

# AIR FORCE QUALIFICATION TRAINING PACKAGE (AFQTP)



FOR  
ELECTRICAL SYSTEMS  
(3E0X1)

**MODULE 27**

**AFSC SPECIFIC CONTINGENCY RESPONSIBILITIES**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

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

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**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:**

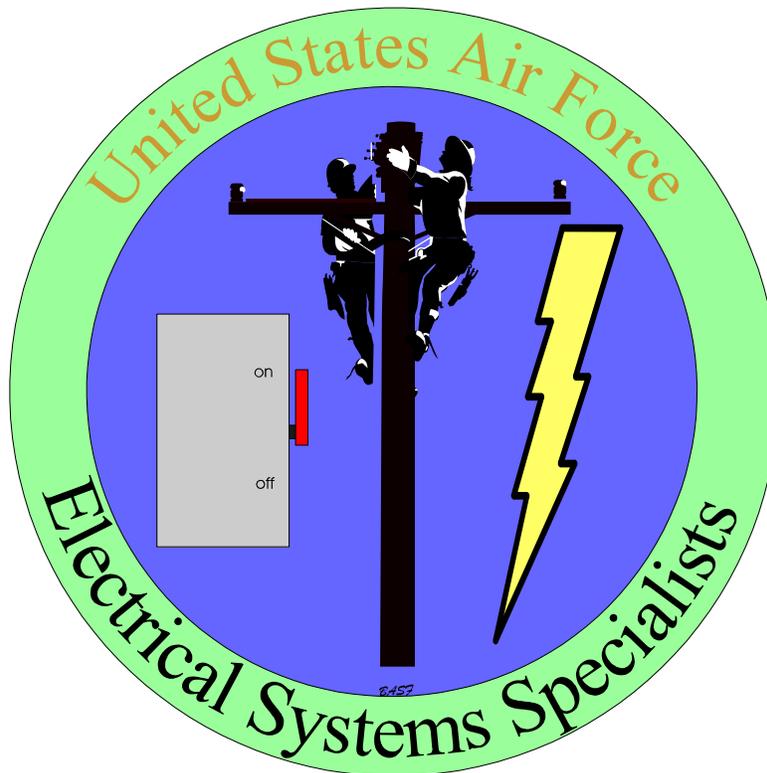
AFQTP completion  
CerTest completion (80% minimum to pass)

**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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**AIRFIELD SUPPORT SYSTEMS**  
**EMERGENCY AIRFIELD LIGHTING SYSTEM (EALS)**  
**INSTALL**

**MODULE 27**

**AFQTP UNIT 1**

- 
- APPROACH (27.1.2.1.1.)**
  - RUNWAY (27.1.2.1.2)**
  - PAPI (27.1.2.1.3)**
  - TAXIWAY (27.1.2.1.4.)**
  - DISTANCE-TO-GO (DTG) (27.1.2.1.5.)**
  - REGULATOR (27.1.2.1.6.)**
  - GENERATOR (27.1.2.1.7.)**
  - OBSTRUCTION LIGHTS (27.1.2.1.8.)**
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## INSTALL EALS APPROACH LIGHTS, RUNWAY EDGE LIGHTS, PAPI LIGHTS, TAXIWAY LIGHTS, DTG MARKER LIGHTS, REGULATOR, GENERATOR, AND OBSTRUCTION LIGHTS

### *Task Training Guide*

<b>STS Reference Number/Title:</b>	27.1.2.1.1., Install EALS approach lights. 27.1.2.1.2., Install EALS runway edge lights. 27.1.2.1.3., Install EALS PAPI lights. 27.1.2.1.4., Install EALS taxiway lights. 27.1.2.1.5., Install EALS DTG marker lights. 27.1.2.1.6., Install EALS regulator. 27.1.2.1.7., Install EALS generator. 27.1.2.1.8., Install EALS obstruction lights.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Technical Order (TO) 35F5-3-17-1, <i>Lighting System, Airfield, Emergency A/E82U-2.</i></a></li> <li>2. <a href="#">TO 35C2-3-446-11, <i>Generator Set, Diesel Engine Driven, Skid Mounted, 30 kW, 3 phase, 4 wire, 120/208 and 240/416 volts, Operator and Organizational Maintenance Manual.</i></a></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 1, Section 1-1: <i>Airfield Support Systems.</i></li> <li>4. <a href="#">Air Force Handbook (AFH) 10-222, Volume 7, <i>Emergency Airfield Lighting System (EALS).</i></a></li> <li>5. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Dec 97: <i>Emergency Airfield Lighting System.</i></li> <li>6. <a href="#">Video # 612838, <i>Emergency Airfield Lighting System.</i></a></li> <li>7. <a href="#">Air Force Instructions (AFI) 32-1064, <i>Electrical Safety Practices.</i></a></li> <li>8. <a href="#">Air Force Manual (AFMAN) 32-1185, <i>Electrical Worker Safety.</i></a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 1, Section 1-1.</li> <li>2.2. TOs 35F-3-17-1 and 35C2-3-446-11.</li> <li>2.3. AFH 10-222, Volume 7.</li> <li>2.4. AFI 32-1064.</li> <li>2.5. AFMAN 32-1185.</li> <li>2.6. Videos # 613208, 613190, and 613196.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Dec 97: <i>Emergency Airfield Lighting System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. EALS (six trailers).</li> <li>2. Gloves.</li> </ol>
<b>Learning Objective:</b>	Given equipment, install EALS approach lights, runway edge lights, PAPI lights, taxiway lights, DTG marker lights, regulator, generator, and obstruction lights.
<b>Samples of Behavior:</b>	Follow approved methods to install EALS approach lights, runway edge lights, PAPI lights, taxiway lights, DTG marker lights, regulator, generator, and obstruction lights.
<b>Notes:</b>	
Any major discrepancies or safety violation constitutes failure.	

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## INSTALL EALS APPROACH LIGHTS, RUNWAY EDGE LIGHTS, PAPI LIGHTS, TAXIWAY LIGHTS, DTG MARKER LIGHTS, REGULATOR, GENERATOR, AND OBSTRUCTION LIGHTS

**1. Background:** The EALS is a runway lighting system designed to be rapidly installed at contingency airfields and at other locations that need temporary airfield lighting. The system supports flying operations at night and during periods of reduced visibility. It provides runway edge lighting, approach lighting, threshold/end lighting, taxiway lighting, PAPI lights, DTG marker lighting, and obstruction lighting.

**1.1.** The EALS can be installed and secured on all types of surfaces (e.g., sand, frozen earth, mud, ice, asphalt, and concrete). The system can light a runway or minimum operating strip (MOS) up to 150 feet wide by 10,000 feet long.

**1.2.** The EALS has three subsystems: the lighting subsystems, the power and control subsystem, and the packaging subsystem. Table 1 highlights the major elements in each subsystem.

**Table 1. EALS Subsystems.**

LIGHTING SUBSYSTEM	POWER AND CONTROL SUBSYSTEM	PACKAGING SUBSYSTEM
Edge lighting	Generators	Trailers
Approach lighting	Regulators	Cable reels
Threshold/end lighting	Control Panels	Containers
PAPI systems	Cabling	Tools and spares
Taxiway lighting	Cable protection	
DTG (and aircraft arresting system) marker lighting		
Obstruction marker lighting		

**2. Theory of Operation.** The EALS includes two 30 kW tactical quiet generators (MEP-805A) to power the system. One generator serves as the primary unit; the other as a standby unit, to provide 416 VAC input power to a 20 kW constant current regulator. Either generator can server as the primary unit.

**NOTE:**

These generators have one “non-standard” feature, a remote start kit that allows you to operate the generators from the system control panel.

**2.1.** Except for the battery powered obstruction lights, all EALS lighting equipment is connected in a single primary series circuit. The regulator provides a constant current to that circuit. Control of the power delivered to and from the regulator is normally accomplished at the EALS control panel, but can also be done at the regulator panel. Except for the approach strobes, a single switch controls all the lights on the series circuit.

**2.2.** If properly connected, the EALS primary control panel automatically transfers the load from the primary generator to the standby unit if the primary unit fails. The load can be manually transferred from one generator to the other at the primary control panel. The generators can also be started and stopped from the primary control panel.

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**2.2.1.** The control panel has a rotary switch with three setting to control the intensity of the runway lights. The nominal regulator output at each setting is 4.8 amps (low), 5.5 amps (medium), and 6.6 amps (high). The switch controls the intensity of the edge lights, approach lights, threshold/end lights, taxiway lights, and DTG marker lights.

**NOTE:**

Light intensity can also be controlled from a rotary switch on the regulator panel.

**2.3.** The series lighting circuit powers the approach strobes located at each end of the runway. An approach strobe segment consists of one strobe master unit and two strobe slave units. The strobe units flash in sequence from the outmost to the innermost unit at one end of the runway or the other. A three position rotary switch on the control panel selects the appropriate strobe segment. When the series circuit is energized, the approach strobes can be turned on or off independent of the runway lights.

**2.4.** There are spares for every component in the EALS. This includes the regulator and the control panel. The backup regulator and backup control panel do not have the full capabilities of the primary units. Only one generator can be physically connected to the backup control panel.

**3. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Dec 97: *Emergency Airfield Lighting System* for detailed instruction on installing the EALS approach lights, runway edge lights, PAPI lights, taxiway lights, DTG marker lights, regulator, generator, and obstruction lights. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8028 and #8029, EALS, Lessons One and Two. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**NOTE TO TRAINER/TRAINEE:**

The EALS can be easily be set up by six people organized in two teams, each team with a general-purpose vehicle. For installing the runway/MOS lighting, each team consists of three people, one of which is identified as the "TAG". During installation, two team members lay the series circuit cable and place the equipment on the ground, while the TAG follows on foot connecting the components to the primary circuit.

The two teams start at opposite ends of the runway/MOS and perform identical tasks, with two exceptions. Team A installs all PAPI lighting, while Team B sets up the regulator and generators.

When the runway /MOS installation is complete, one of the teams borrows a person from the other to install the taxiway lighting while the remaining two people place the obstruction lights.

In this AFQTP, we have broken down the different tasks in the installation process to allow each individual to be certified on each one. As a potential team member, you need to know the complete installation process for the EALS.

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**4. If the equipment is available, then perform the following steps:**

**4.1. For the installation of approach, runway, and DTG lights, follow these steps:**

**Step 1: Get EALS installation details/information.**

- 1.1. Determine location of runway/MOS. Length and width.
- 1.2. Determine which end of runway is the 1-18 end and the 19-36 end.
- 1.3. Find out which lighting sub-systems must be installed:
  - 1.3.1. Edge lights.
  - 1.3.2. Approach strobes.
  - 1.3.3. Approach lights.
  - 1.3.4. Threshold lights.
  - 1.3.5. PAPI lights.
    - 1.3.5.1. Approach slope angle/ PAPI aiming angle.
    - 1.3.5.2. Distance from threshold.
  - 1.3.6. Taxiway lights.
  - 1.3.7. DTG marker lights.
  - 1.3.8. Aircraft arresting system marker lights.
  - 1.3.9. Obstruction lights.
- 1.4. Confirm that the light locations are to be premarked. Coordinate with marking team. Determine how they plan to mark the location of the runway/ MOS threshold, edges, centerline, approach zone centerline, aircraft arresting systems, taxiways, DTG markers, PAPI lights, and obstruction lights.
- 1.5. Coordinate EALS setup with MAAS installation team. Determine if aircraft arresting system is unidirectional/bidirectional. Determine approximate distance from MAAS that the tape would hit edge lights and runway cable.
- 1.6. Determine approximate set up location for EALS regulator and generators.

**NOTE:**

Ensure you have accomplished the pre-installation requirements IAW TO 35F5-3-17-1, paragraph 3-16.

**Step 2: Drive to threshold of runway/MOS.**

**NOTE:**

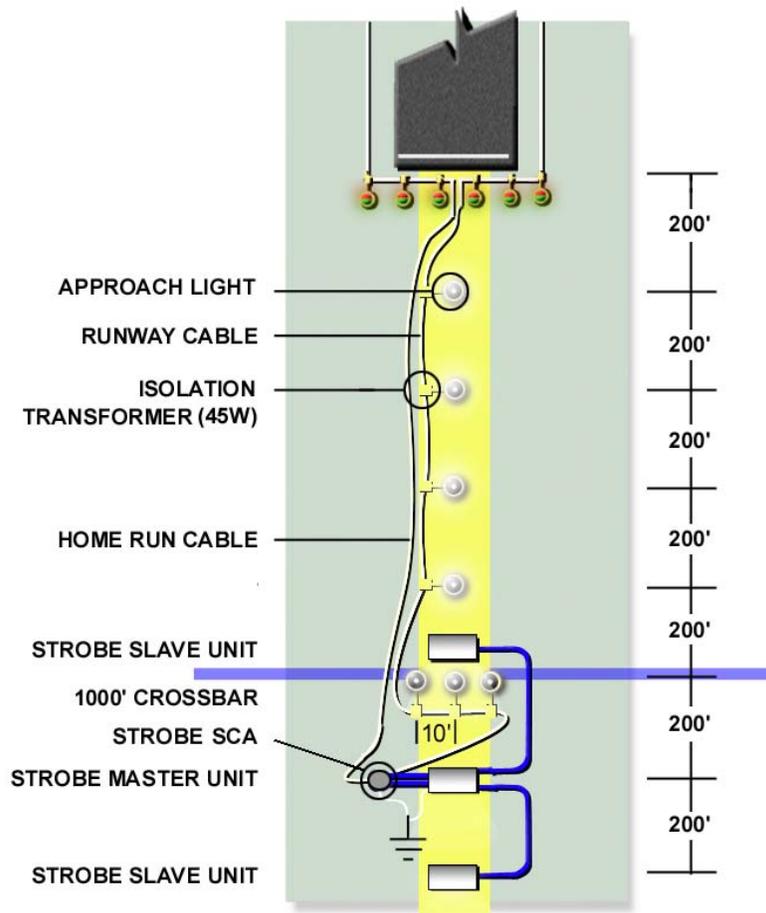
If crater repair operations have not been completed, delay installation of any EALS components that would likely be damaged by those activities.

