and procedures.

1.1. AC testing according to manufacturer's specifications is permitted instead of the DC testing specified below.

1.2. Be sure to observe the safety precautions in the test set instruction manual and the section.

Step 2: Rope off the testing area to guard against accidental contact by people in the vicinity.

Step 3: Sticks may be tested electrically using a DC hi-pot test set. See Figure 1 for typical set-up for test.

3.1. Four one foot segment tests and one overall test are made on each stick. In some cases, test segments may overlap.

3.2. The test contacts must be two spiral springs, 5/8 inch to 1 inch in diameter, or clamps that make contact with the entire circumference of the stick. Springs must be wound of spring steel, 40 thousandths of an inch in diameter (±5 thousandths).

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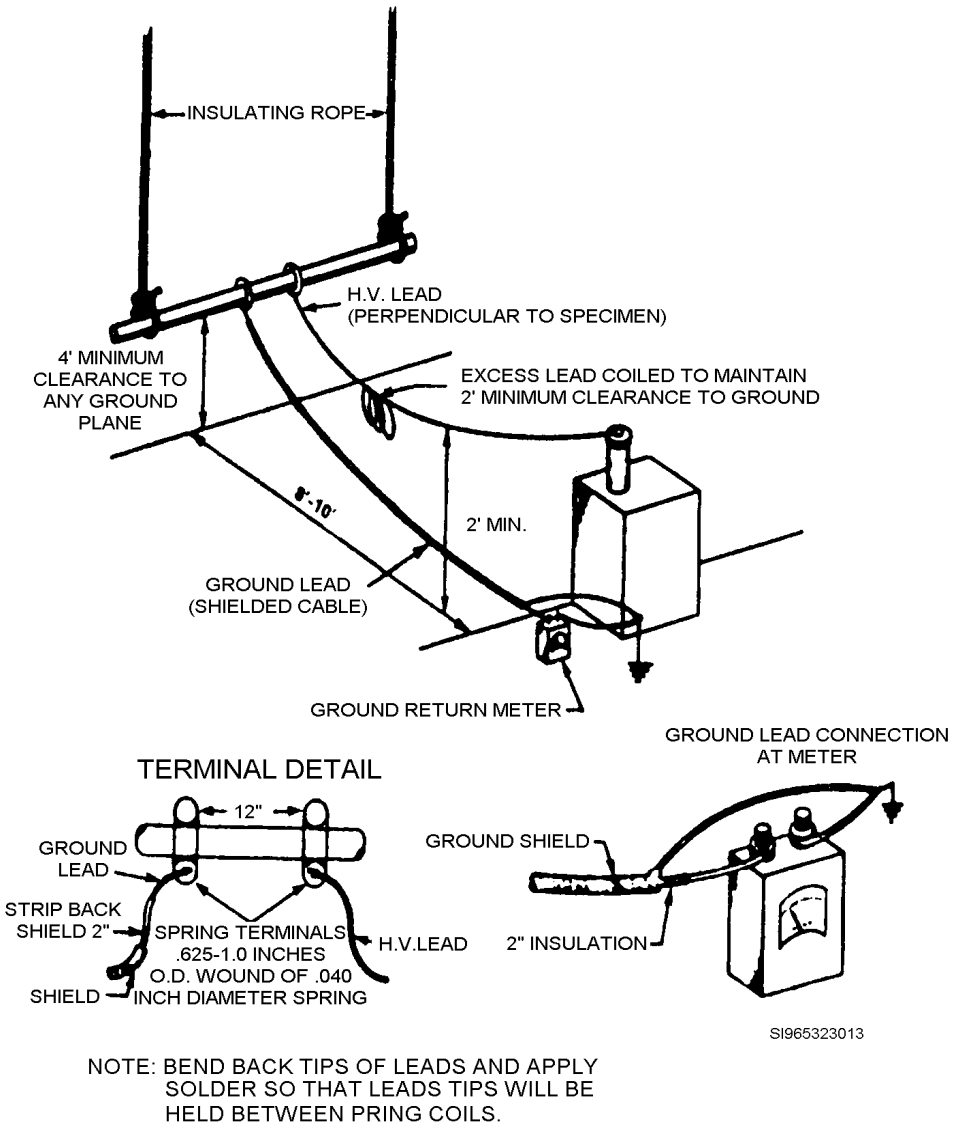

Figure 1, Typical Set-up for High-voltage Tests

Step 4: Suspend the stick in a horizontal position with clean polypropylene insulating rope about four feet above the floor.

Step 5: Place the DC test set on the floor eight to ten feet perpendicular distance from the center of the stick.

Step 6: Wrap the springs around the stick so spring contact is maintained on the entire circumference of the stick. (These springs may have to be shielded to reduce corona losses.)

Step 7: Attach the test leads to the springs so that sharp edges are inside the springs.

7.1. The hot lead of the test set must be routed directly from the top of the test set resistor to the nearest test spring.

7.2. Coil the excess lead in the center of the lead maintaining two feet ground clearance.

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7.3. Bag this connection with a plastic bag heavy enough to eliminate corona.

7.4. Use shielded cable, similar to RG–58, for ground lead.

7.5. Attach the inner conductor of the shielded cable to the ground spring and to ground return meter of the test set.

7.6. Strip back two inches of the shield, float the shield on the spring end, and attach the shield to the ground lug on the test set.

Step 8: Apply potential to the test segment.

8.1. Increase the voltage gradually (10k per second) to 80 kV and maintain for one minute.

8.2. Read the maximum leakage current in the ground return meter.

8.2.1. A leakage in excess of eight microamps (µA) signifies a failure of any test segment.

8.2.2. Test the other three segments the same way as the first and record the four leakage current readings.

8.2.3. Refinish any stick that fails the segment test and retest the stick.

Step 9: Reconnect the test leads to apply 100 KV DC for one minute to the full length of the stick.

9.1. A leakage current above ten µA indicates an internal contamination problem and signifies a failure.

9.2. Internal operating rod shotgun sticks and other hollow fiberglass sticks that fail the overall test must be re-cleaned internally and retested.

2.6. <u>Optional Hot-stick Test</u>. Instead of the procedure we just listed, a trade name hot-stick tester (A. B. Chance LS–80) may be used every six months. Follow the manufacturer's instructions. Hot-line sticks also may be tested by contract according to The American National Standards Institute (ANSI) or American Society for Testing Materials (ASTM) standards.

2.6.1. This tester energizes a portion of the stick and measures the microamp leakage for that portion of the stick. A high leakage would indicate moisture or other **contaminants** that would require you to dry or clean your hot sticks.

2.6.2. Before attempting to check hot sticks using the Portable Hot Stick Tester, it must first be inspected to ensure its serviceability. The first thing you should do is look for any obvious damage. If a previous user dropped the tester while testing, chances are the equipment was damaged. Abusive damage will be easy to see--maybe a corner of the tester is smashed or the meter/switches are broken. Inspect the electrical cord for any damaged insulation. If any part of the tester appears to be unserviceable, don't use it.

2.6.3. The Portable Hot Stock Tester must also receive an operational test before using. Do this by using the "check stick" that comes with the tester. First, place the ZERO knob fully counter clockwise. Second, plug in and flip toggle switch on. Third, Turn ZERO knob until meter needle aligns with ZERO line on meter face. Fourth, Placing the check bar in the tester should result in a full deflection of the meter needle.

2.6.4. Support the stick to be tested at both ends and place tester on stick. Take overlapping readings from one end to the other. **Do not slide the tester along the hot stick. Always lift it clear of the stick before repositioning it.** Rotate stick and test again. Test all four quadrants of stick.

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2.6.5. For wet testing, spray distilled water on stick when it is resting horizontally. Avoid over wetting and discontinue spraying before the beads form a continuous line. The objective is for the water to bead up on a glossy surface. Now follow the procedures for the dry test. All readings should be in the green "PASSES TEST" range on the meter. If stick fails test, clean and wax, if it still fails it probably has internal damage.

2.6.6. As with all test equipment, read and follow the manufacturer's operating instructions.

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REVIEW QUESTIONS
FOR
MAINTAIN HOTLINE TOOLS

QUESTION	ANSWER
1. The purpose of using hotline tools is to minimize the number of power interruptions or outages.	a. True. b. False.
2. Where should hotline tools be stored?	a. In bins or on racks b. In bins or leaning on walls c. Leaning on walls in a vertical position. d. Lying on racks or on floors.
3. Silicone cloths are not used to protect the glossy finish of fiberglass hot-sticks because they _____.	a. dull the glossy finish. b. hamper the refinishing process. c. inhibit the electrical integrity of the stick. d. All of the above.
4. How often are hot line tools tested electrically?	a. Every two years. b. Every three months. c. Every six months. d. Annually.
5. How often do hot sticks require a moisture test?	a. Every two months. b. Every three months. c. Every six months. d. Only when moisture is suspected.

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MAINTAIN HOTLINE TOOLS

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Explain the proper care of hot line tools		
2. Do all necessary steps during inspection		
3. Properly clean hot line tools		
4. Explain the test procedures using hi-pot test equipment		
5. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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TOOLS AND EQUIPMENT

MAINTAIN

MODULE 25 **AFQTP UNIT 1**

RUBBER PERSONNEL PROTECTIVE EQUIPMENT (25.1.2.)

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MAINTAIN RUBBER PERSONNEL PROTECTIVE EQUIPMENT

Task Training Guide

STS Reference Number/Title:	25.1.2., Maintain rubber personnel protective equipment (PPE).
Training References:	1. Career Development Course (CDC) Electrical Systems 3E051B, Vol. 1, Unit 2, Section 2-1: Climbing Equipment and Rubber Goods. 2. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 3. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety*. 4. Manufacturer's Instructions (A. B. Chance LS-80 Hot-sticks Tester). 5. American National Standards Institute (ANSI) or American Society for Testing Materials (ASTM) Standards.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. CDC Electrical Systems 3E051B, Vol. 1, Unit 2, Section 2-1. 2.2. AFI 32-1064. 2.3. AFMAN 32-1185. 2.4. ANSI/ASTM Standards. 2.5. Manufacturer's Instructions.
Equipment/Tools Required:	1. Rubber gloves. 2. Rubber sleeves. 3. Rubber blankets.
Learning Objective:	Given equipment, maintain rubber protective equipment.
Samples of Behavior:	1. Follow approved methods to maintain rubber protective equipment. 2. Know safety requirements associated with care and maintenance of rubber protective equipment.
Notes:	
Any safety violation is an automatic failure.	

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MAINTAIN RUBBER PERSONNEL PROTECTIVE EQUIPMENT

1. Background: Electrician's rubber protective equipment is for personal protection, and serious personal injury may result if it fails in use. The American National Standards Institute/American Society for Testing Materials (ANSI/ASTM) specifications for in-service care of rubber protective equipment stress visual inspection in the field as an important requirement in protecting from electric shock. Rubber protective equipment made of Type I natural or polyisoprene synthetic rubber is subject to ozone and corona deterioration. Salcore equipment made of Type II elastomeric compounds is not affected by this particular deterioration. Your rubber protective equipment may be subject to chemical deterioration and possible loss of insulating properties after prolonged exposure to ozone, heat, sun, oil and grease, or general weathering. Therefore, in addition to regular electrical tests and visual inspection for physical defects such as holes, tears, punctures and cuts, it should also be visually inspected at regular intervals for such signs of possible chemical deterioration as corona cutting, ozone or sun checking, texture changes such as swelling, softening, hardening, or becoming sticky or inelastic. Because of potential loss of electrical resistance due to reversion or other deterioration, equipment should be withdrawn from service upon the first indication of chemical deterioration.

1.1. The protective equipment is manufactured and color code labeled in conformance with applicable ANSI/ASTM specifications that include maximum use voltages and in-service inspection and retest requirements. Specifications for rubber protective equipment are:

ANSI/ASTM D120 Rubber insulating gloves.
ANSI/ASTM D178 Rubber insulating switchboard matting.
ANSI/ASTM D1048 Rubber insulating blankets.
ANSI/ASTM D1049 Rubber insulating insulator covers.
ANSI/ASTM D1050 Rubber insulating line hose.
ANSI/ASTM D1051 Rubber insulating sleeves.
ANSI/ASTM F478 In-service care of insulating line hose and covers.
ANSI/ASTM F479 In-service care of insulating gloves and sleeves.

NOTE:
ASTM publication PCN#06–411001–20, ASTM *Specifications for Electrical Protective Equipment for Workers*, is a compilation of all specifications in one booklet. Copies of individual specifications and the booklet may be obtained from ASTM, 1916 Race St., Philadelphia PA 19103.

1.2. The in service specifications require that rubber gloves and sleeves must be electrically tested initially upon receipt from the manufacturer and retested at least every three months for rubber gloves (shelf life 12 months), and 12 months for rubber sleeves. A visual field inspection should be also made by the exterior electrical supervisor to determine whether the gloves and sleeves are being maintained in satisfactory condition. This inspection should be made every 6 months.

2. Suggested Issue. Each worker should be equipped with a pair of insulating rubber gloves, leather protectors sized to match, a glove bag to carry and store them, and a squeeze bottle of dusting powder. An extra pair of gloves is required for a retesting program, which would leave you with one set of gloves while the other set is tested.

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2.1. Sizes. Rubber gloves are made in hand sizes 9 through 12. Finding the right size will probably involve a little trial and error and some work experience. Gloves a little too small are tough to take off; gloves a little too big will cost you some dexterity. Lengths are 11 inches and 14 inches for low secondary voltages, 14, 16, and 18 inches for primary voltages.

2.2. Leather Protectors or Gauntlets. Leather protectors should be two to five inches shorter than rubber glove length, depending on the maximum voltage use. Although clean and dry leather protectors aren't good conductors, they don't have the insulation value of the rubber glove—thus the reason for the shorter length. Leather protectors match glove size for size.

2.3. Glove Bag. Glove bags should be two inches longer than the rubber gloves. You don't want your gloves in a bag that's too small; they would bend and develop weak areas, possibly breaking down the insulation.