**Step 3: Lay runway cable (200' segments) along extended runway/MOS centerline from the threshold to the center strobe location (1,200 feet from the threshold).**

**CAUTION:**

**CONTROL PAY OUT OF CABLE FROM THE REEL. KEEP OTHER CABLES AND CABLE ENDS SECURED TIGHTLY TO THE REEL.**

**Step 4:** At the strobe master unit location (center strobe - see Figure 1), begin installing strobes.



**Figure 1. Approach and Strobe Light Placement.**

- 4.1.** Unload strobe master, 2 strobe slaves, series circuit adapters (SCA), and 2 strobe SCA cables.
- 4.2.** Get 2 ground rod segments (3 ft), 2 ground rod couplings, 2 ground lugs, 2 ground cables (125-ft), and the ground rod driver.
- 4.3.** Get tools (screwdriver, adjustable wrench, and the shorting stick).
- 4.4.** Unpack strobe master and slave units, if not already done.
- 4.5.** Drive ground rod at least 5 feet into the ground and connect both ground cables to it. Connect other ends of ground cables to the SCA and to the cabinet of strobe master.
- 4.6.** Connect shorting stick to strobe master cabinet and short C101 and C102 capacitors in all three units (Figure 2).

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**Figure 2. Shorting Capacitors.**

**4.7.** Install flash tubes in all three strobe cabinets. Align key on tube with slot in socket. Put packing materials inside cabinets.

**CAUTION:**

**DON'T TOUCH TUBES WITH BARE HANDS. USE PACKING MATERIAL.**

**4.8.** Set ON-OFF switches (S401) to ON (Figure 3).



**Figure 3. Strobe Unit ON-OFF Switch.**

**4.9.** On strobe master, set REMOTE-OFF-ON switch (S301) to REMOTE, and set strobe segment selector switch (S302) to correspond with the proper runway/MOS end. (Figure 4).



**Figure 4. Remote-OFF-ON (S301) Switch.**

**4.10.** Reload strobe slave units on tow vehicle.

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**4.11.** Unwind and lay a 200-ft strobe cable from strobe master to the position of the inboard strobe slave unit.

**NOTE:**

Make sure male end of strobe cable stays at strobe master.

**4.12.** Position the strobe master unit. Level unit with leveling feet and face window away from the runway/MOS.

**4.13.** Place the SCA next to the strobe master, and connect the SCA's primary leads at a cable connection on the runway cable (Figure 5).



**Figure 5. Strobe Master with Series Circuit Adapter.**

**4.14.** Connect (5.5-ft) SCA cables to secondary leads of SCA and to the POWER INPUT connections on the strobe master (Figure 6).



**Figure 6. Cable Connections at Strobe Master.**

**NOTE:**

There are different pin sizes on the secondary leads. Don't force that connection.

**4.15.** After they have been laid, connect the strobe cables to the strobe master.

**WARNING:**

**BE SURE TO CONNECT THE CABLES TO THE CORRECT OUTPUT CONNECTORS.**

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**Step 5: Drive to position of outboard strobe slave unit while laying a 200-ft strobe cable along the extended runway/MOS centerline.**

- 5.1. Unload and position a strobe slave unit. Level unit and face window away from the runway/MOS.
- 5.2. Install flash tube, if not done in step 4.
- 5.3. Connect strobe cable to the connector marked SLAVE INPUT.

**NOTE:**

This also applies if using the spare strobe master as a slave.

**Step 6: Return to strobe master location. Pick up tools and any extra materials and debris. Ensure there is slack in runway cable leading to the SCA. Leave a 10-ft runway cable segment if necessary.**

**Step 7: Drive to position of inboard strobe slave unit paying out runway cable along the extended runway/MOS centerline.**

- 7.1. Unload, position, and connect second strobe slave unit, as before.
- 7.2. Install flash tube, if not done in step 4.
- 7.3. Drop off 3 approach lights, 3 isolation transformers (45W), 3 stakes (if needed), and 2 (10-ft) runway cables for 1000-ft crossbar.
- 7.4. Attach RAC containers (with edge/approach lights and isolation transformers) to trailer mounting pegs (2-person lift). Replace empty containers as required.
- 7.5. At the inboard strobe location, position and connect the 3 crossbar approach lights (Figure 18). Space the lights 10 ft apart and 3 to 5 ft in front of the strobe cabinet.

**Step 8: Drive toward threshold and place approach lights with 45W isolation transformers and stakes (if required) every 200 feet along extension of runway/MOS centerline while paying out runway cable. See Figure 1.**

- 8.1. Position each approach light along the extended centerline and connect it to the transformer and the transformer to the primary series circuit.

**Step 9: At threshold, place threshold/end lights, 100W isolation transformers (yellow tape on leads), 10-ft runway cables, and 2 ballast rings (or 1 stake) per fixture. Place outboard of threshold markers if they are in position.**

**NOTE:**

Need one more light fixture than width of runway/ MOS divided by 10. Don't need a 10-ft cable between middle two lights in threshold bar. Place cables so male ends of connectors point in clockwise direction around runway/MOS.

- 9.1. Position lights no more than 10 ft from threshold and approximately 10 ft apart (Figure 7). Adjust spacing between light fixtures so outboard lights are in line with the edge lights. Face green side of lens out toward approach lights (red side in toward runway/MOS). Place isolation transformers inboard of lights. Connect 10-ft runway cables to isolation transformers and transformers to lights. Keep cable between transformer and light taught. Connect 200-ft runway cables to and from the approach lighting between the middle two lights on the threshold bar. Place ballast rings on fixture (or stake fixture).

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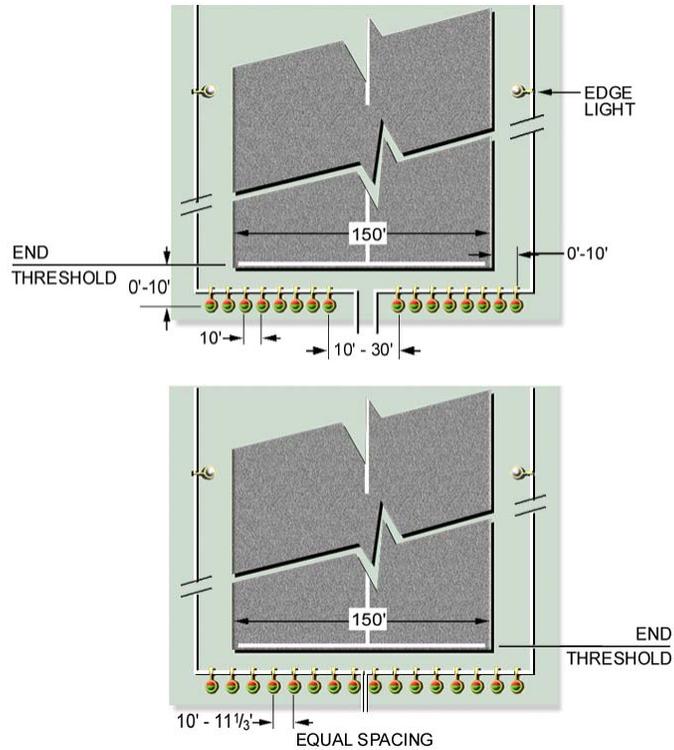


Figure 7. Threshold Light Placement.

**Step 10:** Drive along left side of runway/MOS paying out runway cable and placing an edge light with a 45W isolation transformer every 200 feet (Figure 8). Place inboard of orange edge markers, if they are in position. (Leave a stake or ballast ring at each light if lights to be held down.)

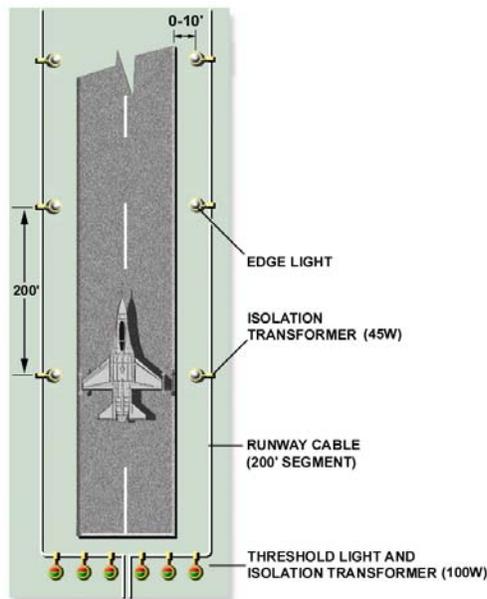


Figure 8. Edge Light Placement.

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**NOTE:**

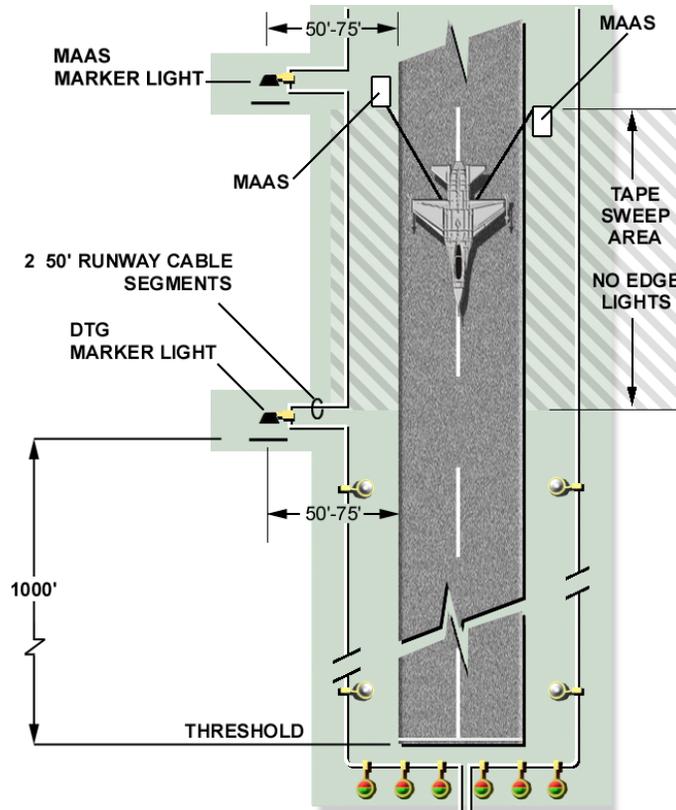
Don't place lights at taxiway intersections or in aircraft arresting system tape sweep areas.

**10.1.** Position lights no more than 10 ft from edge of runway/ MOS, and inboard of edge markers. Place isolation transformers outboard of lights. Connect runway cables to isolation transformers and transformers to lights. Keep cable between transformer and light taught. Stake fixture or place ballast rings as required.

**Step 11: Stop at EDGE A PAPI location, and install PAPI system (see paragraph 4.2.).**

**11.1.** When complete, continue edge lighting installation and laying of the primary series circuit cable.

**Step 12: Place DTG marker lights with 45W isolation transformers and 3 (50-ft) runway cables at 1000-foot markers (in the first 5,000 feet on the left side of the runway/MOS). See Figure 9.**



**Figure 9. Distance-to-Go Marker Light Placement.**

**12.1.** Position light to illuminate marker. Connect light to transformer and transformer to the runway circuit using 50-ft cables as needed.

**Step 13: Place a marker light with 45W isolation transformer along with 2 or 3 (50-ft) runway cables outboard of any aircraft arresting system (Figure 9).**

**NOTE:**

If necessary, use the light intended for the 5000-ft DTG marker. Lay runway cable (200-ft segments) outboard of the arresting system.

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**13.1.** Position light to face marker. Connect light to transformer and transformer to the runway circuit. Use (50-ft) cables as needed. Reposition runway cable outboard of arresting system if not done when cable was laid.

**Step 14: Continue placing lights and laying runway cable to opposite threshold.**

**14.1.** Continue positioning and connecting edge lights, DTG marker lights, and transformers until meeting up with the other team.

**Step 15: If the runway/MOS is to be set up for bi-directional operations. Install second PAPI system following procedures in paragraph 4-2.**

**Step 16: To install taxiway/obstruction lighting, follow the procedures in paragraph 4-3.**

**Step 17: To install the generator(s) and regulator/control panel following the procedures in paragraph 4-4.**

**Step 18: Reconnect the series circuit if left open for crater repair activities.**

**4.2. For the installation of PAPI, follow these steps:**

**Step 1: For the correct location of the PAPI refer to TO 35F5-3-17-1, paragraphs 3-13 and 3-14.**

**Step 2: At PAPI location, unload 2 PAPIs, 1 SCA, 2 (50-ft) runway cables, 1 PAPI cable, 1 PAPI SCA cable (5.5 ft), photo cell, and 6 stakes.**

**Step 3: Get 2 ground rod segments (3 ft), 2 ground rod couplings, 1 ground clamp, 1 (25-ft) ground cable, and the ground rod driver.**

**Step 4: Get tools (screwdriver, adjustable wrench, and hammer).**

**Step 5: Connect the runway cables to the primary circuit along the runway/ MOS edge and carry the loose ends to the inboard PAPI location.**

**Step 6: Remove 2 PAPI units from containers. Ensure the tilt switch cable is connected to the tilt switch connector (Figure 10). Return containers to back of tow vehicle.**



**Figure 10. Tilt Switch and Photo Cell Connections.**

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

**Step 7:** Place inboard PAPI 50-60 feet from edge of runway/MOS. Place outboard PAPI 20-30 feet from inboard unit.

**Step 8:** Place SCA next to the inboard unit and connect the loose ends of the runway cables to the primary leads on the SCA (Figure 11).



Figure 11. Inboard PAPI and Series Circuit Adapter.

**Step 9:** If possible, secure base of inboard PAPI. Remove PAPI from its base; level terrain under PAPI base, align PAPI base so it is parallel with runway/MOS centerline, then stake down. Put PAPI back on its base.

**CAUTION:**

**DON'T DRIVE STAKES ALL THE WAY INTO THE PAPI BASE. THIS CAN DAMAGE THE BASE.**

**Step 10:** Repeat for outboard PAPI.

**10.1.** If the elevation difference between the two units exceeds 12 inches, raise or lower the outboard unit or relocate both units to a more level location.

**Step 11:** Install photocell, if needed.

**Step 12:** Drive ground rod at least 5 feet into the ground. Connect 25-ft ground cable to it and the other end of the cable to the ground lug on the SCA.

**Step 13:** Connect 5.5-ft SCA cable to J1 secondary lead on the SCA and to the power/control in connector on the back panel of the inboard PAPI.

**Step 14:** Connect the 30-ft PAPI cable to power/control out connector on the inboard PAPI and to the power/control in connector on the outboard PAPI (Figure 12).