2.4. Rubber Sleeves. Rubber sleeves come in regular, large, and extra large. The choice depends on the size of the person or the maximum amount of clothing worn in cold weather. Rubber sleeves are tucked into the rubber gloves, leaving continuous protection to your shoulder. To check the fit, stretch your arms; the sleeves should stay inside the rubber gloves.

2.5. Cotton Gloves and Powder. You can wear short cotton gloves inside the rubber gloves during cold weather. Dusting powder soothes your hands and helps prevent sticking when you remove the rubber gloves.

2.6. Contact with Petroleum-based Products. If contact has been made with any petroleum-based products (such as inhibitors, hydraulic fluids, and transformer oils), the gloves and sleeves must be wiped off with a rag as soon after the contact as possible. Failure to remove the petroleum-based product promptly will result in the rubber's swelling and ultimately deteriorating. The swelling will eventually disappear, but it may cause considerable reduction of mechanical strength and possible chemical deterioration at the point of swelling.

2.7. When to Don Rubber Gloves. Rubber gloves are the basic protection from electric shock, because the hands are the most likely part of the body to make initial contact with energized parts. For rubber gloves to provide protection, you should put them on before you're in a position where you might reach or fall into energized lines or equipment.

2.8. Rubber Blankets. Both Type I, natural or polyisoprene synthetic rubber and Type II, Salcore elastomeric compound blankets are subject to damage by petroleum-based products. As it is with rubber gloves and sleeves, prompt removal of the petroleum-based products is important to eliminate or reduce possible swelling and damage to the blanket. Depending on the type of petroleum-based product involved in the contact, the area affected can become spongy and discolored. Blankets damaged by petroleum products should be mutilated and discarded. Rubber blankets must be inspected carefully before each use. When locating defects in blankets, roll them twice on each side so that the second roll is at a 90-degree angle to the first.

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NOTE:
If swelling occurs and eventually goes down, the mechanical strength—that is, the resistance to snag, puncture, and tear—may be greatly reduced and chemical deterioration may result.

2.9. In-service Blanket Specifications. In-service specifications require that rubber blankets must be tested electrically upon receipt from manufacturer and retested at least once a year. In addition to the electrical test, a visual inspection of blankets should be made in the field by the electrical supervisor to see that the blankets are being kept in satisfactory condition by the users. These inspections should be at intervals no longer than six months.

2.10. In-service Specifications. In-service specifications require that rubber line hose, hoods, and covers be tested electrically upon receipt from the manufacturer and retested at least once a year. At least every six months, the electrical supervisor must make a visual inspection of line hose, hoods, and covers to be sure the users are maintaining them in satisfactory condition. Individual users should make frequent field inspections. Type I line hose, hoods, or covers should not be left in service or energized any longer than necessary. Extended exposure may result in ozone checking, corona cutting, or excessive weathering.

2.11. Rubber Goods Stored in Vehicles. Each bucket truck and line maintenance truck must be equipped with ample rubber and other protective equipment normally required. This protective equipment must be further supplemented by such rubber goods, as the electrical superintendent considers desirable for carrying on the work with safety. Those rubber goods must be carried in an approved container; built either in or not, which will protect them from moisture, heat, light, and mechanical injury.

NOTE:
If this container is metal, the rubber goods should be kept from contact with the metal.

2.12. Inspection Record.

2.12.1. The electrical supervisor must maintain a record showing the field inspection date and the electrical test date of all rubber and other protective equipment.

2.12.2. This record must also include the next due date for field inspection and electrical test.

3. ***To perform these tasks, follow these steps:***

3.1. <u>Sleeve Inspection</u>.

Step 1: In inspecting sleeves, inspect the entire inner and outer surface for pinholes, cuts, scratches, abrasions, aging, corona cutting, oil markings, or other chemical injuries.

Step 2: Stretching or rolling the rubber between your fingers or on a flat surface will help reveal defects.

SAFETY:
IF ANY OF THE ABOVE DEFECTS ARE FOUND, THE SLEEVE MUST BE TAGGED AND WITHDRAWN FROM SERVICE.

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3.2. Blanket Inspection.

Step 1: To locate swelling, scratches, tears, abrasions, snags, tracking cutting, or age cracking, roll the blankets twice on each side, with the second roll at a right angle to the first roll.

Step 2: Blankets that show any of the flaws we just listed must be removed from service.

3.3. Blanket Storage.

Step 1: Blankets must always be stored flat or rolled in blanket rollups or canisters. They must never be folded, creased, or compressed in any way.

NOTE:
Don't use any kind of tape to keep the blankets rolled; the adhesive can damage the blanket surfaces.

3.4. Rubber Insulating Line Hose, Hoods, and Covers Inspections.

Step 1: Rubber insulating line hose, hoods, and covers must be inspected before each use.

Step 2: Inspect thoroughly for cuts, scratches, corona cutting, holes, tears and punctures, rope or wire burns, and aged rubber. Also, look for texture changes such as swelling, softening, hardening, becoming sticky or inelastic, which are signs of chemical deterioration.

SAFETY:
IF THE MECHANICAL DAMAGE EXTENDS ONE-QUARTER OF THE WALL THICKNESS OF THE HOSE OR HOODS OR IF THERE IS POSSIBLE CHEMICAL DETERIORATION, THEY MUST BE REMOVED FROM SERVICE

Step 3: Line hoses, hoods, and covers must be wiped clean of any petroleum-based product or other damaging substances as soon as practicable after contract.

Step 4: They should be stored in a relaxed position, that is, without distortion and mechanical stress.

NOTE:
Don't use tape to secure line hose, hoods, or covers for shipping or storage.

3.5. Rubber Glove Inspection. Electrician's rubber gloves must be carefully inspected before each use. Rubber gloves must be field air-tested before use each day, and more frequently if there is cause to suspect damage.

Step 1: Stretch the rubber and look for cracks, tears, and holes in the gloves especially around the parts of the glove that bend when your hands flex.

Step 2: Gloves must be inspected inside and out.

Step 3: To perform a field air test, hold the glove with the opening up and quickly roll the cuff trapping air inside the glove.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Step 4: Hold the glove close to your face, squeeze it, listen for air escaping, and try to feel air on your cheek.

SAFETY:
ANY DAMAGED GLOVE IS TO BE REMOVED FROM SERVICE AND DESTROYED.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

REVIEW QUESTIONS
FOR
MAINTAIN RUBBER PERSONNEL PROTECTIVE EQUIPMENT

QUESTION	ANSWER
1. What problem would you most likely encounter with rubber gloves that are a little too big for your hands?	a. Tough to take off. b. Excessive sweat. c. Loss of dexterity. d. All of the above.
2. How are rubber sleeves worn in conjunction with rubber gloves?	a. Rubber gloves are tucked in to sleeves. b. Rubber gloves are butted up to sleeves. c. Rubber sleeves are tucked into gloves. d. None of the above.
3. How often must rubber gloves be field air-tested?	a. Daily. b. Monthly. c. Before each use. d. Before each use and more often if problem is suspected.
4. What are the items to look for in inspecting a rubber sleeve?	a. Pinholes and cuts. b. Scratches and abrasions. c. Oil markings and chemical injuries. d. All of the above.
5. When locating defects in blankets, roll them twice on each side so that the second roll is at a 60-degree angle to the first.	a. True. b. False.
6. What must be done if you find a petroleum product on a rubber blanket?	a. Wipe off immediately. b. Spread it out on the blanket. c. Take the blanket out of service. d. Notify the supervisor or site foreman.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

RUBBER PROTECTIVE EQUIPMENT

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Perform proper field inspection on sleeves		
2. Perform proper field inspection on blankets		
3. Perform proper field inspection on line hose, hoods and covers		
4. Know proper storage practices for rubber protective equipment		
5. Perform proper field inspection on rubber gloves		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TOOLS AND EQUIPMENT

MAINTAIN

MODULE 25 **AFQTP UNIT 1**

CLIMBING EQUIPMENT (25.1.10.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

MAINTAIN CLIMBING EQUIPMENT

Task Training Guide

STS Reference Number/Title:	25.1.10., Maintain climbing equipment.
Training References:	1. Career Development Course (CDC) Electrical Systems 3E051B, Vol. 1, Unit 2, Section 2-1: Climbing Equipment and Rubber Goods. 2. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 3. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety.* 4. The Lineman's and Cableman's Handbook, Eighth Edition, Section 44: *Climbing Wooden Poles*. 5. Federal Specification KKB-151, Belts, Lineman's Safety Leather, and with subpart 1926.959 (Lineman's Body Belts, Safety Straps, and Lanyards) of OSHA standards.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. CDC Electrical Systems 3E051B, Vol. 1, Unit 2, Section 2-1. 2.2. AFI 32-1064. 2.3. AFMAN 32-1185. 2.4. The Lineman's and Cableman's Handbook, Eighth Edition, Section 44. 2.5. Federal Specification KKB-151, Belts, Lineman's Safety Leather, and with subpart 1926.959 (Lineman's Body Belts, Safety Straps, and Lanyards) of OSHA standards.
Equipment/Tools Required:	1. Climbing equipment. 2. Neutral soap. 3. Neatsfoot oil. 4. Gaff gauge. 5. File. 6. Cleaning cloth.
Learning Objective:	Given equipment, maintain climbing equipment.
Samples of Behavior:	1. Identify defects in climbing equipment. 2. Follow step-by-step procedures to maintain climbing equipment. 3. Know safety requirements to maintain climbing equipment.
Notes:	
Any safety violation is an automatic failure.	

MAINTAIN CLIMBING EQUIPMENT

1. Background: Pole climbing is necessary in constructing and maintaining over 600V electrical systems. The climbing part of overhead work isn't difficult or hazardous if you are careful in selecting, fitting, and maintaining your climbing equipment.

1.1. Only the best grade, smooth, pliable harness leather, or other material approved and conforming to government specifications should be used in body belts, safety straps, and climber straps. All electricians' belts must conform to Federal Specification KKB–151, *Belts, Lineman's Safety Leather,* and with subpart 1926.959 (Lineman's Body Belts, Safety Straps, and Lanyards) of OSHA standards.

2. Safety Inspections and Tests. Personal climbing equipment must be inspected before each use, and the supervisor should inspect body belts and safety straps in conjunction with the regular tool inspection (every 6 months). If faulty conditions are found or suspected, the articles involved must be repaired or replaced at once.

2.1. Belts made of webbing offers some advantages over leather and should be considered. Here are some of the advantages of web belts:

2.1.1. Webbing is superior for any safety belt that may have to take an impact load.

2.1.2. Webbing has three to four times as much resistance to impact loading as the same size leather belt.

2.1.3. The leather belt width has no effect on its strength at the buckle.

2.1.4. Leather takes special care and treatment to retain its strength; webbing doesn't.

2.1.5. Only a leather expert can tell by visual inspection with any accuracy the condition and strength of leather. Webbing can be judged more accurately by visual inspection.

3. How to Use and Store Climbers. The precautions for using, storing, and transporting climbers are:

3.1. Accidents resulting from pole climbing can be reduced if a few simple rules are applied. Although most cutouts are due to improper climbing techniques, a large number are due to improper care and maintenance of climbers. Well cared for climbers are safer and reduce fatigue. Each worker must be equipped with a pair of properly adjusted climbers, and should not use another's.

3.2. Stored climbers should be wrapped in pairs and fastened with their straps.

3.3. Treat the leather straps with Neatsfoot oil to keep them pliable and soft. Inspect straps frequently and keep them in good condition at all times. Immediately replace straps that can't be repaired properly.

3.4. Use of pads is suggested, but they must be kept in satisfactory condition and replaced when they become worn.

3.5. In climbing poles, workers must be careful to put the gaffs only into sound wood and to avoid all knots, loose wood, checks, cracks, decayed spots, nails, ground wires, and similar hazards.

3.6. Ice- or sleet-covered poles require special care to seat the gaffs in the wood securely.

3.7. A worker using climbers on a pole must be careful to avoid injury to others working nearby. Climbers must be inspected before each use to detect nicked or dulled cutting edges on the gaff. Check them immediately if damage is suspected after striking them against hard objects such as pole hardware or nails.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

4. ***To perform these tasks, follow these steps:***

4.1. Clean and Dress Leather. The recommended method for cleaning and dressing body belts and safety straps is to:

Step 1: Body belts and safety straps should be cleaned and dressed every three months and more often if they get wet from rain or perspiration. Wipe off all surface dirt with a dampened (not wet) sponge.

Step 2: Rinse the sponge in clean water and squeeze it nearly dry, and then work up a creamy lather with neutral soap (free from alkali), such as Castile or white toilet soap.

Step 3: Wash the belt or strap thoroughly with the lathered sponge to remove embedded dirt and perspiration. Remove any excessive moisture by wiping dry with a cloth.

Step 4: Work up a lather of saddle soap the same as with neutral soap.

Step 5: Work the saddle-soap lather well into all parts of the leather. Place the leather in shade to dry.

Step 6: When the leather has practically dried, rub it vigorously with soft cloth.

Step 7: When you're using it in connection with painting, carefully remove the paint with dry cloth as soon as possible.

NOTE:
If leather cannot be made soft and pliable by using saddle soap dressing, it should be oiled.

4.2. Oil Leather. Body belts and safety straps usually require oiling about every six months.

Step 1: Clean the leather with neutral soap.

Step 2: While it's still damp, apply about 1/4 ounce or two teaspoonfuls of Neatsfoot oil (or other suitable animal or vegetable oil) gradually with hands or rag, using light strokes to work it into the leather.

2.1. Be sure light, even distribution is made.

2.2. To avoid injuring leather, never flush the oil on directly.

2.3. Don't use mineral oils or greases such as machine oil or Vaseline.

2.4. Leather should never look or feel greasy, an indication of excessive oil. Too much oil stretches leather and may pick up sand or grit.

Step 3: After oiling, set the belt or strap aside in a dry place for about 24 hours to let the leather dry slowly.

Step 4: Rub it vigorously with a soft cloth to remove excess oil.

2.4. Store Leather. Follow these precautions in storing body belts or safety straps:

Step 1: If they're insufficiently oiled, oil them before placing them in storage.