Figure 12. Back Side of Inboard PAPI.

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

**Step 15: Level and align the PAPI.**

15.1. Level the PAPI from side to side. Adjust front two knobs until bubble is centered.

15.2. Get PAPI aiming device and set it to the specified approach slope/aiming angle.

**CAUTION:**

**ADD 15 MINUTES (0.25°) TO SPECIFIED ANGLE FOR INBOARD PAPI. REDUCE ANGLE BY 15 MINUTES (0.25°) FOR OUTBOARD PAPI.**

15.3. Place aiming device on PAPI (tilt switch side) and turn rear adjusting knob until aiming device bubble is centered. Tighten the three securing knobs. Return aiming device to RAC.

**NOTE:**

Be sure you don't place the aiming device on a rivet on the PAPI cabinet.

15.4. Loosen knob on tilt switch. Center the bubble and retighten knob (Figure 13).



**Figure 13. PAPI Alignment.**

**Step 16: Pick up tools and any extra materials and debris.**

**4.3. For the installation of taxiway/obstruction lights, follow these steps:**

**Step 1: Connect trailer #1 to tow vehicle and trailer #4 behind trailer #1.**

**NOTE:**

If the regulator/control panel on trailer #1 is already connected, either disconnect it or relocate needed taxiway lights and isolation transformers from it to the tow vehicle. Get ballast rings or stakes from trailers #2 or #3, and get extra cable protection strips from trailer #2.

**Step 2: Drive to location on edge of runway/MOS where taxiway intersects.**

**Step 3: Place taxiway lights and isolation transformers in a gentle sweeping arc between the runway/MOS and the taxiway as shown in Figure 14.**

3.1. Place two lights at the beginning of the arc near the edge of the runway/MOS. These are the taxiway exit lights. The first light should be 2 ft outboard of the edge lights. Place the second light 5 ft outboard of the first on a line perpendicular to the edge of the runway/MOS.

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

3.2. Space remaining lights 25 ft apart along the arcs and 50 ft apart in the straight sections of the taxiway. Place the lights within 10 ft of the edge of the taxiway.

3.3. At the same time, lay (50-ft) runway cable segments between lights.

3.4. Place two ballast rings or one stake at fixtures that can be hit by jet blast.

3.5. At the taxiway fixture farthest from the runway, lay a (200-ft) runway cable across the taxiway.

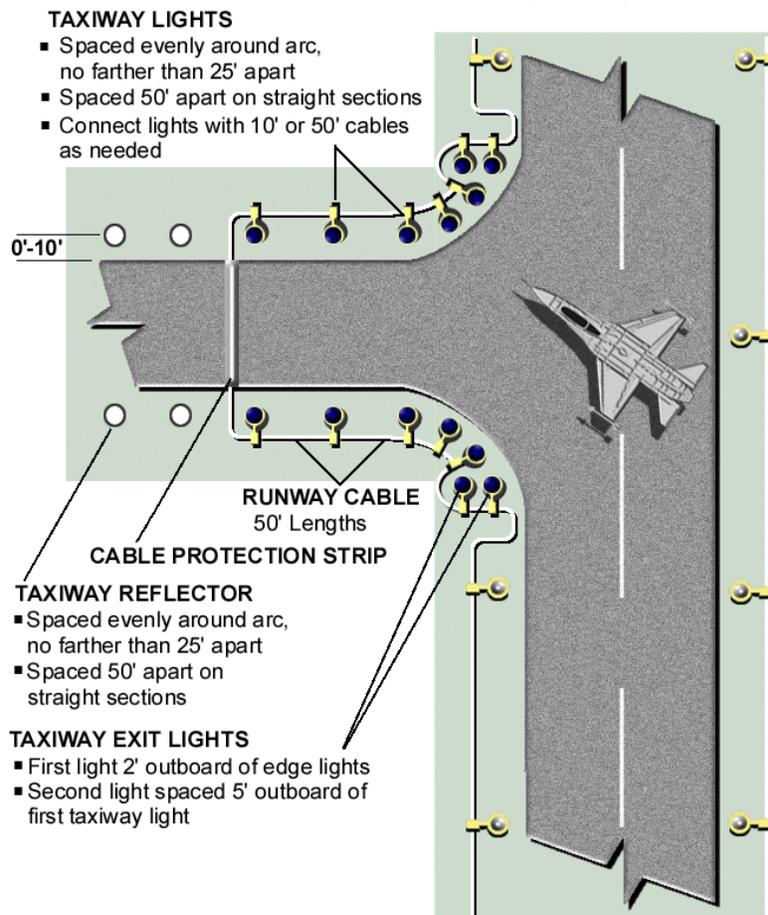
**NOTE:**

You need the (200-ft) cable to avoid a cable connection in the middle of the taxiway. The connectors can't fit in the cable protection strip.

**HINT:**

Delay laying this cable until the cable protection strip is in place. The cable will be too long, so spread out or coil the excess on one side.

3.6. Continue placing fixtures, transformers, cables, and ballast rings/ stakes on the other side to the taxiway exit light at the far taxiway/ runway connection.



**Figure 14. Taxiway Light Placement.**

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

**Step 4: Disconnect and remove the runway cable that crosses the taxiway at the edge of the runway/MOS, and tie the first taxiway light (taxiway exit light) into the primary series circuit.**

- 4.1. Disconnect the cable at the runway/MOS edge light (or a runway cable connection) closest to the taxiway exit light. Pull the two cables off opposite sides of the taxiway.
- 4.2. Connect closest cable end to the taxiway exit light transformer. Use (50-ft) or (10-ft) cable segments, as needed, to make this connection.
- 4.3. Connect the taxiway lights into the primary circuit on the opposite side after the last taxiway light and transformer are placed.

**Step 5: Walk the taxiway circuit to connect lights, transformers, and cables.**

- 5.1. Position lights no more than 10 ft from edge of taxiway.
- 5.2. Place isolation transformers outboard of lights.
- 5.3. Keep cable between transformer and light fixture taught.
- 5.4. Stake fixture or place ballast rings as required.

**Step 6: Lay cable protection strip to protect the (200-ft) cable that crosses the taxiway. Mate cable protector sections and pin together. If possible, extend across and beyond the width of the taxiway (Figure 15).**



Figure 15. Installing Cable Protection Strips.



Figure 16. Laying Cable in Cable Protection Strips.

**CAUTION:**

**BE SURE TO PICK UP ANY LOOSE CABLE PROTECTOR PINS TO ELIMINATE THE FOD HAZARD.**

- 6.1. Insert cable into the slot.

**HINT:**

The easiest way to insert the cable is to hold the cable connector and press the end of the cable just behind the cable connector into the slot. Then using the connector and holding it to the slot, pull the cable through the slot to the opposite side (Figure 16).

- 6.2. Secure the cable protection strip with sandbags on the ends.

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**Step 7:** Install taxiway reflectors beyond the last light as needed. Install along the edge of the taxiway in line with the taxiway lights. Use the same spacing rules as for the lights.

**Step 8:** Repeat steps 2 through 7 for other taxiways.

**Step 9:** If towing trailer #1 and it is used as the regulator, return to the predetermined location for the regulator and reconnect it to the generator(s), control panel, and ground.

**Step 10:** Remove obstruction lights from container on trailer #1. Load into bed of vehicle. Install batteries. Survey MOS and taxiways for the 10 most prominent obstructions, and place lights there. Turn switch to on.

**NOTE:**

Use rechargeable lead acid batteries if temperatures fall below zero degrees F. Otherwise, use the zinc-chloride batteries.

**4.4. For the installation of regulator/generator, follow these steps:**

**Step 1:** Lay (200-ft) runway cable from the predetermined regulator location to the nearest cable connector on the edge of the runway/MOS.

- 1.1. Open the series circuit at that cable connector.
- 1.2. Connect the female end of the just laid cable to the male end of the open series circuit.
- 1.3. Connect the male end of a second runway cable to the female end of the open series circuit, and lay a return cable back to the regulator.
- 1.4. Park trailer #3.

**NOTE:**

Use the cable on trailer #4 if you need additional runway cable to complete the circuit.

**Step 2:** Move the regulator/control panel (trailer #1 or #4) to its predetermined operating location.

- 2.1. Set all switches on the control panel to the off position. On the regulator panel, set the circuit breaker (CB1) to the off position (down) and turn the intensity selector switch (S1) to the off position. See Figures 17 and 18.



Figure 17. Primary Control Panel (Trailer #1).



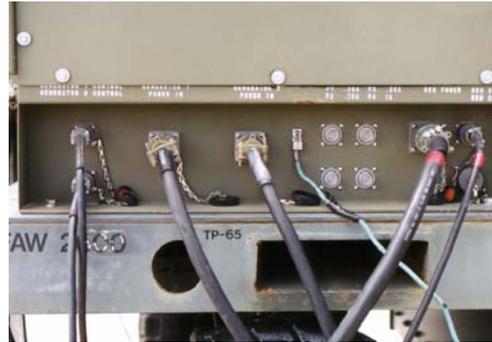
Figure 18. Backup Control Panel (Trailer #4).

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

**2.2.** Connect a (25-ft) ground cable to the grounding lug on the regulator trailer and a second (25-ft) cable to the lug on the control panel. See Figures 19 and 20.



**Figure 19. Regulator Ground.**



**Figure 20. Control Panel Ground.**

**Step 3:** Establish common ground at regulator.

- 3.1. Get 3 (3-ft) ground rod segments, 3 ground rod couplings, 4 ground clamps, and the ground rod driver.
- 3.2. Drive ground rod 8 feet deep.

**Step 4: Connect ground cables from regulator and control panel to common ground.**

**Step 5: Inspect and service generator(s) per TO 35C2-3-446-11.**

- 5.1. Visual inspection for leaks, loose cables, and damage.
- 5.2. Fuel level.
- 5.3. Oil Level.
- 5.4. Engine coolant level.
- 5.5. Battery level and charge.
- 5.6. Belts.
- 5.7. Tire pressure (65 psi).
- 5.8. Hand brake.

**Step 6: Move generators (either or both trailers #5 and #6) into position and set them up.**

**6.1.** *If the generator is to be located greater than 20 ft from the regulator:*

- 6.1.1. Tow generator and trailer #4 from the regulator to the generator site while paying out (250-ft) generator power cable segments from trailer #4.

**NOTE:**

The generator can be located up to 1000 ft from the regulator. When the distance is not too far, the team may choose to lay the generator power, control, and ground cables by hand.

- 6.1.2. Position generator. Park the generator on reasonably level ground. (The generator should be as level as possible during operation.) The unit should be well ventilated and within 25 ft of any auxiliary fuel supply. The soil should support the weight of the generator. The location should permit easy access for refueling the generator or the auxiliary fuel supply. For an indoor installation, follow the instructions in the TO 35F5-3-17-1, paragraph 3-42.

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

**6.1.3.** Connect pigtails on generator unit power cable to terminal board 2 (TB2). Use terminals L1-L3, L1-L2, or L2-L3 (Figure 21).



**Figure 21. Generator Unit Power Cable Connection to Generator.**

**HINT:**

The pigtails may be too short to use on terminals L1-L3 without stripping additional cable insulation.

**CAUTION:**

**DO NOT USE TERMINAL L0—UNLESS YOU INTEND TO OPERATE ON 208 VAC. IN THAT CASE, THE GENERATOR MUST ALSO BE SET UP TO DELIVER 208 VAC VERSUS 416 VAC.**

**6.1.4.** Connect the (250-ft) generator power cable to the generator unit power cable (Figure 30).

**6.1.5.** Connect the (250-ft) generator control cable to the connector on the blackout switch box (Figure 22). Then tow trailer #4 to the regulator while paying out the (250-ft) control cable segments.



**Figure 22. Generator Control Cable Connection to Generator.**

**6.1.6.** Connect the (1000-ft) ground cable from the cable reel on trailer #4 to the common ground at the regulator. Then,

**6.1.7.** Tow trailer to the generator while paying out the 1000-ft ground cable.

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**NOTE:**

If desired and situation warrants, can use 125-ft ground wires, cut wires from base stocks, or cut the 1000-ft wire.

**6.1.8.** Connect the (1000-ft) ground cable to the generator grounding terminal on TB2 (Figure 29).

**6.1.9.** Return to regulator, and park trailer #4.

**6.2.** *If the generator is to be located less than 20 ft from the regulator:*

**6.2.1.** Repeat the above steps but use the (25-ft) generator power, control, and ground cables and lay them by hand.

**Step 7:** Connect the generator power and control cables to the connectors at the side of the control panel (Figure 23).



**Figure 23. Cable Connections at Control Panel.**

**CAUTION:**

**THE CONTROL PANEL ON TRAILER #1 HAS NUMBERED CONNECTORS. ALWAYS CONNECT THE POWER AND CONTROL CABLES FROM THE SAME GENERATOR TO THE GENERATOR POWER IN AND GENERATOR CONTROL CONNECTORS WITH THE SAME NUMBERS.**

**7.1.** Ensure the generator control switch (on the control panel) is in the off position.

**7.2.** Connect the generator power cable to the connector on the control panel.

**7.3.** Connect the (25-ft) generator control adapter cable to the last segment of the (250-ft) control cable.

**NOTE:**

This is necessary, because the connectors on the 250-ft control cable do not fit the connector on the control panel.

**7.4.** Connect the control adapter cable to the connector on the side of the control panel.

**Step 8:** Connect the (6-ft) regulator control and power cables to the REG CONTROL and REG POWER connectors on the control panel and to the REMOTE CONTROL INPUT and the INPUT VOLTAGE connectors on the regulator (Figure 24).



**Figure 24. Cable Connections from Control Panel to Regulator.**

**Step 9:** Connect the two leads of the runway cable (see step 1) to the output current connectors on the regulator (Figure 25).



**Figure 25. Output Current Connectors on Regulator.**

**NOTE:**

If the runway cable was laid correctly, the male/male runway cable adapter must be used to complete the connection.

**Step 10:** If used, set up auxiliary fuel supply within 25 ft of the generator and connect the fuel line to the generator. If required, place fuel spill containment around fuel supply. If desired, get a fire extinguisher.