Step 2: Oil them at least once every six months in storage.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Step 3: Never store leather goods with sharp-edged tools.

3.1. When belts or straps are in the same compartment with climbers, avoid the possibility of cutting or puncturing leather with gaffs.

Step 4: Never store them where they may be subjected to excessive heat or dampness.

2.5. Visually Inspect Body Belts. Inspection must include the following:

Step 1: Leather loops, holding D-rings that are worn, or crushed enough at edges to affect strength, or cause the leather to tear.

Step 2: Loose or broken rivets, particularly those in loops holding D-rings.

Step 3: Cracks and cuts tending to tear the leather or affect belt strength.

Step 4: Hard, dry leather.

Step 5: Broken or torn tool pouch.

Step 6: Broken or defective buckle.

Step 7: Burnt leather.

Step 8: Torn or badly damaged hole for the buckle tongue.

NOTE:
Burnt leather is dry on the outside. Bending it at the burnt spot cracks the leather and you can easily remove small pieces between the cracks with a fingernail.

2.6. Visual Inspection of Safety Straps. Look for:

Step 1: Cracks, cuts, nicks, and tears (particularly across or on the edges of the strap) that tend to affect strength.

Step 2: Loose, worn, steel reinforcing the strap.

Step 3: Hard, dry leather.

Step 4: Broken or defective snaps or poor action of the tongue on the snap (the tongue is the moving part of the snap).

4.1. The tongue should work freely without side play and close securely under the spring tension.

Step 5: Broken or defective buckle.

Step 6: Torn holes for the tongue of the buckle.

Step 7: Wear-thinned leather.

7.1. If it's otherwise sound, the strap may be used if it's at least 1/8 inch thick at every point where it's not doubled.

7.2. In the doubled area, the leather may wear slightly less than 1/8 inch thick.

Step 8: Burnt leather.

Step 9: Grain (smooth side of leather) worn so that fibers are plainly visible.

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2.7. Bending Test for Leather.

Step 1: Before the bending test on a body belt or safety strap, make sure the leather has enough oil to be soft and pliable. After the test, the leather should show no cracks other than slight surface cracks.

Step 2: Bend the safety straps with the grain (smooth) side out over 3/4-inch mandrel. Test over the entire strap.

Step 3: Make a similar test for body belts wherever they can bend, such as under tool loops and at tongue strap.

SAFETY:
DON'T BEND BELTS OR STRAPS SHARPLY OVER TOO SMALL A MANDREL BECAUSE EVEN GOOD LEATHER MAY DEVELOP CRACKS IF EXCESSIVE STRAIN IS PUT ON THE GRAIN LAYER.

2.8. Inspect Climbers. Perform this task upon receipt of the climbers and at least weekly thereafter.

Step 1: Inspect the climbers, associated straps, and pads for:

1.1. Loose gaff.
1.2. Nicks and depressions in the gaff.
1.3. Ridge of gaff for alignment.
1.4. Dull gaffs.
1.5. Broken or distorted gaff points.
1.6. Broken or loose leg or foot strap loop.
1.7. Excessively worn, cracked, or torn straps and pads.
1.8. Enlarged buckle holes in the straps.
1.9. Broken or damaged strap buckles.
1.10. Fractured or cracked leg irons and stirrups.
1.11. Excessively worn stirrups.
1.12. Fractured leg iron sleeves.
1.13. Broken or loose rivets and screws on sleeves and straps.
1.14. Defective strap rings.
1.15. Broken or damaged loop clip-on straps.
1.16. Gaff guards in poor condition.
1.17. Improper length of gaffs.
1.18. When any of these conditions can't be repaired readily, new climbers, pads, or straps must be secured.
1.19. Wash the belt or strap thoroughly with the lathered sponge to remove embedded dirt and perspiration.
1.20. Remove any excessive moisture by wiping dry with a cloth.
1.21. Work up a lather of saddle soap the same as with neutral soap.
1.22. Work the saddle-soap lather well into all parts of the leather.

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1.23. Place the leather in shade to dry.

1.24. When the leather has practically dried, rub it vigorously with soft cloth.

> **NOTE:**
> When you're using it in connection with painting, carefully remove the paint with dry cloth as soon as possible.

2.9. Maintain Climbers. You can restore damaged or dull gaffs to original shape by filing and honing. If gaffs can't be restored, replace them. There are three ways to tell whether gaffs are sharpened properly.

Step 1: Three ways to maintain climbers:

1.1. Gauging. This method checks the gaff's length, width, and thickness and the profile of its point. Reference lines are scored on the gauge with slots provided to tell whether the gaff length is satisfactory. Most gauges also provide a contour test to tell whether the point is curved properly. Openings are provided to tell whether the point is too keen. Each manufacturer makes a gaff gauge for their climbers, so the gauges aren't interchangeable. Always use the manufacturer's instructions if they're available.

1.2. Plane test. This method may be used with the gauge or independently if the gaffs are sharpened by machine. The test is made by using a soft board to tell whether proper sharpness has been reached. Place the climber with the gaff side down and parallel to the board without applying downward pressure above the gaff. Push the climber along the board. If the gaff is properly contoured and sharpened, it will dig into the wood and hold within approximately one inch. If the climber continues to glide along the board for more than one inch, it needs more honing.

1.3. Pole cutout. After the climbers have been machine sharpened or gauged (and as often as required thereafter), the gaffs may be tested on a pole. To do this, put on the climber to be tested with only the foot strap fastened, and place the hand between the leg and the pad with palm toward the pole. With the leg at a 30° angle, jab the gaff about one-fourth inch (in depth) into the pole, about one foot above ground level. Then you must apply enough pressure downward on the climber to hold the gaff into the pole and maintain the same penetration. While in this position, use the other hand to maintain balance and move the knee toward the pole until the strap-loop of the leg iron rests against the pole. Gradually exert pressure (straight downward) with the foot still maintaining pressure against the pole with the knee. A properly sharpened and shaped gaff will cut into the pole and hold within two inches.

Step 2: How to sharpen climbers.

2.1. Honing gaffs with a pocketsize, smooth carborundum stone is all that is necessary for a machine-sharpened climber.

2.2. If gaffs can't be restored to satisfactory condition with a hone in a short period of time, they must be returned for sharpening or replacement.

2.3. The shortest length of gaff permitted is 1-¼ inches as measured on the undersides. (The average life of a pair of climbers is five years or by the time both gaffs have been replaced twice.)

2.4. If gaffs aren't machine sharpened, you'll need two tools to field sharpen them: a file and pocketsize fine-grit carborundum stone. The file should be either a bastard mill file or a standard smooth file.

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2.5. For sharpening the gaff to proper thickness, file the metal from the flat inner-side of the gaff. Take care to keep from notching the leg irons or stirrup.

2.6. Use forward motions, toward the point and down to edges of the gaff's underside. Don't allow rocking motions of the file, because this will round the edges of the gaff.

2.7. After you get the right thickness, the underside of the gaff should be straight to within one-sixteenth inch of the point, and then rounded slightly toward the ridge of the gaff on a radius of one-fourth.

2.8. You can get additional sharpness after filing by dressing the underside and rounded part of the gaff with the honing stone.

2.9. Use the stone to remove any burrs along the edges, but never file the gaff's outer ridge.

2.10. To get the right width, you can use the file on the rounded part. Use strokes following the gaff's contour.

2.11. Use gaff guards to protect the gaffs when the climbers aren't being used and when other tools and materials are stored or transported along with the climbers.

NOTE:
Climbers must never be stored or transported without appropriate gaff guards.

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REVIEW QUESTIONS
FOR
MAINTAIN CLIMBING EQUIPMENT

QUESTION	ANSWER
1. How often should body belts and safety straps be cleaned and dressed?	a. Every month. b. Every two months. c. Every three months. d. Every six months.
2. What is the suggested length of time between oiling body belts and safety straps?	a. Three months. b. Six months. c. Nine months. d. Twelve months.
3. Which of the following **IS NOT** an advantage that belts made of webbing have over leather?	a. Flexibility. b. Does not require special care and treatment. c. Can be judged more accurately by visual inspection. d. Three to four times as much resistance to impact loading as the same size of leather.
4. What items are checked while inspecting climbers?	a. Loose or dull gaffs. b. Defective strap rings. c. Excessively worn stirrups. d. All of the above.
5. What is the average life of a set of climbers?	a. One year b. Three years. c. Five years. d. Six years.
6. What two tools do you need to field sharpen gaffs that aren't machine sharpened?	a. File. b. Gaff gauge. c. Carborundum stone. d. A and C.
7. Rocking motions are avoided while sharpening gaffs to prevent rounding the edges of the gaff.	a. True. b. False.

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MAINTAIN CLIMBING EQUIPMENT

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Clean and dress leather		
2. Visual inspection the body belt and safety strap		
3. Inspect and maintain climbers		
4. Sharpen climbers		
5. Explain proper storage techniques		
6. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TOOLS AND EQUIPMENT

USE TEST EQUIPMENT

MODULE 25 **AFQTP UNIT 5**

MULTIMETER (25.5.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE MULTIMETER

Task Training Guide

STS Reference Number/Title:	25.5.1., Use test equipment, multimeter.
Training References:	1. Career Development Course (CDC) 3E051A Vol. 3, Unit 1: *Meters and Test Equipment.* 2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.* 3. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 4. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety.* 5. Technical Order (TO) 33A12-12-651-1, For Simpson 260 Multimeter. 6. TO 33A1-12-1300-1 for; Fluke Digital Multimeter. 7. TO 33A1-12-1300-1C supplement to the aforementioned TO. 8. Applicable Mulitmeter Manufacturer Manuals.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. Applicable Multimeter Manufacturer Manuals. 2.2. CDC 3E051A Vol. 3, Unit 1. 2.3. TOs 33A12-12-651-1, 33A1-12-1300-1, and 33A1-1300-1C. 2.4. AFI 32-1064. 2.5. AFMAN 32-1185. 3. **Complete CD-ROM AFQTP 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.*** **Equipment/Tools Required:**
Equipment/Tools Required:	1. Computer to support AFQTP CD-ROM. 2. Multimeter.
Learning Objective:	Given equipment, use all functions on a multimeter.
Samples of Behavior:	Following approved steps; use the various functions of a multimeter. Know safety requirements for using multimeter.

Notes:

1. Any safety violation will result in failure.
2. Trainer will demonstrate and test trainee on various applications to insure safe operations.
3. **TRAINER NOTE:** If more than one type of meter is available you must train on all meters that are available in your work center. If your base does not have the meter in the CD-ROM, train on the meter(s) that you have.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE MULTIMETER

1. Background: There are many different types of electrical meters; all of them are important tools for the maintenance and troubleshooting of electrical equipment and circuits. The construction features may vary slightly for different brands of meters but the theory of operation is essentially the same. For example all analog multimeters consist of a meter coil, a means of selecting a function, (A/C, D/C, Mil Amp, and so forth), a means of selecting the range or scale of measurement (0.5 to 1000), and a scale which shows the value of measurement. Digital meters operate in the same basic manner. We need to understand their uses and differences to ensure we interpret their readings correctly to be effective with our mission. Many accidents occur while taking meter readings resulting in personal injury or equipment damage, therefore we must understand the operation and ensure all safety procedures are followed. The ability to select the correct type of electrical meter for the application required is no easy task without proper training. Serious injury or death can result from improper meter selection and use. It is imperative we perform with confidence and safety at all times.

2. *Complete the CD-ROM AFQTP 3E0X2 Electrical Power Production, Version 1.0, Mar 99: Power Production Test Equipment. Upon completion of the above-mentioned CD-ROM properly use a multimeter following the step-by-step procedures listed below.*

NOTE:
The review questions for this material are contained in the above–mentioned CD-ROM.

TRAINER NOTE:
Your equipment may vary. Use this as a teaching guide to insure trainee can successfully operate all meters utilized in your work section.

NOTE:
When using electronic meters, read the manufacturer's instructions and operating guide before attempting to use the meter. Unlike analog multimeters, electronic meters manufactured by different companies may not have the same basic principles of operation.

SAFETY:

1. BEFORE USING ANY METER BE SURE TO:

1.1. REMOVE ALL JEWELRY.

1.2. <u>NOT</u> EXCEED METER SPECIFICATIONS DURING ANY TEST (REFER TO APPLICABLE MANUFACTURER MANUAL).

1.3. ENSURE CIRCUIT IS DE-ENERGIZED WHEN USING THE OHM/CONTINUITY FUNCTIONS.

3. *To perform this task, follow the steps:*

3.1. Refer to manufacturer's manual for operating instructions on your particular multimeter.

Notice. This AFQTP is *<u>NOT</u>* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE MULTIMETER

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Select correct setting on function switch		
2. Correctly "Zero" the meter		
3. Select proper range scale for voltmeter		
4. Know the purpose of the function switch		
5. Operate the ammeter correctly		
6. Turn off power prior to checking resistance		
7. Turn off power prior to checking amps		
8. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TOOLS AND EQUIPMENT

USE TEST EQUIPMENT

MODULE 25 **AFQTP UNIT 5**

CLAMP-ON AMMETER (25.5.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE CLAMP-ON AMMETER

Task Training Guide

STS Reference Number/Title:	24.5.2., Use test equipment, clamp-on ammeter.
Training References:	1. Career Development Course (CDC) 3E051A Vol. 3, Unit 1: *Meters and Test Equipment.* 2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.* 3. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 4. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety.* 5. Applicable Manufacturer Manuals.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. Applicable Manufacturer Manuals. 2.2. CDC 3E051A Vol. 3, Unit 1. 2.3. AFI 32-1064. 2.4. AFMAN 32-1185. 3. **Complete CD-ROM AFQTP 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.***
Equipment/Tools Required:	1. Computer to support AFQTP CD-ROM. 2. Clamp-on ammeter.
Learning Objective:	Given equipment, use of all functions on an ammeter.
Samples of Behavior:	1. Following approved steps; use the various functions of an ammeter. 2. Know safety requirements for using an ammeter.
Notes:	
Any safety violation is an automatic failure.	