**INSTALL EALS APPROACH LIGHTS, RUNWAY EDGE LIGHTS, PAPI LIGHTS, TAXIWAY LIGHTS, DTG MARKER LIGHTS, REGULATOR, GENERATOR, AND OBSTRUCTION LIGHTS**

**PERFORMANCE CHECKLIST**

**INSTRUCTIONS:**

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

<b>DID THE TRAINEE....?</b>	<b>YES</b>	<b>NO</b>
1. Perform all installation procedures for approach lighting correctly		
2. Perform all installation procedures for runway lighting correctly		
3. Perform all installation procedures for PAPI lighting correctly		
4. Perform all installation procedures for taxiway lighting correctly		
5. Perform all installation procedures for DTG marker lighting correctly		
6. Perform all installation procedures for regulator correctly		
7. Perform all installation procedures for generator correctly		
8. Perform all installation procedures for obstruction lighting correctly		
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.



**AIRFIELD SUPPORT SYSTEMS**  
**EMERGENCY AIRFIELD LIGHTING SYSTEM (EALS)**  
**OPERATE**

**MODULE 27**

**AFQTP UNIT 1**

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**REGULATOR (27.1.2.2.1.)**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**OPERATE EALS REGULATOR**  
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.1.2.2.1., Operate EALS regulator.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Technical Order (TO) 35F-3-17-1, <i>Lighting System, Airfield, Emergency A/E82U-2.</i></a></li> <li>2. Career Development Course (CDC) 3E051B Volume 4, Unit 1, Section 1-1: <i>Airfield Support Systems.</i></li> <li>3. <a href="#">Air Force Handbook (AFH) 10-222, Volume 7, <i>Emergency Airfield Lighting System (EALS).</i></a></li> <li>4. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Dec 97: <i>Emergency Airfield Lighting System.</i></li> <li>5. <a href="#">Video # 612838, <i>Emergency Airfield Lighting System.</i></a></li> <li>6. <a href="#">Air Force Instructions (AFI) 32-1064, <i>Electrical Safety Practices.</i></a></li> <li>7. <a href="#">Air Force Manual (AFMAN) 32-1185, <i>Electrical Worker Safety.</i></a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 1, Section 1-1.</li> <li>2.2. TOs 35F-3-17-1.</li> <li>2.3. AFH 10-222, Volume 7.</li> <li>2.4. AFI 32-1064.</li> <li>2.5. AFMAN 32-1185.</li> <li>2.6. Videos # 613208, 613190, and 613196.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Dec 97: <i>Emergency Airfield Lighting System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. EALS regulator.</li> <li>2. Gloves.</li> </ol>
<b>Learning Objective:</b>	Given equipment, operate EALS regulator.
<b>Samples of Behavior:</b>	Follow approved methods to operate EALS regulator.
<b>Notes:</b>	Any major discrepancies or safety violation constitutes failure.

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

## OPERATE EALS REGULATOR

**1. Background:** The EALS 20kW regulator provides a constant current power source for the EALS runway lighting circuit.

**1.1. Regulator Output Current.** As shown in Table 1-1 the regulator has three output current levels. The regulator is air-cooled and designed to accurately regulate the output current to within  $\pm 3\%$ . The regulator output contains a “soft-start” feature that eliminates the need for special “slow-acting” circuit breakers on the input power supply lines.

**Table 1-1. Regulator Output Currents.**

Intensity	Nominal Output	Allowable Range
High	6.6	6.40-6.70
Medium	5.5	5.33-5.67
Low	4.8	4.66-4.94

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Dec 97: *Emergency Airfield Lighting System* for detailed instruction on operating the EALS regulator. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8030, EALS, Lessons Three. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**3.1. To perform a regulator/control panel functional check.**

**Step 1: Ensure switches on the regulator panel are set as follows (see Figure 1):**

- 1.1. Intensity selector switch (S1) - REMOTE.
- 1.2. Master circuit breaker (CB1) - off (down position).



**Figure 1. Backup Control Panel (Trailer #4).**

**Step 2: Set switches on the control panel in the following positions (see Figure 2):**

- 2.1. GENERATOR CONTROL - OFF.
- 2.2. GEN1/GEN2 REMOTE START - OFF.

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

- 2.3. GENERATOR SELECTION - AUTO.
- 2.4. LIGHTING CONTROL - OFF.
- 2.5. STROBE CONTROL - OFF.
- 2.6. PANEL ILLUMINATION - can be in either ON or OFF position.



Figure 2. Primary Control Panel (Trailer #1).

**Step 3: Connect male/male adapter cable to both OUTPUT CURRENT plugs on the regulator.**

**Step 4: Check automatic switching of generators on main control panel.**

**4.1.** Turn GENERATOR CONTROL switch ON. Determine which generator is to be the primary unit.

**4.2.** Turn the REMOTE START switch for the primary unit to AUTO. [The primary unit should start up, and the RUN and ONLINE indicators for that generator should light up.] Wait 5 seconds, then:

**4.3.** Turn the REMOTE START switch of the backup generator to AUTO. [Nothing should happen.]

**4.4.** Turn the REMOTE START switch for the primary unit to OFF. [The primary unit should shut down. The backup generator should start up. The RUN and ONLINE indicators for the primary generator should go off and for the back up generator should light up.]

**Step 5: Turn the circuit breaker (CB1) on the regulator panel to on (up) position.** [The REGULATOR ON indicator light on the regulator panel should light up.]

**Step 6: Check lighting control from control panel.**

**6.1.** Turn LIGHTING CONTROL switch to LOW intensity. Pause while regulator performs internal checks. [Low intensity indicator should light up, and ammeter on regulator panel should show between 4.6 and 4.9 amps.]

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- 6.2. Turn LIGHTING CONTROL switch to MED intensity. [Ammeter should read between 5.3 and 5.7 amps for medium intensity setting.]
- 6.3. Turn LIGHTING CONTROL switch to HIGH intensity. [Ammeter should read between 6.4 and 6.7 amps for high intensity setting.]
- 6.4. Push SYSTEM BLACKOUT button. [The REGULATOR ON indicator light on the regulator panel should go out, and the ammeter reading should drop to zero.] Reset BLACKOUT RESET switch.
- 6.5. Return LIGHTING CONTROL switch to OFF position, pausing at the LOW intensity setting while the regulator cycles

**Step 7: Check lighting control on regulator panel (Figure 3).**

- 7.1. Turn intensity selector switch (S1) from REMOTE to the low intensity (B1) setting. [Ammeter should show between 4.6 and 4.9 amps.]
- 7.2. Turn intensity selector switch (S1) to the medium intensity (B2) setting. [Ammeter should read between 5.3 and 5.7 amps.]
- 7.3. Turn intensity selector switch (S1) to the high intensity (B3) setting. [Ammeter should read between 6.4 and 6.7 amps.]
- 7.4. Return intensity selector switch to OFF position, pausing at the B2 (medium) and the B1 (low) intensity settings while the regulator cycles.



**Figure 3. Regulator Control Panel.**

**Step 8: Perform regulator open-circuit test.**

- 8.1. Turn the circuit breaker (CB1) on the regulator panel to off (down) position.
- 8.2. Remove male/male adapter cable from OUTPUT CURRENT plugs on the regulator.
- 8.3. Turn the circuit breaker (CB1) to on (up) position.
- 8.4. Turn intensity selector switch (S1) to B1 (low) intensity setting. [The regulator should de-energize in less than 2 seconds, and the OPEN CIRCUIT and OUTPUT VOLTAGE LIMIT indicator lights on the regulator panel should light up.]

**WARNING:**

**IMMEDIATELY TURN INTENSITY SELECTOR SWITCH (S1) TO OFF IF OPEN CIRCUIT PROTECTIVE DEVICE DOES NOT ACTIVATE WITHIN 2 SECONDS.**

- 8.5. Turn intensity selector switch (S1) to OFF position. [The open circuit protective device should reset.]
- 8.6. Repeat above two steps to ensure protective device resets.

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

8.7. Turn intensity selector switch (S1) to OFF position and main circuit breaker (CB1) to off (down) position.

8.8. Return intensity selector switch (S1) to REMOTE position.

**Step 9: Turn REMOTE START and GENERATOR CONTROL switches on control panel to OFF position.** [Generator will shut down.]

### 3.2. To activate the EALS from trailer #1.

**Step 1: Set switches on the regulator panel as follows (see Figure 1):**

- 1.1. Intensity selector switch (S1) - REMOTE.
- 1.2. Master circuit breaker (CB1) - off (down position).

**Step 2: Set switches on control panel as follows (see Figure 2):**

- 2.1. GENERATOR CONTROL - OFF.
- 2.2. GEN1/GEN2 REMOTE START - OFF.
- 2.3. GENERATOR SELECTION - AUTO.
- 2.4. LIGHTING CONTROL - OFF.
- 2.5. STROBE CONTROL - OFF.
- 2.6. PANEL ILLUMINATION - can be in either ON or OFF position.

**Step 3: Turn GENERATOR CONTROL switch ON.** Determine which generator is to be the primary unit.

**Step 4: Turn the REMOTE START switch of the primary unit to AUTO.** [The RUN and ONLINE indicators should light up.] Wait 5 seconds, then:

**Step 5: Turn the REMOTE START switch of the backup generator to AUTO.**

**Step 6: Turn the circuit breaker (CB1) on the regulator panel to ON.**

**Step 7: Set LIGHTING CONTROL to proper intensity.** Intensity indicator should light up. Adjust as necessary based on pilot requests. Without other input, use these visibility conditions to determine proper intensity.

<u>VISIBILITY CONDITION</u>	<u>INTENSITY SETTING</u>
Night over 4 miles	Low
Night 3 to 4 miles	Medium
Night under 3 miles	High

**Step 8: Set STROBE CONTROL to proper end.**

### 3.3. To activate the EALS from trailer #4.

**Step 1: Set switches on the regulator panel as follows (see Figure 4):**

- 1.1. Intensity selector switch (S1) - REMOTE.
- 1.2. Master circuit breaker (CB1) - off (down position).



**Figure 4. Backup Control Panel and Regulator Panel.**

**Step 2: Set switches on control panel as follows (see Figure 4):**

- 2.1. GENERATOR CONTROL - OFF.
- 2.2. LIGHTING CONTROL - OFF.
- 2.3. STROBE CONTROL - OFF.
- 2.4. PANEL ILLUMINATION - can be in either ON or OFF position.

**Step 3: Turn GENERATOR CONTROL switch ON.** (The ONLINE indicator should light up.) Wait 5 seconds, then:

**Step 4: Turn the circuit breaker (CB1) on the regulator panel to ON.**

**Step 5: Set LIGHTING CONTROL to proper intensity.** Intensity indicator should light up. Adjust as necessary based on pilot requests. Without other input, use these visibility conditions to determine proper intensity.

<u>VISIBILITY CONDITION</u>	<u>INTENSITY SETTING</u>
Night over 4 miles	Low
Night 3 to 4 miles	Medium
Night under 3 miles	High

**Step 6: Set STROBE CONTROL to proper end.**

**3.4. Perform manual load transfer at the primary control panel (from Generator 1 to Generator 2).**

**Step 1: Turn generator 2 on by turning the GEN 2 REMOTE START switch from AUTO to ON.** [The GEN 2 RUN indicator should light.]

**Step 2: Turn GENERATOR SELECTION switch from AUTO to GEN 2.** [The GEN 2 ONLINE indicator should light and the GEN 1 ONLINE and GEN 1 RUN indicators should go out.]

**Step 3: To reestablish automatic transfer capability, turn GENERATOR SELECTION switch and the GEN 2 REMOTE START switch back to the AUTO position.**

**NOTE:**

To transfer from GEN 2 to GEN 1, use these instructions but substitute GEN 1 for GEN 2 and vice versa.

**3.5. Perform system blackout at control panel.**

**Step 1:** Press SYSTEM BLACKOUT button.

**Step 2:** To resume operation, rotate BLACKOUT RESET switch to RESET and release. See Figure 2.

**3.6. Perform normal shutdown procedures.**

**Step 1:** Turn LIGHTING CONTROL switch on control panel to OFF position.

**Step 2:** At regulator panel, turn circuit breaker (CB1) to off (down) position and intensity selector switch (S1) to OFF position.

**Step 3:** Let generator run 3 minutes.

**Step 4:** Turn generator off by turning REMOTE START switches on main control panel to OFF position. (Step not done on backup control panel.)

**Step 5:** Turn GENERATOR CONTROL switch on control panel to OFF position.

**3.7. Perform emergency shutdown procedures.**

**3.7.1. Use any one of the following procedures.**

**3.7.1.1. At control panel:**

**Step 1:** Turn GENERATOR CONTROL switch to OFF position. [Kills generators and all power to the system.] Or,

**Step 2:** Press SYSTEM BLACKOUT button. [Kills lights. Generators still run.] Or,

**3.7.1.2. At regulator panel:**

**Step 1:** Turn regulator circuit breaker (CB1) off (down position). [Kills all power to the regulator and lighting circuit.] Or,

**Step 2:** Turn intensity selector switch (S1) to OFF. [Kills lights. Generators still run.] Or,

**3.7.1.3. At the generator:**

**Step 1:** Press the EMERGENCY STOP button. [Kills generator and all power to the system.]

**OPERATE EALS REGULATOR**

**PERFORMANCE CHECKLIST**

**INSTRUCTIONS:**

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

<b>DID THE TRAINEE....?</b>	<b>YES</b>	<b>NO</b>
1. Perform a regulator/control functional check correctly		
2. Activate the EALS from trailer #1 correctly		
3. Activate the EALS from trailer #4 correctly		
4. Perform a manual load transfer at the primary control panel correctly		
5. Perform a system blackout correctly		
6. Perform normal shutdown procedures correctly		
7. Perform emergency shutdown procedures correctly at the: 7.1. Control panel. 7.2. Regulator panel. 7.3. Generator.		
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.