USE CLAMP-ON AMMETER

1. Background: There are times when you must measure the current flow in an AC circuit to ensure proper circuit function and to prevent damage to equipment. There are several meters available to measure current flow but the simplest and easiest meter to use is the clamp-on ammeter. Most clamp-on ammeters are multimeters. That is, they measure either voltage or amperage.

2. *Complete the CD-ROM AFQTP 3E0X2 Electrical Power Production, Version 1.0, Mar 99: Power Production Test Equipment. Upon completion of the above-mentioned CD-ROM properly use a clamp-on ammeter following the step-by-step procedures listed below.*

NOTE:
The review questions for this material are contained in the above–mentioned CD-ROM.

TRAINER NOTE:
Your equipment may vary. Use this as a teaching guide to insure trainee can successfully operate all clamp-on ammeter utilized in your work section.

SAFETY:

1. **WHEN TAKING MEASUREMENTS DO NOT TOUCH THE JAWS OF THE METER. HOLD THE METER BY THE HAND-GRIP ONLY.**
2. **IF AMPROBE IS TO BE USED ON HIGH-VOLTAGE USE RUBBER GLOVES. IF USED ON THE PRIMARY SIDE OF A TRANSFORMER, UTILIZE THE NEUTRAL SIDE OF THE PRIMARY AS THE SPOT TO TAKE THE READING FROM. CHECKING THE NEUTRAL SIDE CONNECTION OF THE TRANSFORMER WILL YIELD THE SAME READING AS THE HOT SIDE.**

NOTE:
If you want to measure the total amperage of a multi-tap connector with several conductors of one phase of power, you must take a reading of all conductors individually and add each together to find the total of that phase.

3. *To perform this task, follow the steps:*

3.1. Refer to manufacturer's manual for operating instructions on your particular clamp-on ammeter.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE CLAMP-ON AMMETER

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Place the switch in the desired amperage range		
2. Properly take readings for several conductors		
3. Know when to set to the highest setting		
4. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TOOLS AND EQUIPMENT

USE TEST EQUIPMENT

MODULE 25 **AFQTP UNIT 5**

PHASE ROTATION METER (25.5.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE PHASE ROTATION METER

Task Training Guide

STS Reference Number/Title:	24.5.3., Use test equipment, phase rotation meter.
Training References:	1. Career Development Course (CDC) 3E051A Vol. 3, Unit 1: *Meters and Test Equipment.* 2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.* 3. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 4. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety.* 5. Applicable Manufacturer Manuals.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. Applicable Manufacturer Manuals. 2.2. CDC 3E051A Vol. 3, Unit 1. 2.3. AFI 32-1064. 2.4. AFMAN 32-1185. 3. **Complete CD-ROM AFQTP 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.***
Equipment/Tools Required:	1. Computer to support AFQTP CD-ROM. 2. Phase rotation meter. 3. Three phase power source. 4. Voltmeter.
Learning Objective:	Given equipment, use a phase rotation meter.
Samples of Behavior:	1. Following approved steps; use the various functions of a phase rotation meter. 2. Know safety requirements for using a phase rotation meter.
Notes:	
Any safety violation is an automatic failure.	

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE PHASE ROTATION METER

1. Background: The purpose of a phase-rotation meter is to determine the phase sequence of a three-phase circuit. Most industrial facilities use equipment that is run by three phase motors. In order to connect a three-phase motor and have it turn in the proper direction, you need to know which wire of the power supply is A phase, B phase, and C phase. It is often necessary to know the phase sequence for the following reasons: to make sure motors rotate in the proper direction; to properly connect three phase transformer banks, generators, and busses; to ensure the proper phase sequence when replacing a three-phase transformer bank; to connect meters, instruments, and other components in the right rotation. There are two basic types of phase rotation meters. The first type is the (neon) glow lamp type. The face of the meter has two neon lamps, which glow at an uneven brightness for a given phase. The lamp that is glowing the brightest indicates the phase rotation of the system. This meter has selector switches for different voltages. Ensure the selector switch is set at the proper voltage before making any connections. The second type of meter is the motor driven type. When this meter is connected to the system, a rotation disk in the center of the case indicates the sequence of rotation. This meter has no selection switch and it operates in the 60 to 600 volt range. It is important to use the phase rotation meter correctly or serious personal injury and damage to the meter can result. Some meters are designed to be connected to de-energized circuits (motor shaft phase rotation meters). Do not confuse these with meters designed for energized circuits! Use the right meter for the right job.

2. *Complete the CD-ROM AFQTP 3E0X2 Electrical Power Production, Version 1.0, Mar 99: Power Production Test Equipment. Upon completion of the above-mentioned CD-ROM properly use a phase rotation meter following the step-by-step procedures listed below.*

NOTE:
The review questions for this material are contained in the above–mentioned CD-ROM.

TRAINER NOTE:
Your equipment may vary. Use this as a teaching guide to insure trainee can successfully operate all phase rotation meters utilized in your work section.

SAFETY:
EXERCISE EXTREME CAUTION WHEN CONNECTING THE PHASE ROTATION METER TO LIVE CIRCUITS! WEAR SAFETY EQUIPMENT AND REMOVE ALL JEWELRY.

3. *To perform this task, follow the steps*:

3.1. Refer to manufacturer's manual for operating instructions on your particular phase rotation meter.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE PHASE ROTATION METER

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Understand purpose of phase rotation meter		
2. Understand proper phase rotation sequence		
3. Know the difference between the motor-driven and the (neon) glow-lamp type rotation meter		
4. Properly interpret phase meter readings		
5. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TOOLS AND EQUIPMENT

USE TEST EQUIPMENT

MODULE 25 **AFQTP UNIT 5**

MEGOHMMETER (25.5.4.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE MEGOHMMETER

Task Training Guide

STS Reference Number/Title:	25.5.4., Use test equipment, megohmmeter.
Training References:	1. Career Development Course (CDC) 3E051A Vol. 3, Unit 1: *Meters and Test Equipment.* 2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.* 3. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 4. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety.* 5. Applicable Manufacturer Manuals. 6. MEG-CHEK Manual 17456. 7. Technical Order (TO) 33A1-4-5-11 for the PSM1/A and PSM2/A hand-crank.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. Applicable Manufacturer Manuals. 2.2. CDC 3E051A Vol. 3, Unit 1. 2.3. TO 33A1-4-5-11. 2.4. AFI 32-1064. 2.5. AFMAN 32-1185. 2.6. MEG-CHEK Manual 17456. 3. **Complete CD-ROM AFQTP 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.***
Equipment/Tools Required:	1. Computer to support AFQTP CD-ROM. 2. Megohmmeter. 3. Two conductors of a de-energized circuit.
Learning Objective:	Provided proper equipment; use the megohmmeter.
Samples of Behavior:	1. Following proper procedures, use the various functions of a megohmmeter. 2. Know safety requirements involved while using a megohmmeter.
Notes:	
1. Any safety violation is an automatic failure. 2. Trainer; your equipment may vary. Use this as a teaching guide to insure trainee can successfully operate a megohmmeter. If hand crank and digital are available train on both.	

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE MEGOHMMETER

1. Background: The megohmmeter, also known as a "megger," is used to determine insulation breakdown. It's primary uses are determining resistance value between two isolated conductors determining that each motor, generator, or transformer winding is separate and not shorted or grounded, or it can also be used to indicate that a winding has continuity, such as in the case with the primary winding of a single phase transformer.

1.1. The meter will produce one of three results. They are: a true ohmic value (represented in megohms), Infinity, or zero. A reading of zero (or near zero) will indicate that there is continuity between two test points such as when testing a single conductor from end to end. Infinity indicates that the two test points are NOT connected, as with the secondary and primary windings in a transformer. The true ohmic value may be useful when testing the insulation of a conductor. For instance, when testing an underground cable with a megger, a low megohm value between the neutral or ground, and the phase may be an indication that the insulation is breaking down.

1.2. There are two types of megohmmeters that are used today. They are the manual hand-crank model and the Electronic Insulation Tester.

2. ***Complete the CD-ROM AFQTP 3E0X2 Electrical Power Production, Version 1.0, Mar 99: Power Production Test Equipment. Upon completion of the above-mentioned CD-ROM properly use a*** **megohmmeter** ***following the step-by-step procedures listed below.***

NOTE:
The review questions for this material are contained in the above–mentioned CD-ROM.

TRAINER NOTE:
Your equipment may vary. Use this as a teaching guide to insure trainee can successfully operate all megohmmeter utilized in your work section.

SAFETY:
1. **NEVER USE A MEGOHMMETER ON A LIVE CIRCUIT.**
2. **NEVER USE A MEGOHMMETER IN AN EXPLOSIVE ENVIRONMENT OR IN AN AREA WHERE CONDUCTORS PASS THROUGH AN EXPLOSION PROOF AREA. (THE MEGOHMMETER IS A HIGH-VOLTAGE AND SPARK PRODUCING APPARATUS.)**
3. **USE EXTREME CAUTION WHILE TESTING CONDUCTORS TO INSURE THAT EVERYONE IS CLEAR OF THE CIRCUIT**

3. ***To perform this task, follow the steps*****:**

3.1. Refer to manufacturer's manual for operating instructions on your particular megohmmeter.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE MEGOHMMETER

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Explain the uses of a megohmmeter		
2. Know the different types of megohmmeter		
3. Know the general safety procedures associated with use of the megohmmeter		
4. Know the steps involved in taking an accurate meter reading		
5. Comply with all the safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TOOLS AND EQUIPMENT

USE TEST EQUIPMENT

MODULE 25 **AFQTP UNIT 5**

HIGH VOLTAGE PHASE TESTER (25.5.14.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE HIGH VOLTAGE PHASE TESTER

Task Training Guide

STS Reference Number/Title:	25.5.14.,Use test equipment, high voltage phase tester.
Training References:	1. Career Development Course (CDC) 3E051A Vol. 3, Unit 1: *Meters and Test Equipment.* 2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.* 3. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 4. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety.* 5. Applicable Manufacturer Manuals. 6. Technical Order (TO) 33A1-12-963-1, 7. Chance Phasing Tool Manual.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. Applicable Manufacturer Manuals. 2.2. CDC 3E051A Vol. 3, Unit 1. 2.3. TO 33A1-12-963-1. 2.4. AFI 32-1064. 2.5. AFMAN 32-1185. 2.6. Chance Phasing Tool Manual. 3. **Complete CD-ROM AFQTP 3E0X2 Electrical Power Production Version 1.0, Mar 99: *Power Production Test Equipment.***
Equipment/Tools Required:	1. Computer to support AFQTP CD-ROM. 2. Personal protective equipment. 3. Extension sticks. 4. High Voltage Phase tester.
Learning Objective:	Given equipment, use the high voltage phase tester.
Samples of Behavior:	1. Following approved steps; use the various functions of a high voltage phase tester. 2. Know safety requirements for using a high voltage phase tester.
Notes:	
Any safety violation is an automatic failure.	

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE HIGH VOLTAGE PHASE TESTER

1. Background: The High Voltage Phase Tester is a portable device that permits the checking of AC voltages on distribution and transmission circuits. It allows measurements from 0V to 80 kV and determines phase relationships and the approximate line-to-line or line-to-ground voltage. The basic instrument is designed so voltages up to 16 kV can be read directly on the black scale of the meter. This unit consists of two high-impedance units housed in the contact ends of the two epoxyglas housings. The resistance units are enclosed in a suitable compound epoxy to protect them from mechanical damage and to prevent moisture penetration or accumulation around the resisters. For use on lines above 16 kV, two resistor sticks are provided, increasing the voltage range to 48 kV. With these extensions in place, the reading is then multiplied by three. To measure voltages of up to 80 kV, add a second pair of resister sticks and multiply by five.

SAFETY:

KEEP RESISTOR PORTION OF TOOL CLEAN AND DRY. KEEP INSULATION IN GOOD WORKING CONDITION. IF IT BECOMES FRAYED, DISCONTINUE USE AND INFORM SUPERVISOR IMMEDIATELY. MAINTAIN WORKING CLEARANCE BETWEEN HANDS, METER, AND CABLE BY USING PROPER LENGTH UNIVERSAL POLES.

2. ***To perform this task, follow these steps:***

3.2. Overhead Distribution Systems.

Step 1: Be knowledgeable of system voltage.

Step 2: Choose proper stick configuration for system voltage to be tested.

Step 3: Test each line to ground.

NOTE:

When testing line to ground voltage, the handle on which the meter is mounted is placed at the ground potential contact, to minimize stray capacitance influence on the meter.

Step 4: Test line-to-line voltage.

NOTE:

For line-to-line measurements, contact is made to each phase conductor keeping the connecting cable as far as possible from other conductors, grounded or metal structures, and away from platforms or earth contact. This helps avoid influences that may distort meter indications.

3.3. Underground Systems.

Step 1: Be knowledgeable of system voltage, if unknown check with Electrical Systems supervisor.

Step 2: Choose proper stick configuration for system voltage to be tested.

Step 3: Test each line to ground.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

NOTE:

1. When testing line to ground voltage, the handle on which the meter is mounted is placed at the ground potential contact, to minimize stray capacitance influence on the meter.
2. To test underground rural distribution equipment a small hex head screw (1/4 by 20, 3/8 inch long) could be inserted to protect the female thread.

SAFETY:

DO NOT USE ANY PROBES ON THE PHASING TESTER WHEN TESTING LIVE-FRONT UNDERGROUND RURAL DISTRIBUTION EQUIPMENT, DUE TO THE CLOSE PROXIMITY OF ENERGIZED PARTS AND GROUNDED SURFACES. THIS COULD CAUSE FLASH OVER. USE PROPER ELBOW OR BUSHING ADAPTERS WHEN TESTING DEAD-FRONT UNDERGROUND RURAL DISTRIBUTION EQUIPMENT.

Step 4: Test line-to-line voltages.

NOTE:

In tying two energized three-phase feeders together where it is necessary to match phases, voltage measurements must be made between a conductor of one circuit and each of the conductors of the second circuit. This procedure is followed for each phase to avoid connecting phases in reversed order.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

REVIEW QUESTIONS
FOR
USE HIGH VOLTAGE PHASE TESTER

QUESTION	ANSWER
1. The basic instrument can test voltages up to _____.	a. 20,000 volts. b. 14,000 volts. c. 10,000 volts. d. 16,000 volts.
2. When using a second pair of resistor sticks you multiply the meter reading by _____.	a. three. b. five. c. seven. d. ten.
3. Why is the handle on which the meter is mounted placed on the ground potential contact?	a. To reduce stray capacitance that may influence reading. b. Enables the user to read the scale more with ease. c. Reduces the length cable necessary to make the reading. d. Insures proper polarity in the A/C circuit.
4. Why must you not use probes on live front underground rural distribution equipment?	a. Accurate reading cannot be obtained. b. The cables are not long enough. c. Phasing sticks are only to be used while in the bucket truck. d. Working in close proximity of energized parts and grounded surfaces.
5. What should you do if you notice frayed insulation on the test cable?	a. Make temporary fix with tape. b. Use an additional resistor. c. Disregard and use it. d. Do not use and immediately inform supervisor.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE HIGH VOLTAGE PHASE TESTER

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Know the system voltage prior to using meter		
2. Know proper meter configurations		
3. Know the proper procedure for testing live-front underground distribution equipment		
4. Comply with all of the safety precautions associated with the use of high voltage phase tester		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TOOLS AND EQUIPMENT

MODULE 25 AFQTP UNIT 6

PERFORM OPERATOR'S MAINTENANCE ON AERIAL LIFT TRUCK WITH INSULATED BUCKET (25.6.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PERFORM OPERATOR'S MAINTENANCE ON AERIAL LIFT TRUCK WITH INSULATED BUCKET

Task Training Guide

STS Reference Number/Title:	25.6., Perform operator's maintenance on aerial lift truck with insulated bucket.
Training References:	1. Career Development Course (CDC) 3E051B Vol. 1, Unit 2, Section 2-3: *Special-purpose Vehicles.* 2. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 3. AFI 24-301, *Vehicle Operations*. 4. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety.* 5. Applicable Manufacturer Manuals. 6. Technical Order (TO) 36A12-5-1-181, Operation Manual High Reach Maintenance Truck. 7. TO 36C–1–4, *Dielectric Testing of Insulated Aerial Manlift Devices.* 8. AF Form 1806, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal).
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. Applicable Manufacturer Manuals. 2.2. CDC 3E051B Vol. 1, Unit 2, Section 2-3. 2.3. TO 36A12-5-1-181 and 36C-1-4. 2.4. AFI 32-1064 and 24-301. 2.5. AFMAN 32-1185.
Equipment/Tools Required:	1. Aerial lift truck. 2. Leather gloves. 3. Hardhat. 4. AF Form 1806.
Learning Objective:	Given equipment, perform operator's maintenance on aerial lift truck with insulated bucket.
Samples of Behavior:	1. Following approved steps; perform the operator's maintenance on an aerial lift truck with insulated bucket. 2. Know safety requirements for performing operator's maintenance on an aerial lift truck with bucket.
Notes:	
Any safety violation is an automatic failure.	

PERFORM OPERATOR'S MAINTENANCE ON AERIAL LIFT TRUCK WITH INSULATED BUCKET

1. Background: Special-purpose vehicles for power line work have greatly reduced the physical labor that once was required in this work. One person operating the power supplied by the truck has the physical strength of several people working with hand tools. As with almost everything else however, accidents can happen. In the process of investigating bucket truck accidents over a period of years, it became clear that operator error and/or lack of proper maintenance were primary reasons for these accidents. We'll talk about these areas of operator safety and operating instructions in this unit.

1.1. The Air Force has invested a great deal of money in maintenance trucks. Ensuring that the equipment has the proper care protects this investment, which makes your job easier. Let's look at a few of the pre-operation inspection items you should check before operating the maintenance truck.

2. ***To perform this task, follow these steps:***

Step 1: Pre-operational check.

1.1. Check vehicle daily and note any discrepancies in AF Form 1806, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal).

1.2. The operator maintains things such as cleanliness, tire pressure, battery water, fuel, oil, and coolant levels.

1.3. For all other discrepancies, turn the truck into the motor pool for repair as soon as possible.

1.4. Now check the actual AF Form 1806 in Figures 1 and 2 as we clarify particular inspection items on the form.

1.4.1. Check for damage, such as damaged or missing external or internal components.

1.4.2. Check for oil, fuel, and hydraulic leaks.

1.4.3. Keep the tire pressure at the level that is consistent with the tire's manufacturer and found on the sidewall of the tire.

1.4.4. The operator keeps proper levels of fuel, oil, and coolant.

1.4.5. Check the battery terminals for tightness and cleanliness, and check the water level in each cell.

1.4.6. Check the horn for proper operation.

1.4.7. Make sure all lights work and that the reflectors aren't broken.

1.4.8. Check the instruments and see that the windshield wipers work properly and the blades are in good condition.

1.4.9. If there are windshield washers, be sure the reservoir is full and they operate properly.

1.4.10. Clean the windshield—especially if it's covered with hydraulic fluid or tree sap from tree trimming. Cargo and mounted equipment checks include booms, buckets, front jacks, rear jacks, and the controls.

1.4.11. Clean the vehicle inside and out—at least once a week or as needed for proper cleanliness.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

1.4.12. The truck must also be waxed periodically.

1.4.13. Check the steering for looseness, wandering, or shimmying.

1.4.14. Check the power steering fluid, if there is any.

1.4.15. Make sure all safety devices are intact and operating properly.

1.4.16. Check the fan, generator, power steering, hydraulic pump, and air compressor drive belts and pulleys and the cable pulleys on the booms.

1.4.17. Check the brakes for pulling, grabbing, or softness.

1.5. The motor pool should change the oil and lubricate the truck periodically.

Step 2: Operational check.

2.1. The operational inspection is made while the vehicle or auxiliary equipment is in use.

2.2. Check for noises such as metal screeching against metal, loose belts, or engine noises.

NOTE:
Things like this can only be identified while the vehicle or equipment is in use.

2.3. Checking for leaks is easy because of the pressure generated by the pumps.

2.4. During operation, inspect all hydraulic connections for visible leaks.

2.5. Also, check oil levels of the hydraulic system during operation, and check the hydraulic reservoir site glass periodically.

2.5.1. If the oil drops below the site glass, stop operation and fill the system tank.

2.5.2. Absence of fluid in the tank will cause strain and damage to truck equipment.

2.5.3. Continually check the gauges to ensure correct hydraulic pressure to protect the equipment.

2.6. Make sure there's enough fuel to complete the job.

NOTE:
The most important gauge to watch is the tachometer. Don't exceed the manufacturer's specifications for maximum engine revolutions per minute (rpm).

Step 3: Post-operational checks.

3.1. Make the post-op check every time you've finished with the vehicle for the day, and before storing the truck.

3.2. This lets you identify any damage, minor or major, that may have been overlooked during the day's work.

3.3. Note any discrepancies during the pre-op, operational, or post-op checks and annotate your findings on AF Form 1806.

3.4. Notify your supervisor and then turn the truck into the motor pool for repair.

Step 4: Vehicle maintenance.

4.1. Necessary periodic maintenance schedules are in the manufacturer's maintenance and operation manual for each unit. Use only standard parts furnished by the manufacturer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

4.2. Keep all fiberglass coated or wrapped, and keep booms and buckets clean by hand washing with a mild detergent and hand rinsing.

4.3. Don't use a high-pressure water hose.

4.4. Make electrical tests on insulation every 6 months, or more frequently when the need is indicated, according to TO 36C–1–4.

4.5. When the weather is below freezing, operate the hydraulic pump 5 to 10 minutes before operating the boom.

4.6. Refer to the operation manual for the grade and maintenance of hydraulic fluid that lets you put the unit in operation with minimum warm-up time.

4.7. Line purging or any repair that involves opening the hydraulic pressure system pressure lines must be done by a qualified person.

4.8. Check maximum allowable load operation through all positions periodically.

4.9. Check boom and leveling wire rope cables for frayed strands, security of terminals, and correct adjustment.

Step 5: Rental units.

5.1. Notify the BCE if the insulated personnel lifting device becomes inoperable and the estimated return-to-service date is more than 10 days.

5.2. Upon notification, the BCE should forward a request to the Transportation Squadron Fleet Manager for rental/lease vehicle support.

5.3. Rental vehicles must be thoroughly inspected and tested before initial use.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

ITEMS TO BE CHECKED (Cont'd)	OPERATOR SIGNATURE	DAY
23. HEATER/DEFROSTER		23
24. BRAKES/CLUTCHES (operate) AIR TANKS (drain)		24
25. CYLINDERS/VALVES (operation)		25
26. SAFETY DEVICES (seat belts/warning devices/fire extinguisher)		26
27. INSTRUMENTS (during operation)		27
28. UNUSUAL NOISE (during operation)		28
29. LUBE/OIL CHANGE (check date due)		29
30.		30
31.		31
32.		
33.		
34.		
35.		
36.		

MONTHLY TIRE PRESSURE CHECK

TIRES GAUGED, ADJUSTED TO:

FRONT_____ LBS REAR_____ LBS

OPERATOR'S SIGNATURE	DATE

SPARK CHECK (Scheduled Inspection Intervals)

TYPE INSPECTION (Weekly or Sched)	DATE DUE	DATE ACCOM	OPERATOR OR MECHANIC SIGNATURE AND GRADE

3 *U.S. Government Printing Office: 1991 - 201-461/40150

OPERATOR'S INSPECTION GUIDE AND TROUBLE REPORT (AIRCRAFT TOWING, BASE MAINTENANCE, DEICERS, HIGH REACH AND SNOW REMOVAL) — DATE (Mo/Yr): OCT 96

VEHICLE TYPE	REGISTRATION NUMBER
HI REACH	94 C 127

USING ORGANIZATION	LOCATION	PHONE NUMBER
366 TRS	SAFB TX	6-5854

NAME OF VEHICLE CONTROL OFFICER	GRADE	PHONE NUMBER
JAMES TOOTHILL	MSGT	6-5854

ITEMS TO BE CHECKED	OPERATOR SIGNATURE	DAY
1. CLEANLINESS/DAMAGE/MISSING ITEMS (interior/exterior)	[illegible]	1
2. LEAKS (fuel/oil/coolant/hydraulic/air)		2
3. LEVELS (fuel/oil/coolant/hydraulic)		3
4. BATTERIES (front/rear) FLUID LEVEL/DAMAGE/CLEANLINESS		4
5. DRIVE BELTS/PULLEY/MOTOR (air/hydraulic/electrical)		5
6. STEERING/SPRINGS/SHACKLES		6
7. WINCH/TOW CONNECTIONS		7
8. TIRES/WHEELS/TRACK		8
9. PUMPS/PIPING/SPARE BARS		9
10. BROOMS/SPROCKETS/CHAINS		10
11. EXHAUST SYSTEM/SPARK ARRESTORS		11
12. MOULDBOARDS/BOWLS/CUTTING EDGES		12
13. SHEAVES/BLOCKS/CABLES		13
14. CHUTES/AUGERS/FAN BLADES WEARSHOES		14
15. DRUMS/CROWNS/FAIRLEADS		15
16. BOOMS/OUTRIGGERS (check for cracks & damage)		16
17. BASKET/PLATFORM/TURNTABLE (check for cracks & damage)		17
18. BLADE/REELS/SICKLE BARS		18
19. KETTLE/HOISTING MECHANISM/AGITATORS		19
20. AUXILIARY GENERATOR/HEATER		20
21. WIRING/LIGHTS/HORN/REFLECTORS/MIRRORS		21
22. WINDSHIELD WIPERS/WASHERS		22

AF Form 1806, JUL 86 REPLACES AFTO 373, JAN 74 WHICH WILL BE USED 1

Figure 1, Front and Back of AF Form 1806, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal)

OPERATOR REPORT			REPORTED TO MAINTENANCE			MAINTENANCE CONTROL REPORT			
ITEM NO.	DISCREPANCY	DATE FOUND	DATE	TIME	OPERATOR'S SIGNATURE	WORK ORDER NUMBER	DATE	STATUS[1] CODE	INIT
1	Minor Dents & Scratches						JAN 94	W	

[1]STATUS CODE: C = Corrected; C – T by Temp Fix; C – P by Perm Fix; D = Delay; D – P for Parts; D – M for Maint; D – D for Disposition; W = Waiver of Repairs; N = No Repairs; See AFM 77-310, Vol 2, Chap 6

2 AF Form 1806, JUL 86

SI965323017

Figure 2, Inside of AF Form 1806, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

REVIEW QUESTIONS
FOR
PERFORM OPERATOR'S MAINTENANCE ON AERIAL LIFT TRUCK WITH INSULATED BUCKET

Question	Answer
1. What AF Form is used to annotate discrepancies found on the high reach truck?	a. 1000. b. 623. c. 1806. d. 1800.
2. The three operational checks made on the aerial lift truck are: - Pre-operational. - Operational. - Post-operational.	a. True. b. False.
3. What check is made while the vehicle or auxiliary equipment is in use?	a. Pre-operational. b. Operational. c. Post- operational. d. All of the above.
4. What check lets the operator identify any damage that may have been overlooked during the day's work?	a. Pre-operational. b. Operational. c. Post-operational. d. All of the above.
5. How often is tire pressure checked and where is it annotated?	a. Once a day / 1806. b. Monthly / 1800. c. Once a day / 1800. d. Monthly / 1806.