**AIRFIELD SUPPORT SYSTEMS**  
**EMERGENCY AIRFIELD LIGHTING SYSTEM (EALS)**  
**OPERATE**

**MODULE 27**

**AFQTP UNIT 1**

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**GENERATOR (27.1.2.2.2.)**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**OPERATE EALS GENERATOR**  
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.1.2.2.2., Operate EALS generator.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Technical Order (TO) 35F-3-17-1, <i>Lighting System, Airfield, Emergency A/E82U-2.</i></a></li> <li>2. <a href="#">TO 35C2-3-446-11, <i>Generator Set, Diesel Engine Driven, Skid Mounted, 30 kW, 3 phase, 4 wire, 120/208 and 240/416 volts, Operator and Organizational Maintenance Manual.</i></a></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 1, Section 1-1: <i>Airfield Support Systems.</i></li> <li>4. <a href="#">Air Force Handbook (AFH) 10-222, Volume 7, <i>Emergency Airfield Lighting System (EALS).</i></a></li> <li>5. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Dec 97: <i>Emergency Airfield Lighting System.</i></li> <li>6. <a href="#">Video # 612838, <i>Emergency Airfield Lighting System.</i></a></li> <li>7. <a href="#">Air Force Instructions (AFI) 32-1064, <i>Electrical Safety Practices.</i></a></li> <li>8. <a href="#">Air Force Manual (AFMAN) 32-1185, <i>Electrical Worker Safety.</i></a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 1, Section 1-1.</li> <li>2.2. TOs 35F-3-17-1 and 35C2-3-446-11.</li> <li>2.3. AFH 10-222, Volume 7.</li> <li>2.4. AFI 32-1064.</li> <li>2.5. AFMAN 32-1185.</li> <li>2.6. Videos # 613208, 613190, and 613196.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Dec 97: <i>Emergency Airfield Lighting System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. EALS generator.</li> <li>2. Gloves.</li> </ol>
<b>Learning Objective:</b>	Given equipment, operate EALS generator.
<b>Samples of Behavior:</b>	Follow approved methods to operate EALS generator.
<b>Notes:</b>	Any major discrepancies or safety violation constitutes failure.

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

## OPERATE EALS GENERATOR

**1. Background:** The EALS is equipped with a MEP 805A, 30kW, 50-60 Hz tactical quiet diesel engine-driven generator sets. The generators are set for 240/416 VAC, 60 Hz operation, and are equipped with a remote start kit for starting and stopping of the generator from the control panel.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Dec 97: *Emergency Airfield Lighting System* for detailed instruction on operating the EALS generator. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8030, EALS, Lessons Three. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Safety steps:**

**1.1.** At the regulator (trailer #1 or #4), be sure all switches on the EALS control panel are in the OFF position. On the regulator panel, set the circuit breaker (CB1) to the off position (down) and turn the intensity selector switch (S1) to the OFF position.

**1.2.** Be sure generator is grounded.

**Step 2: Be sure the P11/J11 electrical connection is disconnected if auxiliary fuel is not used, and connected if it is. See Figure 1.** This connection provides electrical power to the auxiliary fuel pump, which fills the day tank on the generator.



**Figure 1. P11/J11 Connection on Generator.**

**CAUTION:**

**IF AUXILIARY FUEL IS NOT USED AND THE P11/J11 CONNECTION IS MADE, THE AUXILIARY FUEL PUMP CAN BURN OUT.**

**Step 3: Place DEAD CRANK switch in NORMAL position. See Figure 2.**

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



Figure 2. Dead Crank Switch.

**Step 4: Ensure voltage reconnection terminal board (TB1) is positioned to 240/416V. See Figure 3.**



Figure 3. Generator Terminal Board #1 (TB1).

**Step 5: Set up the generator control panel. See Figure 4.**

- 5.1. Push in DC CONTROL POWER circuit breaker (located on control bracket behind control panel - Figure 39).
- 5.2. Set FREQUENCY SELECT switch to 60Hz.
- 5.3. Set AM-VM transfer switch to match the pigtail connections on the generator output terminal board (TB2).
- 5.4. Place PARALLEL UNIT switch in UNIT position.
- 5.5. Set MASTER switch to PRIME AND RUN.
- 5.6. Push PRESS TO TEST button on malfunction indicator panel. [All lights should light up, and all lights should go out when released.]
- 5.7. Press BATTLE SHORT button to test light. [Indicator light should illuminate.]
- 5.8. Press AC CIRCUIT INTERRUPTER button to test light. [Indicator light should illuminate.]

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



Figure 4. Generator Control Panel.

**Step 6: Start the generator.**

**CAUTION:**

**DON'T CRANK ENGINE LONGER THAN 15 SECONDS. WAIT 15 SECONDS BETWEEN ATTEMPTS.**

**6.1.** Rotate MASTER switch to start, and hold until engine starts, oil pressure reaches at least 25 psi, voltage has increased to near rated value, and engine has reached a stable operating speed. Release switch.

**NOTE:**

In cold weather, push ETHER switch to ON until engine speed stabilizes.

**6.2.** If using the auxiliary fuel source, rotate MASTER SWITCH to PRIME AND RUN AUX FUEL position.

**6.3.** Warm engine without load for 5 minutes (unless the situation requires immediate load).

**6.4.** Check COOLANT TEMP indicator for normal reading (170°-200°F). Repeat for OIL PRESSURE (25-60 psi).

**6.5.** Turn FREQUENCY adjust knob until FREQUENCY METER indicates 60 Hz.

**6.6.** Turn voltage adjustment potentiometer until the AC voltmeter (VOLTS AC) indicates 416 volts. Allowable range is 405 – 458 volts. **Compensate for voltage drop if generator is positioned away from regulator, as follows:**

<u>IF CABLE LENGTH FROM REGULATOR IS</u>	<u>SET VOLTAGE AT</u>
25 feet	416 volts
250 feet	425 volts
500 feet	434 volts
750 feet	441 volts
1,000 feet	450 volts

**6.7.** Press GROUND FAULT CIRCUIT INTERRUPTER TEST push button. Indicator window should be CLEAR. Press RESET button and ensure indicator is RED.

**6.8.** Place AC CIRCUIT INTERTRUPTER switch in CLOSED position.

**6.9.** Recheck voltage and frequency and adjust if required.

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

**Step 7: Stop the generator.**

- 7.1. Place AC CIRCUIT INTERRUPTER switch in OPEN position.
- 7.2. Allow generator to operate 5 minutes without load.
- 7.3. Place MASTER SWITCH in OFF position.

**Step 8: Repeat steps 2-7 for second generator, if needed.**

## OPERATE EALS GENERATOR

### 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. Ensure the generator was properly grounded		
2. Set up the generator control panel correctly		
3. Start the generator correctly		
4. Compensate for voltage drop correctly (if needed)		
5. Shutdown the generator correctly		
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.



## HARVEST EAGLE (HE) ASSETS

### ELECTRICAL DISTRIBUTION SYSTEM

MODULE 27

AFQTP UNIT 2

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INSTALL (27.2.1.2.1.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**INSTALL HE ELECTRICAL DISTRIBUTION SYSTEM**  
**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.1.2.1., Install HE electrical distribution system.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Technical Order (TO) 35C1-2-1-331, <i>Electrical Distribution System Harvest Eagle.</i></a></li> <li>2. <a href="#">TO 40W4-9-1 and 40W4-9-1C, <i>Water Purification Unit.</i></a></li> <li>3. <a href="#">TO 40W4-13-1, <i>Water Purification Unit, Reverse Osmosis.</i></a></li> <li>4. <a href="#">TO 50D1-3-1, <i>Laundry Facility, Standardized Bare Base.</i></a></li> <li>5. <a href="#">TO 35E4-169-1, <i>Kitchen Facility, Harvest Eagle/Falcon.</i></a></li> <li>6. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 1, <i>Contingency and Disaster Planning.</i></a></li> <li>7. <a href="#">AFPAM 10-219, Volume 5, <i>Bare Base Conceptual Planning.</i></a></li> <li>8. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Oct 98: <i>Harvest Eagle Electrical Distribution System.</i></li> <li>9. Video # 612076, <i>Harvest Eagle Electrical System.</i></li> <li>10. Career Development Course (CDC) 3E051B Volume 4, Unit 2: <i>Expedient Beddown Methods.</i></li> <li>11. <a href="#">Air Force Instructions (AFI) 32-1064, <i>Electrical Safety Practices.</i></a></li> <li>12. <a href="#">Air Force Manual (AFMAN) 32-1185, <i>Electrical Worker Safety.</i></a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 2.</li> <li>2.2. TOs 35C1-2-1-331, 40W4-9-1, 40W4-13-1C, 40W4-13-1, 50D1-3-1, and 35E4-169-1.</li> <li>2.3. AFPAM 10-219, Volumes 1 and 5.</li> <li>2.4. AFI 32-1064.</li> <li>2.5. AFMAN 32-1185.</li> <li>2.6. Videos # 612076.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Oct 98: <i>Harvest Eagle Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	Hand tools.
<b>Learning Objective:</b>	Trainee will know the necessary steps to properly install Harvest Eagle Electrical System components.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to identify the various types of components to a HE Electrical Distribution System.</li> <li>2. Trainee will know the required steps to install the various types of components.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the trainee must be able to identify proper procedures to install HE electrical distribution system components with no major discrepancies.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## INSTALL HE ELECTRICAL DISTRIBUTION SYSTEM

**1. Background:** For most contingency situations, the electrical system to support force beddown operations is required immediately. The limitation of available time dictates the expedient methods used to complete the system. In setting up the electrical utility for a force beddown operation, adherence to certain construction principles ensures that effective use is made of available manpower and resources.

**NOTE:**

Harvest Eagle electrical distribution is different from Bare Base in that the Harvest Eagle Electrical Distribution is primarily used for deployments that are short term, and require primarily low voltage distribution.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Oct 98: *Harvest Eagle Electrical Distribution System* for detailed instruction on installing electrical distribution system. After completing, the CD-ROM AFQTP see your *Unit Education and Training Manager* to take the mandatory CerTest # 8130 *Harvest Eagle Electrical Dist. System, Lessons 1-3*. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35C1-2-1-331.**

**Step 2: Install HE Electrical Distribution System.**

**2.1. Refer to TO 35C1-2-1-331, Section 3, paragraph 3.7.**

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

## INSTALL HE ELECTRICAL DISTRIBUTION SYSTEM

### 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 types of generators in a Harvest Eagle electrical kit		
2. Know importance of collecting data		
3. Perform proper grounding requirements for MEP generators and panels		
4. Comprehend Harvest Eagle cable sizes and applications		
5. Know the recommended power source for force beddown operations		
6. Identify the different types of layouts		
7. 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.



## HARVEST EAGLE (HE) ASSETS

### ELECTRICAL DISTRIBUTION SYSTEM

MODULE 27

AFQTP UNIT 2

MAINTAIN (27.2.1.2.2.)

TROUBLESHOOTING (27.2.1.2.3.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

## MAINTAIN/TROUBLESHOOT HE ELECTRICAL DISTRIBUTION SYSTEM

### *Task Training Guide*

<b>STS Reference Number/Title:</b>	27.2.1.2.2., Maintain HE electrical distribution system. 27.2.1.2.2., Troubleshooting HE electrical distribution system.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Technical Order (TO) 35C1-2-1-331, <i>Electrical Distribution System Harvest Eagle</i>.</a></li> <li>2. <a href="#">TO 40W4-9-1 and 40W4-9-1C, <i>Water Purification Unit</i>.</a></li> <li>3. <a href="#">TO 40W4-13-1, <i>Water Purification Unit, Reverse Osmosis</i>.</a></li> <li>4. <a href="#">TO 50D1-3-1, <i>Laundry Facility, Standardized Bare Base</i>.</a></li> <li>5. <a href="#">TO 35E4-169-1, <i>Kitchen Facility, Harvest Eagle/Falcon</i>.</a></li> <li>6. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 1, <i>Contingency and Disaster Planning</i>.</a></li> <li>7. <a href="#">AFPAM 10-219, Volume 5, <i>Bare Base Conceptual Planning</i>.</a></li> <li>8. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Oct 98: <i>Harvest Eagle Electrical Distribution System</i>.</li> <li>9. Video # 612076, <i>Harvest Eagle Electrical System</i>.</li> <li>10. Career Development Course (CDC) 3E051B Volume 4, Unit 2: <i>Expedient Beddown Methods</i>.</li> <li>11. <a href="#">Air Force Instructions (AFI) 32-1064, <i>Electrical Safety Practices</i>.</a></li> <li>12. <a href="#">Air Force Manual (AFMAN) 32-1185, <i>Electrical Worker Safety</i>.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 2.</li> <li>2.2. TOs 35C1-2-1-331, 40W4-9-1, 40W4-13-1C, 40W4-13-1, 50D1-3-1, and 35E4-169-1.</li> <li>2.3. AFPAM 10-219, Volumes 1 and 5.</li> <li>2.4. AFI 32-1064.</li> <li>2.5. AFMAN 32-1185.</li> <li>2.6. Videos # 612076.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Oct 98: <i>Harvest Eagle Electrical Distribution System</i>.</b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Hand tools.</li> <li>2. Rubber protective equipment.</li> </ol>
<b>Learning Objective:</b>	Trainee will know the necessary steps to properly maintain/troubleshoot HE electrical system components.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to identify the various types of components to a HE Electrical Distribution System.</li> <li>2. Trainee will know the required steps to maintain/troubleshoot the various types of components.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the trainee must be able to identify proper procedures to maintain/troubleshoot HE system components with no major discrepancies.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## MAINTAIN/TROUBLESHOOT HE ELECTRICAL DISTRIBUTION SYSTEM

**1. Background:** The electrical distribution system is dependent upon 30 and 60 kW generators for primary power. However, it can also accept power from the secondary voltage of the Harvest Falcon distribution system (120/208). If this is the case, then the SDC is the primary distribution point for the secondary circuits that power various loads such as airfield lighting, shelters, hangars, remote area lighting, and other systems requiring 120/208 VAC.

2. In most situations, all that is needed for troubleshooting is a voltage tester and an ammeter. Once the entire system is operating properly, it is only a matter of time until you lose power to a certain area. This is when true troubleshooting comes into play.

**3. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Oct 98: *Harvest Eagle Electrical Distribution System* for detailed instruction on maintaining / troubleshooting the electrical distribution system. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8131 Harvest Eagle Electrical Dist. System, Lessons 4. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**4. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35C1-2-1-331.**

**Step 2: Maintain HE electrical distribution system.**

**2.1. Refer to TO 35C1-2-1-331, Section 5, paragraph 5.1.**

**Step 3: Troubleshoot HE electrical distribution system.**

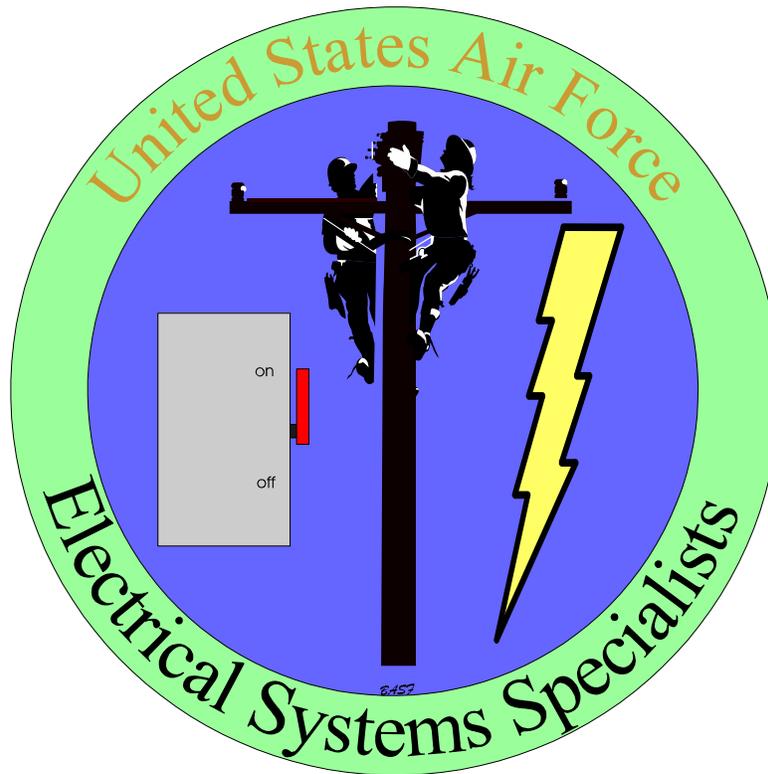
**3.1. Refer to TO 35C1-2-1-331, Section 5, paragraph 5.3.**

**MAINTAIN/TROUBLESHOOT HE ELECTRICAL DISTRIBUTION SYSTEM****PERFORMANCE CHECKLIST****INSTRUCTIONS:**

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

<b>DID THE TRAINEE....?</b>	<b>YES</b>	<b>NO</b>
<b>Maintain:</b>		
1. Understand the purpose of the Secondary Distribution Center (SDC)		
2. Identify the capabilities of the SDC input/output, and number of circuits		
3. Know the operation of the SDC		
4. Comply with all safety requirements		
<b>Troubleshoot:</b>		
1. Have the proper tools for troubleshooting		
2. Start by isolating the problem		
3. Understand the proper steps to follow		
4. Restore the power		
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.



**HARVEST FALCON (HF) ASSETS**  
**REMOTE AREA LIGHTING SYSTEM (RALS)**

**MODULE 27**

**AFQTP UNIT 2**

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**INSTALL (27.2.2.1.1.)**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**INSTALL RALS**  
**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.2.1.1., Install remote area lighting system (RALS).
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 1, Contingency and Disaster Planning.</a></li> <li>2. <a href="#">AFPAM 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>3. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Jul 02: <i>Remote Area Lighting System.</i></li> <li>4. Career Development Course (CDC) 3E051B Volume 4, Unit 3: <i>Harvest Falcon Assets.</i></li> <li>5. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>6. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 3.</li> <li>2.2. AFPAM 10-219, Volumes 1 and 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Jul 02: <i>Remote Area Lighting System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Personal protective equipment and clothing.</li> <li>2. Hand tools.</li> <li>3. Multimeter.</li> <li>4. Work gloves.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely install a RALS.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to install a RALS.</li> <li>2. Trainee will be able to install a RALS.</li> </ol>
<b>Notes:</b>	
To successfully complete this element, the steps must be followed exactly--no exceptions. 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 if equipment is available. It is to be used in conjunction with these for training purposes only.

## INSTALL RALS

**1. Background:** When you are deployed to a bare-base site, time is of the essence. Your team is required to get the base mission ready within 72 hours. In order to meet this deadline, your team has to work around the clock. You need a reliable lighting source that can illuminate the work areas during the hours of darkness. The RALS meets this need. Not only does it provide all the light during base setup, but it can also be easily repositioned to meet other needs once the base is operational. Some of the other uses for the RALS are aircraft parking, munitions storage, and roadway lighting. Each RALS unit (Figure 1) is an air transportable cabinet that weighs approximately 2,500 pounds and contains everything needed to construct a 1,500-foot-long lighting system. The cabinet contains 250 feet of input cable, two 750-foot lighting cable assemblies, 13 light masts and associated bases, 13 fixtures, and 30 mercury vapor lamps. This system can be energized from any source that provides 120/208 VAC, 3-phase power.

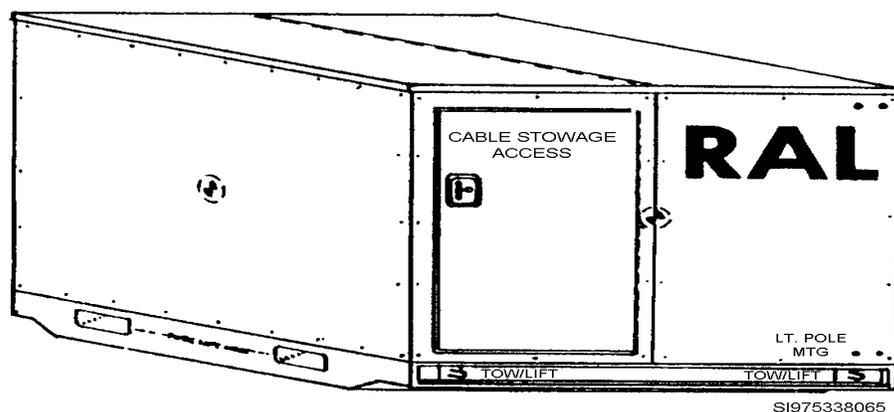
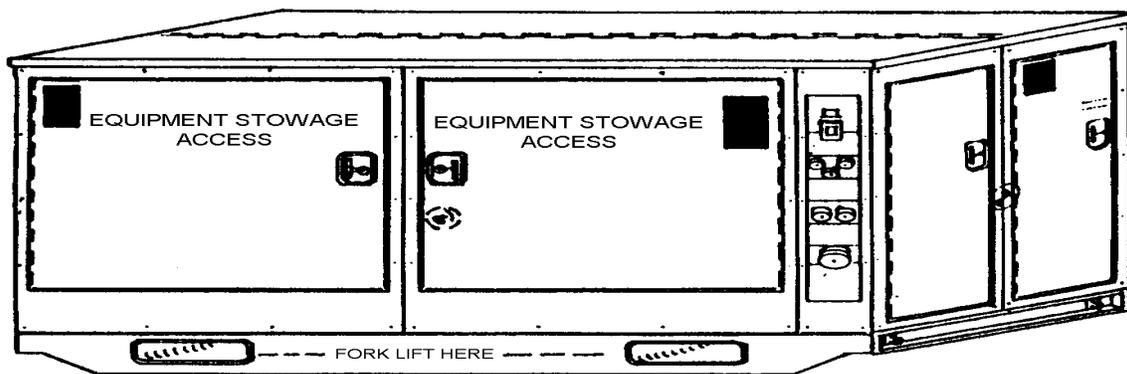


Figure 1. RALS Cabinet.

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

2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Jul 02: *Remote Area Lighting System* for detailed instruction on installing a RALS. *After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8123 RALS. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.*

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

3. If the equipment is available, then perform the following steps:

**Step 1: RALS installation.**

1.1. Proper site selection is your first consideration when you install the unit. When you select this site, keep in mind the limitations of the lighting cables and the extent of the circuit.

**NOTE:**

While it is not critical that the RALS unit is perfectly level, the site should be as nearly level as possible for convenience.

1.2. Clear the selected site of any brush or rocks that would make the unit unstable.

1.3. The surface should also be firm and well drained to prevent the soil from washing out during heavy rains.

1.4. Once the RALS cabinet is in place, you need to lay your cable.

**Step 2: Cable.**

2.1. There are three sections of 3-phase secondary cable, one 50-foot and two 100-foot sections, stored in the RALS.

2.2. These cables are used to provide the power from the secondary distribution center (SDC) to the unit.

2.3. In most cases, the cables can be laid directly on the ground. However, bury the cables in areas of vehicle and pedestrian traffic.

2.4. Do not connect the cables to the power source at this time.

2.5. The lighting cables come in four 375-foot sections. Two of these sections make up one 750-foot lighting loop assembly (Figure 2).

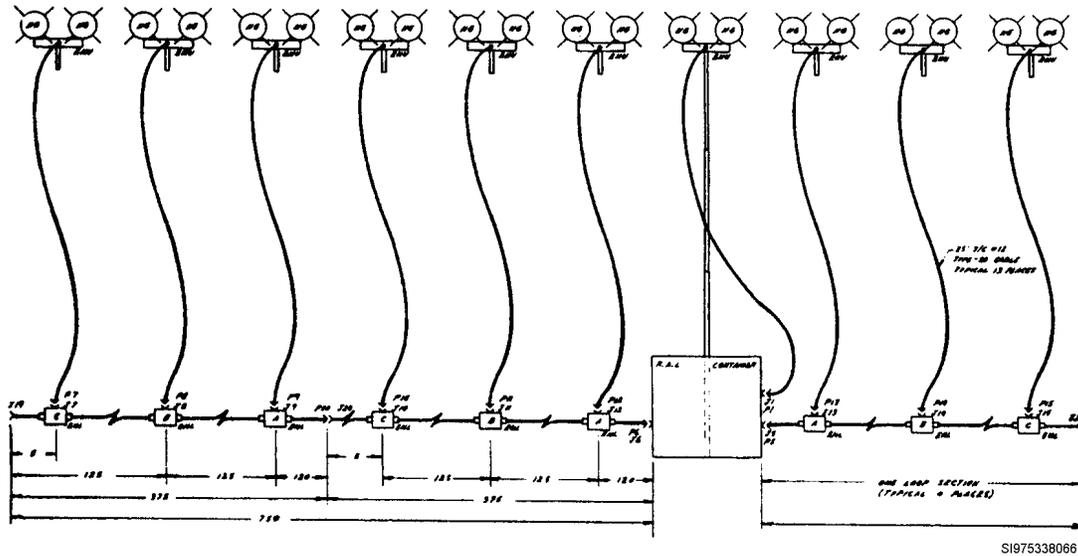


Figure 2. RALS Lighting Layout.

2.6. Two lighting loop assemblies make up the entire lighting system.

2.7. Layout the two loop cord assemblies starting at the RALS cabinet and extending out to the end of each circuit.

2.8. As with the feeder cables, install these cables above ground except in high traffic areas. Connect each circuit to the appropriate plug on the RALS receptacle panel.

**Step 3: Lights.**

3.1. There is a junction box every 125 feet along each lighting loop assembly.

3.2. Remove and assemble the 12 light mounting pads (Figure 3) from the RALS unit.

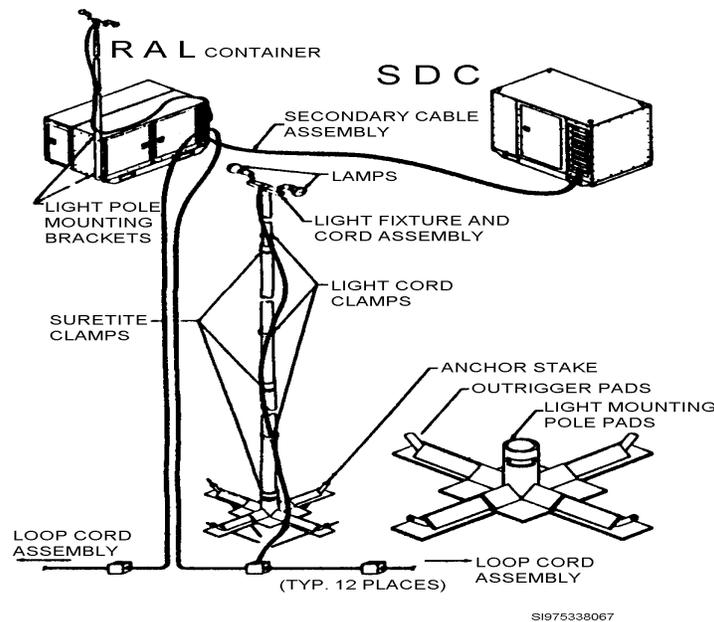


Figure 3. RALS Components.

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

- 3.3.** Position and anchor one pad at each of the 12 junction box locations.
- 3.4.** Place 12 of the 13 telescopic light poles in each of the mounting pads.
- 3.5.** Secure the 13th pole to the RALS cabinet.
- 3.6.** Once you secure all the poles, attach the light fixtures and install the lamps.
- 3.7.** With the lamps and fixtures in place, extend the light poles up to their full height.
- 3.8.** Secure the power cord from each fixture to the poles and connect it to the junction box.
- 3.9.** Before you perform the operational checks, connect the feeder cable to the SDC.

## INSTALL RALS

### 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 all the equipment needed for the job		
2. Layout cables properly		
3. Properly secure light mounting pole to pads		
4. Properly mount light fixtures to poles		
5. Secure light cord to light mounting poles		
6. Securely connected light cord connectors to junction boxes		
7. Connect loop cord assemblies to lighting loop 1 and 2 receptacles		
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.



**HARVEST FALCON (HF) ASSETS**  
**REMOTE AREA LIGHTING SET (RALS)**

**MODULE 27**

**AFQTP UNIT 2**

---

**OPERATE (27.2.2.1.2.)**

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**OPERATE RALS**  
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.2.2.1.2., Operate RALS.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 1, Contingency and Disaster Planning.</a></li> <li>2. <a href="#">AFPAM 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>3. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Jul 02: <i>Remote Area Lighting System.</i></li> <li>4. Career Development Course (CDC) 3E051B Volume 4, Unit 3: <i>Harvest Falcon Assets.</i></li> <li>5. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>6. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 3.</li> <li>2.2. AFPAM 10-219, Volumes 1 and 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Jul 02: <i>Remote Area Lighting System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Personal protective equipment and clothing.</li> <li>2. Hand tools.</li> <li>3. Multimeter.</li> <li>4. Work gloves.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely operate a RALS.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to operate RALS.</li> <li>2. Trainee will be able to operate a RALS.</li> </ol>
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>	

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

## OPERATE RALS

**1. Background:** When you are deployed to a bare-base site, time is of the essence. Your team is required to get the base mission ready within 72 hours. In order to meet this deadline, your team has to work around the clock. You need a reliable lighting source that can illuminate the work areas during the hours of darkness. The remote area lighting system meets this need. Not only does it provide all the light during base setup, but it can also be easily repositioned to meet other needs once the base is operational. Some of the other uses for the RALS are aircraft parking, munitions storage, and roadway lighting. This system can be energized from any source that provides 120/208 VAC, 3-phase power.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Jul 02: *Remote Area Lighting System* for detailed instruction on operating a RALS. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8123 RALS. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step1: Post-installation checks.**

**1.1.** The following post-installation checks must be made before the system is ready for operation. You must ensure that:

**1.1.1.** The light fixture and pole assemblies are firmly in place and the proper lamps (150-watt, PAR-38, mercury vapor) are installed.