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PERFORM OPERATOR'S MAINTENANCE ON AERIAL LIFT TRUCK WITH INSULATED BUCKET

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Know the three types of inspections that should be performed		
2. Perform all steps associated with the pre-operational inspection		
3. Perform operational inspections		
4. Properly perform a post-operational inspection		
5. Know the proper way to report and annotate discrepancies when found		
6. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TOOLS AND EQUIPMENT

MODULE 25 AFQTP UNIT 7

PERFORM OPERATOR'S MAINTENANCE ON LINE MAINTENANCE TRUCK (25.7.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PERFORM OPERATOR'S MAINTENANCE ON LINE MAINTENANCE TRUCK

Task Training Guide

STS Reference Number/Title:	25.7.,Perform operator's maintenance on line maintenance truck.
Training References:	1. Career Development Course (CDC) 3E051B Vol. 1, Unit 2, Section 2-3: *Special-purpose Vehicles.* 2. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 3. AFI 24-301, *Vehicle Operations*. 4. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety*. 5. Applicable Manufacturer Manuals. 6. Technical Order (TO) 36A12-5-1-181, Operation Manual High Reach Maintenance Truck. 7. AF Form 1806, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal).
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. Applicable Manufacturer Manuals. 2.2. CDC 3E051B Vol. 1, Unit 2, Section 2-3. 2.3. TO 36A12-5-1-181, and 182. 2.4. AFI 32-1064 and 24-301. 2.5. AFMAN 32-1185.
Equipment/Tools Required:	1. Line maintenance truck. 2. Leather gloves. 3. Hardhat. 4. AF Form 1806.
Learning Objective:	Given equipment, perform operator's maintenance on a line maintenance truck.
Samples of Behavior:	1. Following approved steps, perform operator's maintenance on a line maintenance truck. 2. Know safety requirements for performing operator's maintenance.
Notes:	
Any safety violation is an automatic failure.	

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PERFORM OPERATOR'S MAINTENANCE ON LINE MAINTENANCE TRUCK

1. Background: Special-purpose vehicles for power line work have greatly reduced the physical labor that once was required in this work. One person operating the power supplied by the truck has the physical strength of several people working with hand tools. As with almost everything else however, accidents can happen. In the process of investigating bucket truck accidents over a period of years, it became clear that operator error and/or lack of proper maintenance were primary reasons for these accidents. We'll talk about these areas of operator safety and operating instructions in this unit.

1.1. The Air Force has invested a great deal of money in maintenance trucks. Ensuring that the equipment has the proper care protects this investment, which makes your job easier. Let's look at a few of the pre-operation inspection items you should check before operating the maintenance truck.

2. ***To perform this task, follow these steps:***

Step 1: Pre-operational check.

1.1. Check them daily and note any discrepancies in AF Form 1806, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal).

1.2. The operator maintains things such as cleanliness, tire pressure, battery water, fuel, oil, and coolant levels.

1.3. For all other discrepancies, turn the truck into the motor pool for repair as soon as possible.

1.3.1. Now check the actual AF Form 1806 in Figures 1 and 2 as we clarify particular inspection items on the form.

1.3.2. Check for damage, such as damaged or missing external or internal components.

1.3.3. Check for oil, fuel, and hydraulic leaks.

1.3.4. Keep tire pressure at the level stenciled on the inside of the door on the driver's side of the truck.

1.3.5. Since tires are changed at the motor pool, there are no spare tires, jacks, or lug wrenches with the truck.

1.3.6. The operator keeps proper levels of fuel, oil, and coolant.

1.3.7. Check the battery terminals for tightness and cleanliness, and check the water level in each cell.

1.3.8. Check the horn for proper operation.

1.3.9. Make sure all lights work and that the reflectors aren't broken.

1.3.10. Check the instruments and see that the windshield wipers work properly and the blades are in good condition.

1.3.11. If there are windshield washers, be sure the reservoir is full and they operate properly.

1.3.12. Clean the windshield—especially if it's covered with hydraulic fluid or tree sap from tree trimming.

1.3.13. Cargo and mounted equipment checks include booms, buckets, front jacks, rear jacks, and the controls.

1.3.14. Clean the vehicle inside and out—at least once a week or as needed for proper cleanliness.

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1.3.15. The truck must also be waxed periodically.

1.3.16. Check the steering for looseness, wandering, or shimmying.

1.3.17. Check the power steering fluid, if there is any.

1.3.18. Make sure all safety devices are intact and operating properly.

1.3.19. Check the fan, generator, power steering, hydraulic pump, and air compressor drive belts and pulleys and the cable pulleys on the booms.

1.3.20. Check the brakes for pulling, grabbing, or softness.

1.4. The motor pool should change the oil and lubricate the truck periodically.

Step 2: Operational check.

2.1. The operational inspection is made while the vehicle or auxiliary equipment is in use.

2.2. Check for noises such as metal screeching against metal, loose belts, or odd engine noises.

NOTE:
Things like this can only be identified while the vehicle or equipment is in use.

2.3. Checking for leaks is easy because of the pressure generated by the pumps.

2.4. During operation, inspect all hydraulic connections for visible leaks.

2.5. Also, check oil levels of the hydraulic system during operation, and check the hydraulic reservoir site glass periodically.

2.6. If the oil drops below the site glass, stop operation and fill the system tank.

2.7. Absence of fluid in the tank will cause strain and damage to truck equipment.

2.8. Continually check the gauges to ensure correct hydraulic pressure to protect the equipment.

2.9. Make sure there's enough fuel to complete the job.

NOTE:
The most important gauge to watch is the tachometer. Don't exceed the manufacturer's specifications for maximum engine revolutions per minute (rpm).

Step 3: Post-operational checks.

3.1. Make the post-op check every time you've finished with the vehicle for the day, and before storing the truck.

3.2. This lets you identify any damage, minor or major, that may have been overlooked during the day's work.

3.3. Note any discrepancies during the pre-op, operational, or post-op checks and annotate your findings on AF Form 1806.

3.4. Notify your supervisor and then turn the truck into the motor pool for repair.

Step 4: Maintenance checks.

4.1. Every vehicle requires a certain amount of maintenance to keep it running properly. Our trucks are no different.

4.2. Wash the vehicle at least once a week and wax it once a month. Camouflaged vehicles usually don't require waxing.

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4.3. As the operator of an Air Force-owned vehicle, you're responsible for all fluid levels, so be sure to add oil, windshield washer fluid, and battery fluid as necessary. Identify low coolant levels to the motor pool, because they're the only people authorized to add coolant. Maintaining fluid levels help prevent premature vehicle breakdown, and it may end up saving all of us a little money.

4.4. Low tire pressure can cause a number of problems, ranging anywhere from uneven tire wear to inability to control the vehicle. There is a space on AF Form 1806 to annotate the tire pressure. Check it at least monthly.

4.5. You maintain the truck's winches. Keep the winch cables lubricated to prevent corrosion, and repair or replace any frayed or damaged cable.

4.6. It's very important to read the operation and maintenance manuals before you operate your utility vehicles. Study them carefully so that you'll meet safety requirements and vehicle maintenance requirements.

Step 5: Rental units.

5.1. Notify the BCE if the insulated personnel lifting device becomes inoperable and the estimated return-to-service date are more than 10 days.

5.2. Upon notification, the BCE should forward a request to the Transportation Squadron Fleet Manager for rental/lease vehicle support.

5.3. Rental vehicles must be thoroughly inspected and tested before initial use.

ITEMS TO BE CHECKED *(Cont'd)*	OPERATOR SIGNATURE	DAY
23. HEATER/DEFROSTER		23
24. BRAKES/CLUTCHES *(operate)* AIR TANKS *(drain)*		24
25. CYLINDERS/VALVES *(operation)*		25
26. SAFETY DEVICES *(seat belts/warning devices/fire extinguisher)*		26
27. INSTRUMENTS *(during operation)*		27
28. UNUSUAL NOISE *(during operation)*		28
29. LUBE/OIL CHANGE *(check date due)*		29
30.		30
31.		31
32.		
33.		
34.		
35.		
36.		

MONTHLY TIRE PRESSURE CHECK

TIRES GAUGED, ADJUSTED TO:

FRONT_____ LBS REAR_____ LBS

OPERATOR'S SIGNATURE	DATE

SPARK CHECK *(Scheduled Inspection Intervals)*

TYPE INSPECTION *(Weekly or Sched)*	DATE DUE	DATE ACCOM	OPERATOR OR MECHANIC SIGNATURE AND GRADE

3 *U.S. Government Printing Office: 1991 - 261-461/40150

OPERATOR'S INSPECTION GUIDE AND TROUBLE REPORT (AIRCRAFT TOWING, BASE MAINTENANCE, DEICERS, HIGH REACH AND SNOW REMOVAL) — DATE (Mo/Yr): OCT 96

VEHICLE TYPE	REGISTRATION NUMBER	
HI REACH	94 C 127	
USING ORGANIZATION	LOCATION	PHONE NUMBER
366 TRS	SAFB TX	6-5854
NAME OF VEHICLE CONTROL OFFICER	GRADE	PHONE NUMBER
JAMES TOOTHILL	MSGT	6-5854

ITEMS TO BE CHECKED	OPERATOR SIGNATURE	DAY
1. CLEANLINESS/DAMAGE/MISSING ITEMS *(interior/exterior)*	[illegible]	1
2. LEAKS *(fuel/oil/coolant/hydraulic/air)*		2
3. LEVELS *(fuel/oil/coolant/hydraulic)*		3
4. BATTERIES *(front/rear)* FLUID LEVEL/DAMAGE/CLEANLINESS		4
5. DRIVE BELTS/PULLEY/MOTOR *(air/hydraulic/electrical)*		5
6. STEERING/SPRINGS/SHACKLES		6
7. WINCH/TOW CONNECTIONS		7
8. TIRES/WHEELS/TRACK		8
9. PUMPS/PIPING/SPARE BARS		9
10. BROOMS/SPROCKETS/CHAINS		10
11. EXHAUST SYSTEM/SPARK ARRESTORS		11
12. MOULDBOARDS/BOWLS/CUTTING EDGES		12
13. SHEAVES/BLOCKS/CABLES		13
14. CHUTES/AUGERS/FAN BLADES WEARSHOES		14
15. DRUMS/CROWNS/FAIRLEADS		15
16. BOOMS/OUTRIGGERS *(check for cracks & damage)*		16
17. BASKET/PLATFORM/TURNTABLE *(check for cracks & damage)*		17
18. BLADE/REELS/SICKLE BARS		18
19. KETTLE/HOISTING MECHANISM/AGITATORS		19
20. AUXILIARY GENERATOR/HEATER		20
21. WIRING/LIGHTS/HORN/REFLECTORS/MIRRORS		21
22. WINDSHIELD WIPERS/WASHERS		22

AF Form 1806, JUL 86 — REPLACES AFTO 373, JAN 74 WHICH WILL BE USED — 1

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Figure 1, AF Form 1806, Front and Back, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal).

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VEHICLE/EQUIPMENT DISCREPANCY AND MAINTENANCE REPORT

OPERATOR REPORT			REPORTED TO MAINTENANCE			MAINTENANCE CONTROL REPORT			
ITEM NO.	DISCREPANCY	DATE FOUND	DATE	TIME	OPERATOR'S SIGNATURE	WORK ORDER NUMBER	DATE	STATUS[1] CODE	INIT
1	Minor Dents + Scratches						JAN 94	W	

[1] STATUS CODE: C = Corrected; C – T by Temp Fix; C – P by Perm Fix; D = Delay; D – P for Parts; D – M for Maint; D – D for Disposition: W = Waiver of Repairs; N = No Repairs; See AFM 77-310, Vol 2, Chap 6

[2] AF Form 1806, JUL 86

SI965323017

Figure 2, AF Form 1806, Inside, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal).

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

REVIEW QUESTIONS
FOR
PERFORM OPERATOR'S MAINTENANCE ON LINE MAINTENANCE TRUCK

QUESTION	ANSWER
1. What AF Form is used to annotate discrepancies found on the line maintenance truck?	a. 1000. b. 623. c. 1806. d. 1800.
2. The three operational checks made on the line maintenance truck are: - Pre-operational. - Operational. - Post operational.	a. True. b. False.
3. What check is made while the vehicle or auxiliary equipment is in use?	a. Pre-operational. b. Operational. c. Post- operational. d. All of the above.
4. What check lets the operator identify any damage that may have been overlooked during the day's work?	a. Pre-operational. b. Operational. c. Post-operational. d. All of the above.
5. How often is tire pressure checked and where is it annotated?	a. Once a day / 1806. b. Monthly / 1806. c. Once a day / 1800. d. Monthly / 1800.
6. Whose responsibility is it to maintain line truck fluid levels?	a. Supervisor. b. Vehicle NCO. c. Operator. d. Motor pool.

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PERFORM OPERATOR'S MAINTENANCE ON LINE MAINTENANCE TRUCK

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Know the three types of inspections that should be performed		
2. Perform all steps associated with the pre-operational inspection		
3. Perform operational inspections		
4. Properly perform a post-operational inspection		
5. Know the proper way to report and annotate discrepancies when found		
6. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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TOOLS AND EQUIPMENT

MODULE 25 AFQTP UNIT 8

OPERATE AERIAL LIFT TRUCK CONTROLS (25.8.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

OPERATE AERIAL LIFT TRUCK CONTROLS

Task Training Guide

STS Reference Number/Title:	25.8., Operate aerial lift truck controls.
Training References:	1. Career Development Course (CDC) 3E051B Vol. 1, Unit 2, Section 2-3: *Special-purpose Vehicles.* 2. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 3. AFI 24-301, *Vehicle Operations*. 4. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety.* 5. Applicable Manufacturer Manuals. 6. Technical Order (TO) 36A12-5-1-181, Operation Manual High Reach Maintenance Truck. 7. TO 36C–1–4, *Dielectric Testing of Insulated Aerial Manlift Devices.* 8. AF Form 1806, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal).
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. Applicable Manufacturer Manuals. 2.2. CDC 3E051B Vol. 1, Unit 2, Section 2-3. 2.3. TO 36A12-5-1-181, and 36C-1-4. 2.4. AFI 32-1064 and 24-301. 2.5. AFMAN 32-1185.
Equipment/Tools Required:	1. Aerial lift truck. 2. Leather gloves 3. Hardhat.
Learning Objective:	Given equipment, operate aerial lift controls.
Samples of Behavior:	1. Following approved steps; operate aerial lift truck controls. 2. Know safety requirements for operating aerial lift truck controls.
Notes:	
Any safety violation is an automatic failure.	