**1.1.2.** All fixture power cords and junction boxes are securely connected.

**1.1.3.** The two loop assemblies are securely connected to the RALS receptacle panel.

**1.1.4.** The mating ends of the secondary feeder cables linking the RALS with the SDC are properly connected.

**1.2.** Once these checks are made, the system should be ready for initial turn-on procedures.

**Step 2: Initial turn-on procedures.**

**2.1.** These procedures are designed to check the operation of the system and must be performed in the following order:

**2.1.1.** Go to the SDC and set the circuit breaker that energizes the feeder cable receptacle to ON. This energizes the circuit breaker panel on the RALS.

**2.1.2.** Now set the magnetic lighting contactor and the photo-cell override switch on the RALS breaker panel to ON. All of the lights should come on at this time.

**2.1.3.** Once the lights come on, set the photo-cell override switch to OFF. At this time all lights in the circuit go out.

**2.1.4.** Set the override switch to AUTO and cover the window of the photo-cell with an opaque object. The lights should turn on again in about 15 to 20 seconds. If you notice any problems with any of the fixtures, repair them at this time.

**2.1.5.** Leave the photo-cell override switch in AUTO after all repairs are made. The system is now fully operational.

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

## OPERATE RALS

### 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. Ensure that 150 watt, PAR-38, mercury vapor lamps are used		
2. Check the layout of cables		
3. Check to see if the cords and junction boxes were connected correctly		
4. Properly check the operation of the photocell		
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.



**HARVEST FALCON (HF) ASSETS**  
**REMOTE AREA LIGHTING SET (RALS)**

**MODULE 27**

**AFQTP UNIT 2**

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**MAINTAIN (27.2.2.1.3.)**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**MAINTAIN RALS**  
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.2.2.1.3., Maintain RALS.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 1, Contingency and Disaster Planning.</a></li> <li>2. <a href="#">AFPAM 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>3. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Jul 02: <i>Remote Area Lighting System.</i></li> <li>4. Career Development Course (CDC) 3E051B Volume 4, Unit 3: <i>Harvest Falcon Assets.</i></li> <li>5. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>6. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 3.</li> <li>2.2. AFPAM 10-219, Volumes 1 and 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Jul 02: <i>Remote Area Lighting System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Personal protective equipment and clothing.</li> <li>2. Hand tools.</li> <li>3. Multimeter.</li> <li>4. Work gloves.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely maintain a RALS.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to maintain a RALS.</li> <li>2. Trainee will be able to maintain a RALS.</li> </ol>
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>	

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

## MAINTAIN RALS

**1. Background:** The RALS is a very reliable lighting system if it is installed properly. However, as with any lighting system, recurring maintenance is required in order to keep it that way. Keep in mind that this system is designed to be, and may be required to be mobilized at a moment's notice. Therefore, the entire system must be maintained in a fully operational status, including the storage cabinet itself. All inspections and maintenance are performed quarterly unless otherwise stated.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Jul 02: *Remote Area Lighting System* for detailed instruction on maintaining a RALS. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8123 RALS. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Lamps and fixtures.**

- 1.1. Check the lamp fixtures and mounting poles for security, condition, and corrosion.
- 1.2. Check the condition of the lamps.
- 1.3. Correct any found discrepancies.

**Step 2: Circuit breakers and fuses.**

- 2.1. Check the breakers and fuses for condition and operability.
- 2.2. Check the fuse holders, breaker mounts, and electrical connections for corrosion and broken items.
- 2.3. Repair or replace any item that's defective.

**Step 3: Lighting loop assemblies.**

- 3.1. Make sure all connectors on each of the two circuits are secure and free of corrosion.
- 3.2. Make a thorough inspection of the cables to check for damaged insulation.
- 3.3. Repair any discrepancies.
- 3.4. Excessive corrosion warrants the replacement of the connectors.

**Step 4: RALS structure.**

- 4.1. Check the RALS structure semiannually for structural damage, condition of paint, cleanliness of storage compartments, and corrosion.
- 4.2. Repair any structural damage and clean all storage compartments.
- 4.3. If any corrosion is found, remove the corrosion with sandpaper or a wire brush and repaint the affected area.
- 4.4. Paint chipped or scratched areas to prevent corrosion from starting.

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

**MAINTAIN RALS**

**PERFORMANCE CHECKLIST**

**INSTRUCTIONS:**

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

<b>DID THE TRAINEE....?</b>		<b>YES</b>	<b>NO</b>
1. Know the major areas to maintain on the RALS			
1.1.	Lamps and fixtures		
1.2.	Circuit breakers and fuses		
1.3.	Lighting loop assemblies		
1.4.	RALS structure		
2. Know all inspection and maintenance time frames			
3. 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.



## HARVEST FALCON (HF) ASSETS

### HARVEST FALCON/EAGLE KITCHEN EQUIPMENT

MODULE 27

AFQTP UNIT 2

---

### INSTALL POWER SUPPLY (27.2.2.4.1.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**INSTALL POWER SUPPLY TO HE/HF KITCHEN EQUIPMENT**

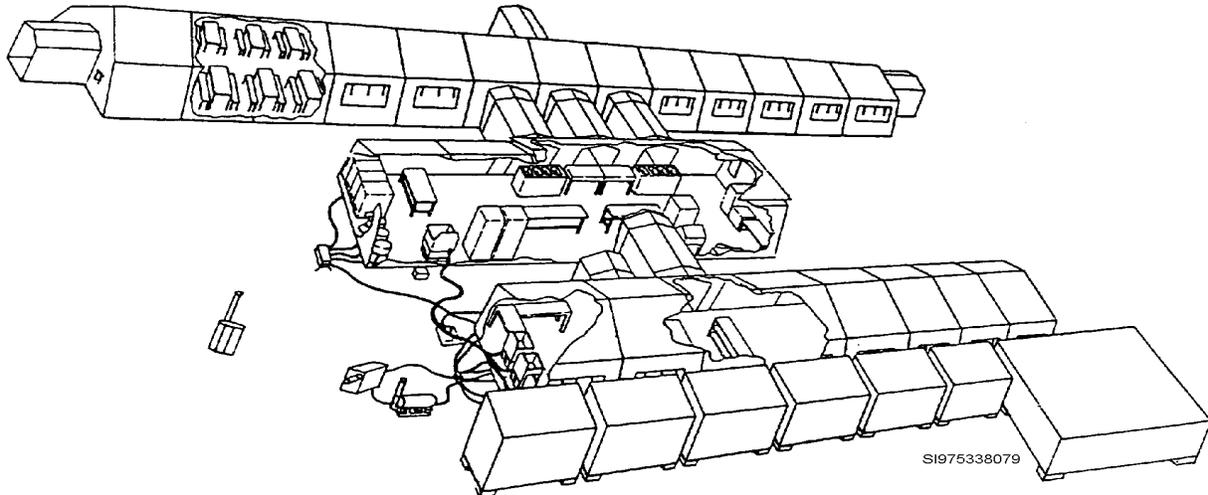
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.2.2.4.1., Install power supply to HE/HF kitchen equipment.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 3: <i>Harvest Falcon Assets.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35E4-169-1, Kitchen Facility, Harvest Eagle/Falcon.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 3.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35E4-169-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	Electrical hand tools.
<b>Learning Objective:</b>	The trainee will know the steps required to safely provide electricity to Harvest Falcon/Eagle Kitchen Equipment.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will know the difference between Harvest Falcon/Eagle Kitchen Facilities.</li> <li>2. Trainee will know the sequence of electrical connections.</li> </ol>
<b>Notes:</b>	Any safety violation is an automatic failure.

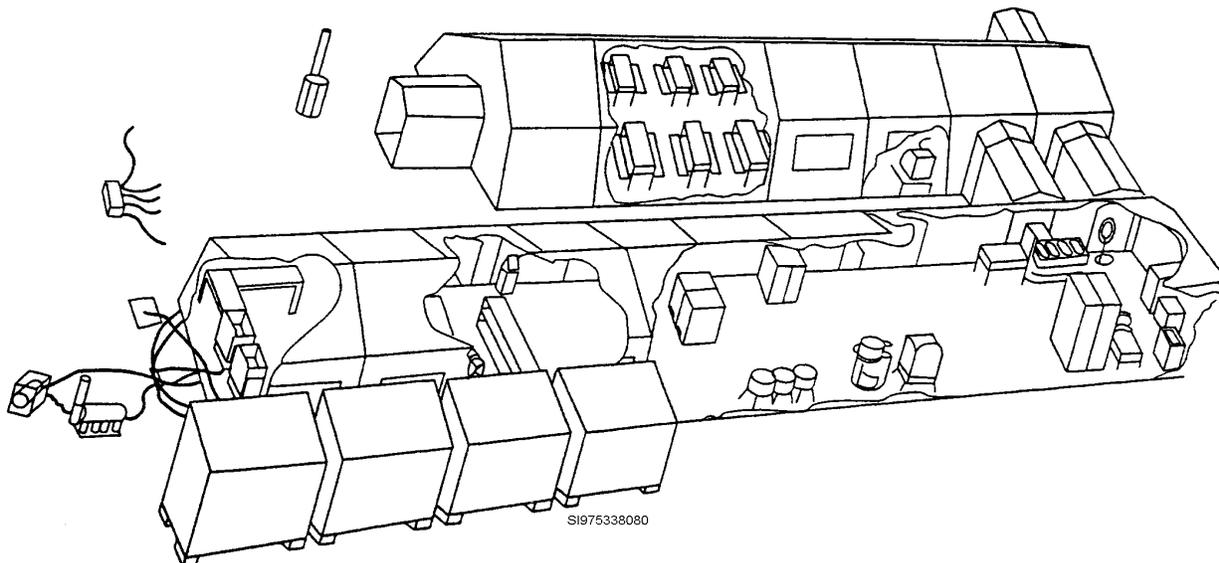
**Notice.** This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

## INSTALL POWER SUPPLY TO HE/HF KITCHEN EQUIPMENT

**1. Background:** The Harvest Falcon/Eagle kitchen facilities are completely portable food preparation and serving complexes. The Harvest Falcon kit (Figure 1) is designed to serve up to 1,100 personnel and seat 240. The Harvest Eagle kitchen facility (Figure 2) is designed to serve up to 550 personnel and seat 120. All tools, supplies, and equipment, with the exception of electrical and water supplies, are supplied in the kits. Refer to the appropriate TO in the event of actual facility installation and maintenance.



**Figure 1. Harvest Falcon Kitchen.**



**Figure 2. Harvest Eagle Kitchen.**

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

2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on connecting power supply to kitchen equipment. *After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8121 Harvest Falcon/Eagle Kitchen Equipment. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.*

**NOTE:**

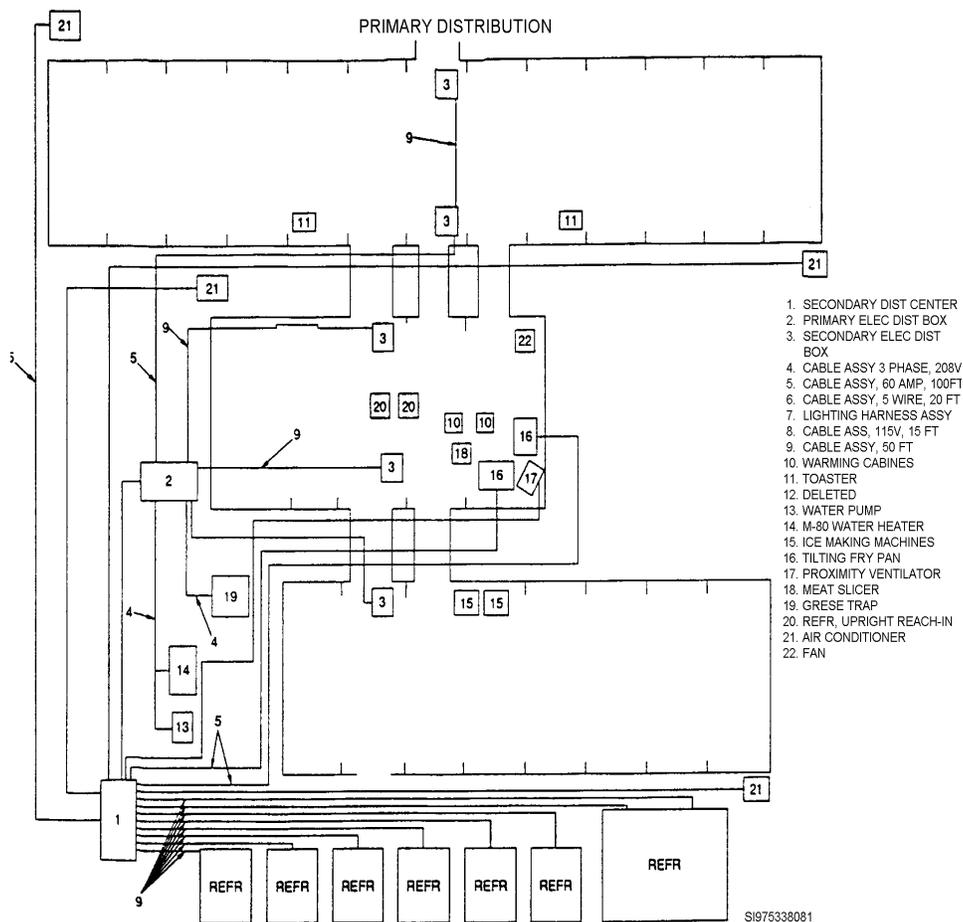
The review questions for this material are in the above-mentioned CD-ROM.