OPERATE AERIAL LIFT TRUCK CONTROLS

1. Background: This lesson covers the operation of hydraulic booms with aerial baskets in electric maintenance work. Lift controls must be tested each day before use to make sure they're in safe working condition. The insulated part of an aerial lift must not be altered in any way that might reduce its insulating value. The vehicle may become energized (or grounded) when the boom or the aerial basket itself comes in direct contact with energized (or grounded) conductors or equipment. Never depend on the truck, the boom, or the aerial basket to be Electrically Insulated. Don't let anyone touch the truck or equipment when aerial equipment is operating in or near energized conductors. The vehicle must be grounded or considered as energized and barricaded. The rules governing use of rubber or other protective equipment while working on poles and structures also apply to work from aerial baskets. You must use a body belt with a secured safety strap (or approved equivalent) for any work from an aerial basket, and it must be attached to the boom. Basket liners must be used (if the basket is designed to be used with a liner) and tested according to TO 36C–1–4, *Dielectric Testing of Insulated Aerial Manlift Devices.* Anyone working from an aerial basket or on the ground near one must wear a safety hat and suitable clothing at all times. Don't let unauthorized or unqualified people operate the boom carrying an aerial basket. Insulated aerial lifting devices used for working on energized electrical systems must be specifically designed for that sole function. The aerial lift must be used only for electrical related work. The manufacturers load limits of the boom or baskets must be posted on the unit, and they must not be exceeded. All hydraulic and pneumatic tools used on or near energized equipment must have non-conducting hoses rated for normal operating pressure. An aerial crew must include at least two qualified workers.

2. Travel procedures.

2.1. Drivers of aerial basket trucks must be constantly alert to the fact the vehicle has exposed equipment above the elevation of the truck cab and provide the necessary clearance.

2.2. Moving the truck into the opposing traffic stream is hazardous and must be avoided when possible by planning the order of the work.

2.3. Any backing of the truck must be done slowly and under the direction of one person, on the ground, with an unobstructed view of the intended path and the driver.

2.4. Never move a truck with the boom elevated in working position.

2.5. When you're traveling to and from job sites, either remove pin-on-type buckets and store them on the truck or secure them in a horizontal position to keep from obstructing the driver's vision.

3. Setting up and knocking down at the job site.

3.1. At the work area, the truck must be parked legally while the vehicle and pedestrian warning signs, lights, and barricades are being placed.

3.2. Consider the location of overhead conductors and the surrounding conditions before the truck is moved into the work position.

3.3. Make every effort to place the truck so that the boom without moving the truck may reach all work areas at that location.

3.4. Carefully examine the footing available for the truck wheels and outriggers, and take extra caution if there is snow, ice, mud, soft ground, or other unusual conditions.

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3.5. You must consider blind ditches, manholes, culverts, cesspools, wells, and similar construction as additional possible hazards.

3.6. Before lowering the stabilizers, outriggers, or hydraulic jacks, the operator must be sure that no one is close enough to be injured.

3.7. Chocks or cribbing may be needed to stabilize the truck body.

3.8. On an inclined road or street, check each outrigger or jack to ensure a stable setup, with the truck approximately level as viewed from the rear.

3.9. A warm-up period is needed at the beginning of each day's work.

NOTE:
This time may vary with different makes, models, and ambient temperature ranges.

3.10. When work is complete, lower the bucket, cradle the boom, and secure them by an approved tie-down.

3.11. Everyone must stand clear as the bucket and boom are being lowered to a cradled position.

SAFETY:
WE'LL CONSIDER BUCKET OPERATION IN FOUR AREAS: BEFORE RAISING THE BUCKET, RAISING THE BUCKET, WORKING ALOFT, AND GROUND OPERATION. THIS IS A VERY HAZARDOUS PART OF YOUR DUTIES. "READ AND HEED."

4. Before operating the boom.

4.1. One person must be responsible for everything required to place the basket in operating position, use the bucket, and restore it to the traveling position.

4.2. The operator must check to be sure that the outriggers or stabilizers are down, the truck hand brake is set, and the rear wheels of the truck chalked, if necessary.

4.3. The outriggers or stabilizers must be checked for safe operation before a load is lifted if the operator has any doubt as to the stability of the truck due to terrain.

4.4. When the boom must be maneuvered over a street or highway, necessary precautions must be taken to avoid accidents with traffic or pedestrians.

4.5. Enter the bucket only when the bucket is in the position for which it is designed.

5. Operate the boom.

5.1. Note the location of all obstructions, so that neither the bucket nor the boom will contact them in raising, lowering, or rotating.

5.2. The operator should always face the direction in which the bucket is moving.

5.3. The operator must follow the sequence prescribed by the manufacturer in raising the boom section.

5.4. Before reaching any area that has obstructions, the operator must test the boom and bucket controls and suspend operations if the unit isn't working properly.

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5.5. Raise the bucket directly above energized conductors or equipment only when it's ABSOLUTELY NECESSARY.

6. Working aloft.

6.1. Buckets should be located under or to the side and must not contact any conductors or equipment.

6.2. Any worker who must get within reach of energized conductors or equipment must wear proper primary rubber gloves and rubber sleeves.

6.3. Cover energized conductors and equipment with protective devices if that's necessary to work safely.

6.4. Maintain adequate clearance so that protruding tools won't contact conductors, limbs, or other obstructions.

6.5. The worker must not stand on top of the bucket or on planks across the top of the bucket during work.

6.6. The worker must not belt into an adjacent pole, structure, or equipment while working from the basket.

6.7. The operator must make sure that handlines and tools don't become entangled with the levers that operate the boom.

6.8. When you're working aloft, secure all tools that aren't in use.

7. Ground operations.

7.1. When the bucket is being used in any way that might make the basket, boom, or anything attached to them contact an energized conductor, consider the vehicle energized at line potential, and follow these safe practices:

7.2. Never pass materials or tools between a worker on the vehicle and a worker on the ground unless both workers wear primary rubber gloves and use the other required protective devices.

7.3. Employees operating ground controls must be on the vehicle or insulated from the ground by using primary rubber gloves and other protective equipment.

7.4. Before entering or leaving the vehicle, the employee must make sure that the boom or bucket isn't in contact or near energized equipment.

7.5. Workers on the ground must not work directly below the work area of the bucket.

7.6. Don't throw tools or materials to or from the elevated basket.

8. ***To perform this task, follow these steps:***

8.1. Refer to owner's manual for operating instructions on your particular vehicle.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

REVIEW QUESTIONS
FOR
OPERATE AERIAL LIFT TRUCK CONTROLS

QUESTION	ANSWER
1. How many people make up an aerial crew?	a. At least one qualified worker. b. At least two qualified workers. c. At least three qualified workers. d. At least four qualified workers.
2. The operator must make sure no one is close enough to the truck to get hurt when _____.	a. checking the hydraulic fluid. b. moving into opposing traffic. c. lowering the stabilizers. d. All of the above.
3. What safety equipment must be worn when working on or around a bucket truck?	a. Hardhat. b. Suitable clothing. c. Both a & b.
4. When working aloft the bucket should be positioned _____ or to the _____ and must not contact any installed equipment.	a. over / front b. under / rear c. under/ side d. over / rear
5. The worker must use any means necessary to reach work positions, even if it includes standing on top of the bucket or on planks across the top of the bucket.	a. True. b. False.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

OPERATE AERIAL LIFT TRUCK CONTROLS

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Operate and identify aerial lift controls		
2. Properly set up vehicle		
3. Explain the safety factors associated with operating the high reach controls		
4. Operate bucket controls smoothly and safely		
5. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

TOOLS AND EQUIPMENT

MODULE 25 AFQTP UNIT 9

OPERATE LINE MAINTENANCE TRUCK CONTROLS (25.9.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

OPERATE LINE MAINTENANCE TRUCK CONTROLS

Task Training Guide

STS Reference Number/Title:	25.9., Operate line maintenance truck controls.
Training References:	1. Career Development Course (CDC) 3E051B Vol. 1, Unit 2, Section 2-3: *Special-purpose Vehicles.* 2. Air Force Instructions (AFI) 32-1064, *Electrical Safety Practices*. 3. AFI 24-301, *Vehicle Operations*. 4. Air Force Manual (AFMAN) 32-1185, *Electrical Worker Safety*. 5. Applicable Manufacturer Manuals. 6. Technical Order (TO) 36A12-5-1-181, Operation Manual High Reach Maintenance Truck. 7. AF Form 1806, Operator's Inspection Guide and Trouble Report (Aircraft Towing, Base Maintenance, Deicers, High Reach and Snow Removal). 8. CerTest Tape #1.7.56: *Hydraulic Derricks and Digging Equipment*.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1. Applicable Manufacturer Manuals. 2.2. CDC 3E051B Vol. 1, Unit 2, Section 2-3. 2.3. TO 36A12-5-1-181. 2.4. AFI 32-1064 and 24-301. 2.5. AFMAN 32-1185. 2.6. CerTest Tape #1.7.56.
Equipment/Tools Required:	1. Line maintenance truck. 2. Leather gloves. 3. Hardhat.
Learning Objective:	Given equipment, operate line maintenance truck controls.
Samples of Behavior:	1. Following approved steps; operate line maintenance controls. 2. Know safety requirements for operating line maintenance controls.
Notes:	
Any safety violation is an automatic failure.	

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OPERATE LINE MAINTENANCE TRUCK CONTROLS

1. Background: The line truck is used to construct and maintain electrical distribution lines. Most line trucks have a compartment body, a power- driven winch, capstan, tow hooks, boom, auger, and body support jacks.

2. Compartments.

2.1. There are bins on the line truck for your tools, equipment, and materials.

2.2. Keep each item in its place, and carry at least a one day supply of hardware such as bolts, lag screws, connectors, and tape.

2.3. The equipment you'll need for electric line work is also stored on the line truck.

3. Power-driven winch.

3.1. The winch is operated through the truck power takeoff (PTO).

3.2. Most line trucks have two winch drums, one in front and the other tied in with the boom operation.

3.3. Both winch drums have automatic brakes to keep the winch from turning when it's under load.

3.4. You can release the brakes when the engine is running and the power takeoff unit is engaged.

3.5. Don't exceed the truck and winch line load limitations stated in the manufacturer's load capacity chart.

3.6. The winch must lift 15,000 pounds safely with the cable on bare drum wrap layer, and 6,000 pounds with a full drum.

3.7. For loads less than 10,000 pounds, 1/2-inch wire rope is sufficient; for loads over 10,000 pounds, use 5/8 IWRC 6 by 19 VHS cable.

3.8. Avoid stacking the winch line and jerking the load.

3.9. Consider using nonconductive winch cable (fabric) for the line truck.

> **NOTE:**
> In addition to not conducting electricity, the nonconductive winch cable has no steel strands to cut skin and it's lighter, and more manageable to work with.

4. Boom.

4.1. The boom and winch are used to raise and set, pull and lower poles; load and unload poles from the pole trailer; and load, unload, raise, or lower pole line equipment such as transformers.

4.2. Read and understand all operation instructions before you operate the boom or any other part of the truck.

4.3. Operating the line truck can be extremely hazardous if you don't know what you're doing.

4.4. All winch and boom operation takes at least two people: an operator and a spotter, who gives signals.

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4.5. On a crown or slope, position the truck so that you work on the high side, avoid soft ground and overhead obstructions, and set the parking brake.

4.6. To engage the power takeoff (PTO) with standard transmission, push in the clutch, place the truck in neutral, engage the PTO, and then release the clutch.

4.7. If your truck has a transfer case, you push in the clutch, put the transfer case in neutral, and engage PTO; then you put the transmission in fourth gear and let out the clutch.

4.8. Never operate the boom without lowering the jacks until the tires are almost off the ground and leveling the truck bed by raising the high side jacks.

4.9. Level the truck to within 15 percent grade (8 1/2°) for lifting to prevent boom side overload.

4.10. If there's a question about soft ground, hot asphalt, or weak pavement, use planks of sufficient area and strength under jack pads.

4.11. Some trucks have a safety switch to prevent boom operation if the jacks aren't all the way down.

4.12. Check the operator's manual for override procedures if necessary.

4.13. The digging auger and fiberglass boom extension are normally attached to the line maintenance truck boom. The hydraulic auger can dig holes ranging from 12 inches to 36 inches in diameter and up to 12 feet deep.

5. Boom precautions.

5.1. The fiberglass boom with attached buckets lets you work on energized circuits. The buckets alone have no insulating value, so they have polyethylene liners.

5.2. Don't operate the boom when winds exceed 30 mph (26 knots).

5.3. Don't operate steel booms within 15 feet of energized overhead lines.

5.4. Don't pull poles out of the ground with derrick booms.

5.5. Don't pull side loads with the boom.

5.6. When you're dragging poles, line up the boom with the winch cable.

5.7. Don't pull stumps with the boom and winch (use a pole jack).

5.8. Don't rock a pole with the boom to loosen it in the hole.

5.9. When you're using the fiberglass boom to work on energized circuits, remove the boom winch line.

5.10. Don't use buckets without polyethylene liners.

5.11. Don't exceed the maximum rated load of the boom, winch, or buckets.

6. Capstan.

6.1. The capstan is used for raising loads like transformers, pulling slack in conductors, or holding a strain.

6.2. Wind the rope clockwise on the capstan, as shown in Figure 1, with the load end next to the truck.

6.3. Keep the load at a 90° angle to the capstan so that the rope won't climb the flange or bind at the turns.

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6.4. Vary the number of turns of rope from three to six or more, depending on the load weight.

6.5. The capstan turns clockwise to raise a load, and it stops for lowering heavy loads.

6.6. To pick up a load, gradually increase the strain on the free end of the rope until the load is being reeled in at the rate you want.

6.7. Lessen the strain to slow or stop the load pickup.

6.8. Stopping the capstan and providing a controlled amount of slack will let you lower the load.

6.9. Always keep the free end of the rope in the clear.

6.10. Don't stand on the free end or let it tangle around your feet.

6.11. A wet rope sticks, slips, or binds, and makes it hard to lower or hold a load.

6.12. An oily rope slips too fast, letting a load lower too fast.

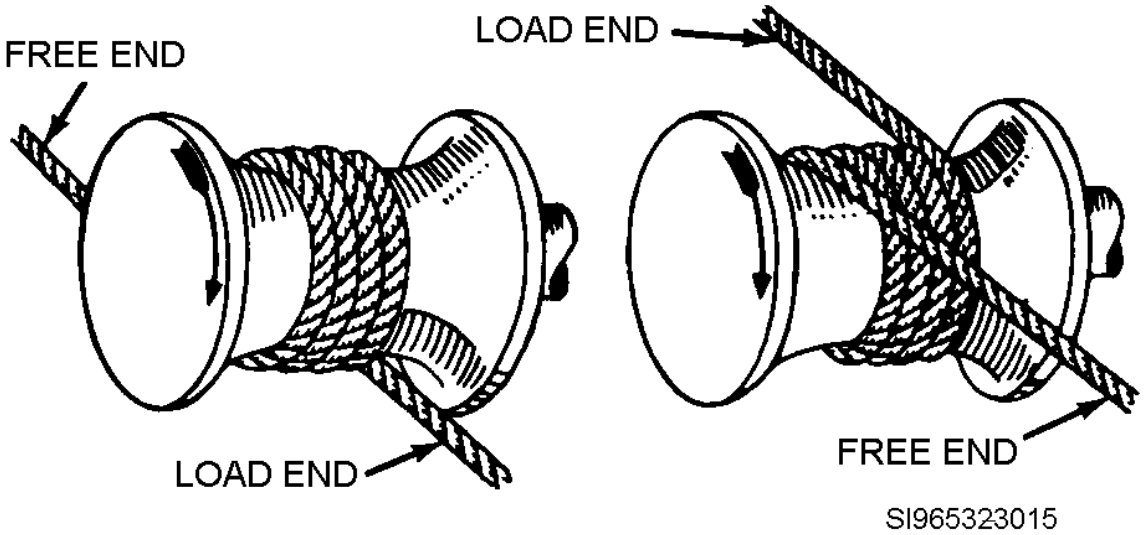

Figure 1, Capstan

7. ***To perform this task, follow these steps:***

7.1. Refer to owner's manual for operating instructions on your particular vehicle.

REVIEW QUESTIONS
FOR
OPERATE LINE MAINTENANCE TRUCK CONTROLS

QUESTION	ANSWER
1. What size winch cable will handle loads of less than 10,00 pounds?	a. 1/2-inch wire rope. b. 3/8-inch wire rope. c. 5/8-inch wire rope. d. 1-inch wire rope.
2. What is the advantage of using fabric winch cable instead of a wire rope cable?	a. Cheaper in cost. b. Stronger than steel. c. Last longer. d. No steel strands to cut the skin.
3. What can you do if the line truck must be set up on hot asphalt or soft ground?	a. Leave outriggers barely off the ground. b. Set up the truck as normal. c. Place planks under jack pads. d. Place 6’X8’ bricks under outriggers.
4. What piece of equipment is used to pull a pole?	a. Capstan. b. Pole jaws. c. Winch lines. d. Pole jacks.
5. How do you compensate for various loads while using capstan?	a. Use a second capstan. b. Reverse direction of line. c. Engage the power takeoff. d. Vary number of turns around capstan.

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OPERATE LINE MAINTENANCE TRUCK CONTROLS

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1. Identify major working parts of the line truck		
2. Explain the factors to be considered when operating the line truck		
3. Explain factors to be considered when positioning the line truck		
4. Demonstrate proper techniques for moving material		
5. Operate and identify line truck controls		
6. Properly set up vehicle		
7. Explain the safety factors associated with operating the high reach controls		
8. Operate bucket controls smoothly and safely		
9. Comply with all safety requirements		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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TOOLS AND EQUIPMENT

MODULE 25 **AFQTP UNIT 10**

USE HAND SIGNALS TO DIRECT LINE MAINTENANCE TRUCK OPERATION (25.10.)

THIS AFQTP IS UNDER DEVELOPMENT ECD 1 NOV 02.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE HAND SIGNALS TO DIRECT LINE MAINTENANCE TRUCK OPERATION

Task Training Guide

STS Reference Number/Title:	25.10., Use hand signals to direct line maintenance truck operation.
Training References:	1. 2.
Prerequisites:	1. **Possess as a minimum a 3E031 AFSC.** 2. **Review the following references:** 2.1.
Equipment/Tools Required:	Line maintenance truck.
Learning Objective:	Given equipment, use hand signals to direct line maintenance truck operation.
Samples of Behavior:	1. Following approved steps; use hand signals to direct line maintenance truck operation. 2. Know safety requirements for performing hand signals to direct line maintenance truck operation.
Notes:	
Any safety violation is an automatic failure.	

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

USE HAND SIGNALS TO DIRECT LINE MAINTENANCE TRUCK OPERATION

1. Background:

2. ***To perform this task, follow these steps:***

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REVIEW QUESTIONS
FOR
USE HAND SIGNALS TO DIRECT LINE MAINTENANCE TRUCK OPERATION

QUESTION	ANSWER
1.	a. b. c. d.
2.	a. b.
3.	a. b. c. d.
4.	a. b. c. d.
5.	a. b. c. d.

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USE HAND SIGNALS TO DIRECT LINE MAINTENANCE TRUCK OPERATION

PERFORMANCE CHECKLIST

INSTRUCTIONS:
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE….?	YES	NO
1.		
2.		
3.		
4.		

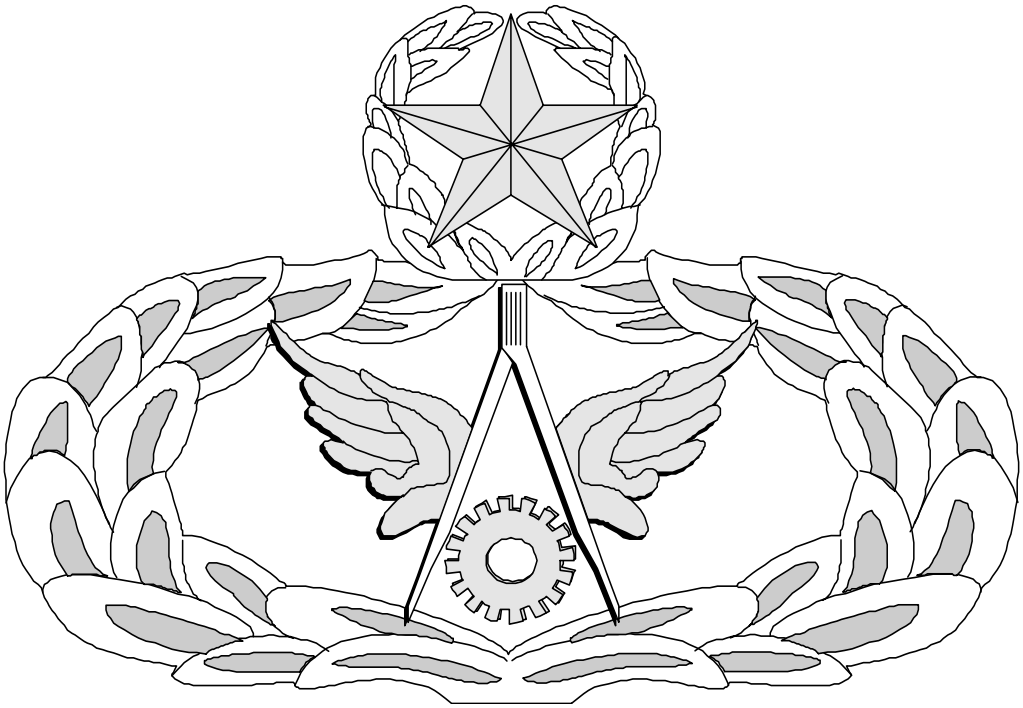
FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



FOR

ELECTRICAL SYSTEMS
(3E0X1)

MODULE 25

TOOLS AND EQUIPMENT

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

MAINTAIN HOTLINE TOOLS
(3E0X1-25.1.1.)

QUESTION	ANSWER
1. The purpose of using hotline tools is to minimize the number of power interruptions or outages.	a. True.
2. Where should hotline tools be stored?	a. In bins or on racks.
3. Silicone cloths are not used to protect the glossy finish of fiberglass hotsticks because they _____.	b. hamper the refinishing process.
4. How often are hot line tools tested electrically?	c. Every six months
5. How often do hot sticks require a moisture test?	c. Every six months

MAINTAIN RUBBER PROTECTIVE EQUIPMENT
(3E0X1-25.1.2.)

QUESTION	ANSWER
1. What problem would you most likely encounter with rubber gloves that are a little too big for your hands?	c. Loss of dexterity.
2. How are rubber sleeves worn in conjunction with rubber gloves?	c. Rubber sleeves are tucked into gloves.
3. How often must rubber gloves be field air-tested?	d. Before each use and more often if problem is suspected.
4. What are the items to look for in inspecting a rubber sleeve?	d. All of the above.
5. When locating defects in blankets, roll them twice on each side so that the second roll is at a 60-degree angle to the first.	b. False.
6. What must be done if you find a petroleum product on a rubber blanket?	a. Wipe of immediately.

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MAINTAIN CLIMBING EQUIPMENT
(3E0X1-25.1.10.)

QUESTION	ANSWER
1. How often should body belts and safety straps be cleaned and dressed?	c. Every three months.
2. What is the suggested length of time between oiling body belts and safety straps?	b. Six months.
3. Which of the following **IS NOT** an advantage that belts made of webbing have over leather?	a. Flexibility.
4. What items are checked while inspecting climbers?	d. All of the above.
5. What is the average life of a set of climbers?	c. Five years.
6. What two tools do you need to field sharpen gaffs that aren't machine sharpened?	d. A and C.
7. Rocking motions are avoided while sharpening gaffs to prevent rounding the edges of the gaff.	a. True.

USE HIGH VOLTAGE PHASE TESTER
(3E0X1-25.5.14.)

QUESTION	ANSWER
1. The basic instrument can test voltages up to _____.	d. 16,000 volts.
2. When using a second pair of resistor sticks, you multiply the meter reading by _____.	b. five.
3. Why is the handle on which the meter is mounted placed on the ground potential contact?	a. To reduce stray capacitance that may influence reading.
4. Why must you not use probes on live front underground rural distribution equipment?	d. Working in close proximity of energized parts and grounded surfaces.
5. What should you do if you notice frayed insulation on the test cable?	d. Do not use and immediately inform supervisor.

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PERFORM OPERATOR'S MAINTENANCE ON AERIAL LIFT TRUCK WITH INSULATED BUCKET
(3E0X1-25.6.)

QUESTION	ANSWER
1. What AF Form is used to annotate discrepancies found on the high reach truck?	c. 1806.
2. The three operational checks made on the high reach truck are: - Pre-operational. - Operational. - Post-operational.	a. True.
3. What operational check is made while the vehicle or auxiliary equipment is in use?	b. Operational
4. What check lets the operator identify any damage that may have been overlooked during the day's work?	c. Post-operational
5. How often is tire pressure checked and where is it annotated?	d. Monthly / 1806

PERFORM OPERATOR'S MAINTENANCE ON LINE MAINTENANCE TRUCK
(3E0X1-25.7.)

QUESTION	ANSWER
1. What AF Form is used to annotate discrepancies found on the line maintenance truck?	c. 1806.
2. The three operational checks made on the line maintenance truck are: - Pre-operational. - Operational. - Post operational.	a. True.
3. What operational check is made while the vehicle or auxiliary equipment is in use?	b. Operational.
4. What check lets the operator identify any damage that may have been overlooked during the day's work?	c. Post-operational.
5. How often is tire pressure checked and where is it annotated?	b. Monthly / 1806.
6. Whose responsibility is it to maintain line truck fluid levels?	c. Operator.

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OPERATE AERIAL LIFT TRUCK CONTROLS
(3E0X1-25.8.)

QUESTION	ANSWER
1. How many people make up an aerial crew?	b. At least two qualified workers.
2. The operator must make sure no one is close enough to the truck to get hurt when _____.	c. lowering the stabilizers.
3. What safety equipment must be worn when working on or around a bucket truck?	c. Both a & b.
4. When working aloft the bucket should be positioned _____ or to the _____ and must not contact any installed equipment.	c. under / side
5. The worker must use any means necessary to reach work positions, even if it includes standing on top of the bucket or on planks across the top of the bucket.	b. False.

OPERATE LINE MAINTENANCE TRUCK CONTROLS
(3E0X1-25.9.)

QUESTION	ANSWER
1. What size winch cable will handle loads of less than 10,00 pounds?	a. 1/2 inch wire rope
2. What is the advantage of using fabric winch cable instead of a wire rope cable?	d. No steel strands to cut the skin.
3. What can you do if the line truck must be set up on hot asphalt or soft ground?	c. Place planks under jack pads.
4. What piece of equipment is used to pull a pole?	d. Pole jacks.
5. How do you compensate for various loads while using capstan?	d. Vary number of turns around capstand.

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USE HAND SIGNALS TO DIRECT LINE MAINTENANCE TRUCK OPERATIONS
(3E0X1-25.10.)

QUESTION	ANSWER
1.	a.
2.	
3.	
4.	
5.	

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MEMORANDUM FOR HQ AFCESA/CEOF
139 Barnes Drive Suite 1
Tyndall AFB, FL 32403-5319

FROM:

SUBJECT: Qualification Training Package Improvement

1. Identify module.

   Module # and title_____

2. Identify improvement/correction section(s):

   _____ STS Task Reference
   _____ Training Reference
   _____ Evaluation Instructions
   _____ Performance Resources
   _____ Steps in Task Performance
   _____ Performance Checklist
   _____ Feedback
   _____ Format
   _____ Other

3. Recommended changes--use a continuation sheet if necessary.

   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

4. You may choose to call in your recommendations to DSN 523-6392 or FAX DSN/Commercial 523-6488 or (850) 283-6488 or email ceof.helpdesk@tyndall.af.mil.

5. Thank you for your time and interest.

YOUR NAME, RANK, USAF
Title/Position