3. If the equipment is available, then perform the following steps:

3.1. Harvest Falcon (HF) kitchen equipment.

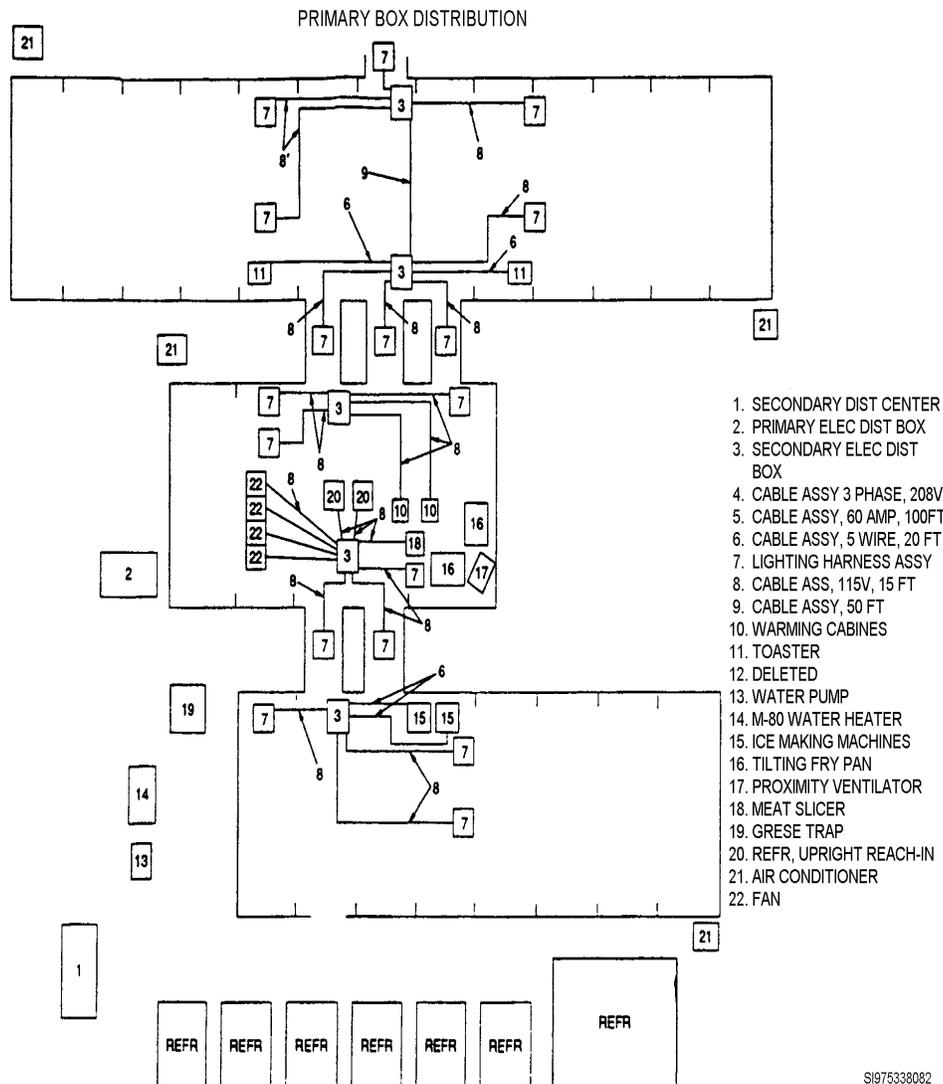
**Step 1: Power supply installation (HF).**

1.1. The Harvest Falcon kitchen must be fed by a 120/208-VAC power source that is capable of meeting its heavy load demands. Although other assets are capable of meeting these voltage levels, the load demands dictate providing the facility with its own dedicated SDC. The facility electrical system uses every available receptacle on the SDC. Figures 3 and 4 show the entire Harvest Falcon distribution circuit layout.



**Figure 3. HF Kitchen Primary Distribution Layout.**

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



**Figure 4. HF Kitchen Secondary Distribution.**

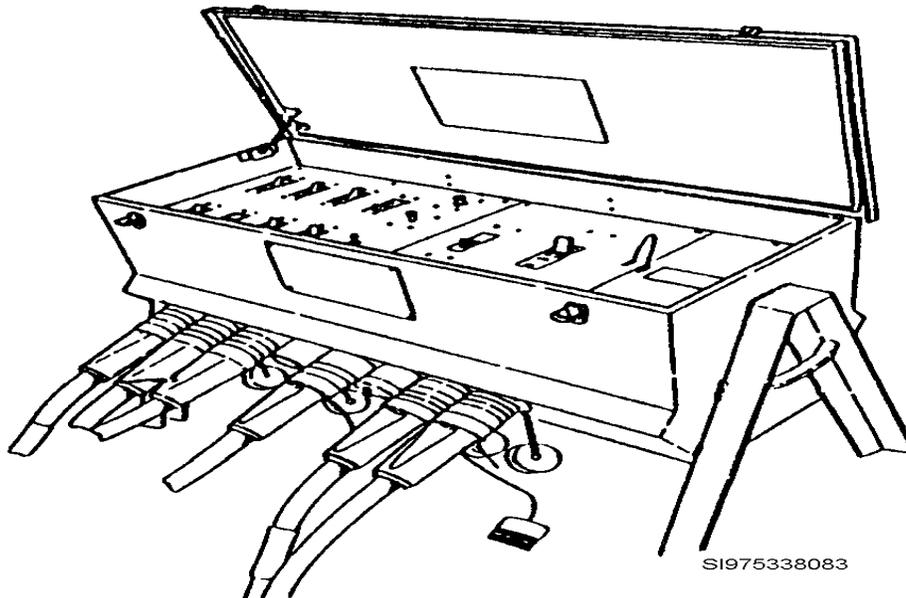
**Step 2: Power supply (HF).**

- 2.1. The SDC supplies power to the following circuits:
- 2.2. Eight circuits feed the walk-in refrigeration units through 50-foot, 3-phase, 60-amp cable assemblies.
- 2.3. Four circuits feed the air-conditioners through both 50 and 100-foot, 3-phase, 60-amp cable assemblies.
- 2.4. Two circuits feed the tilting fry pan appliances through 100-foot, 3-phase, 60-amp cable assemblies.
- 2.5. One circuit feeds the kitchen proximity ventilator through a 100-foot, 3-phase, 60-amp cable assembly.
- 2.6. One circuit feeds the primary distribution box through a 50-foot, 3-phase 60-amp cable assembly.

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

**Step 3: Primary distribution box (HF).**

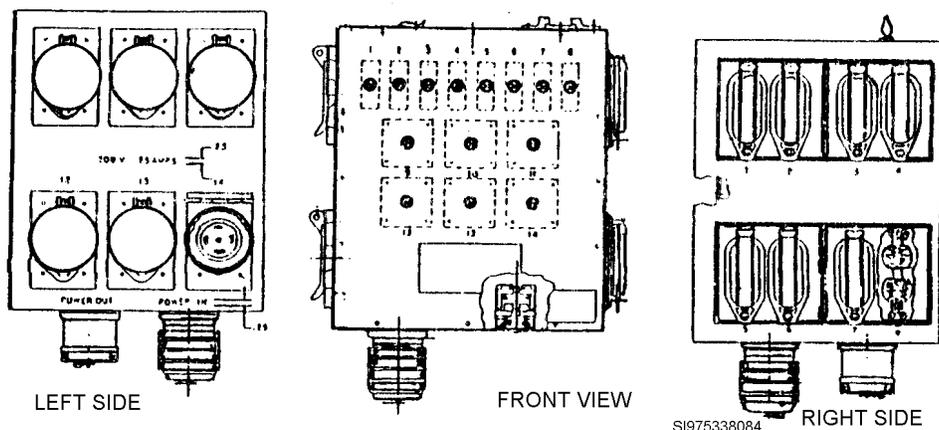
3.1. The primary distribution box (Figure, 5) receives its power from the SDC and supplies power to seven different circuits. The circuits include the five secondary electrical distribution boxes, the water pump, and the water heater.



**Figure 5. Primary Distribution Box.**

**Step 4: Secondary electrical distribution boxes (HF).**

4.1. The secondary electrical distribution boxes (Figure 6) supply power to a number of different appliances and equipment as illustrated in Figure 4. The equipment that receives power from the boxes includes light circuits, fans, upright refrigerators, warming cabinets, ice machines, toasters, and a meat slicer.



**Figure 6. Secondary Distribution Box.**

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

### 3.2. Harvest Eagle (HE) kitchen equipment.

#### Step 1: Power supply installation (HE).

1.1. The Harvest Eagle kitchen is much smaller than the Harvest Falcon kitchen. Due to its reduced size and load requirements, this facility gets all the power it needs from one 60-kW and one 30-kW generator (Figure, 7). The generators provide power to the entire facility by way of the two primary distribution boxes. The boxes not only serve as distribution points, they also provide circuit protection as well.

#### Step 2: Distribution boxes (Harvest Eagle).

2.1. One of the distribution boxes feeds the four refrigerators, two air-conditioners, and two of the four secondary electrical distribution boxes. The other distribution box feeds the grease trap, water heater, water pump, tilting fry pan, air-conditioner, and one of the four secondary electrical distribution boxes.

#### Step 3: Secondary electrical distribution boxes (Harvest Eagle).

3.1. The secondary electrical distribution boxes feed three fans, two light circuits, an upright refrigerator, meat slicer, warming cabinet, and a toaster (Figure 8).

#### Step 4: Protect cables.

4.1. One important thing to keep in mind when you install either kitchen is the protection of your distribution cables. Remember, the Harvest Falcon facility is designed to feed 1,100 people per meal. That many people walking around could destroy your distribution cables in no time. Bury the cables in any area where you expect a high volume of traffic.

**NOTE:**

If for any reason you are unable to bury them, fabricate a platform so people can walk over them.

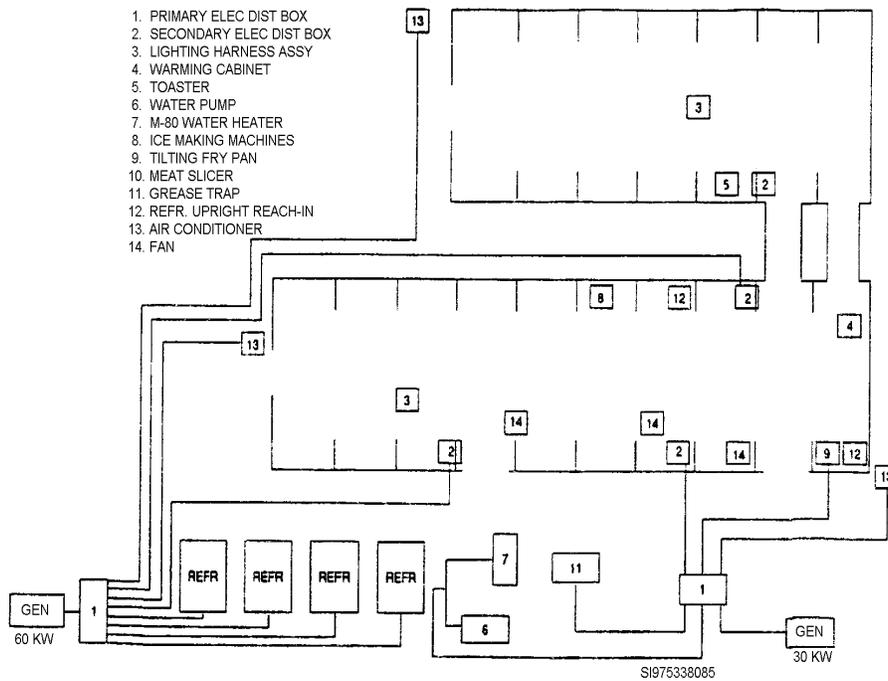


Figure 7. Harvest Eagle Kitchen Primary Distribution.

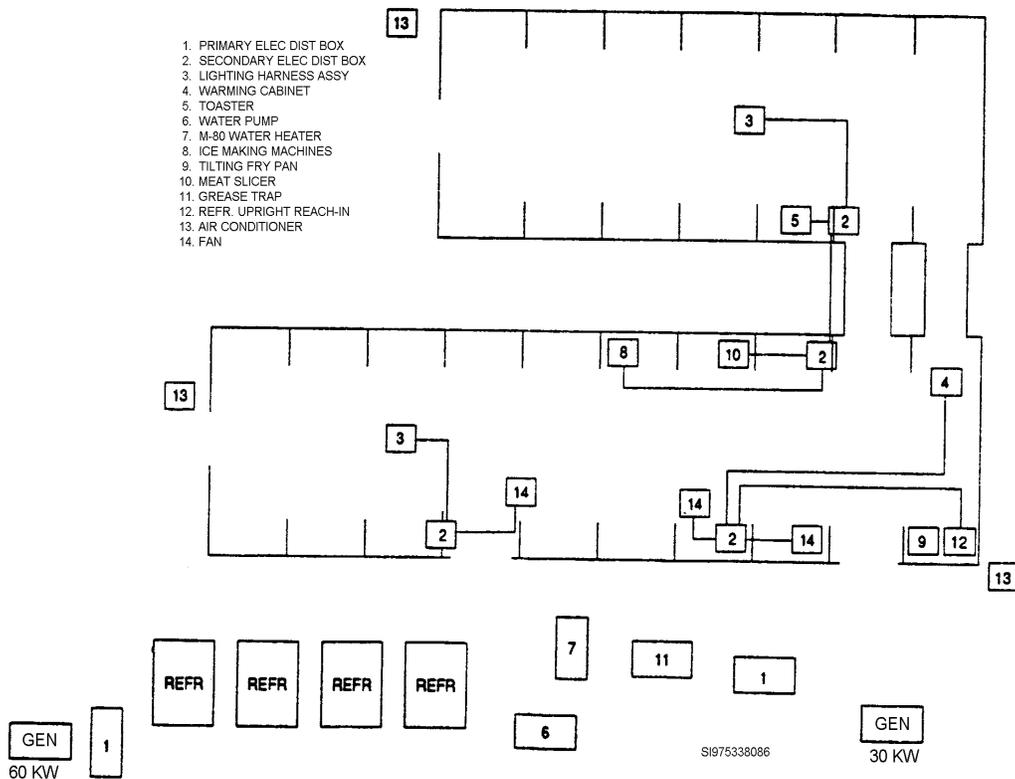


Figure 8. Harvest Eagle Kitchen Secondary Distribution.

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

**INSTALL POWER SUPPLY TO HE/HF KITCHEN EQUIPMENT**

**PERFORMANCE CHECKLIST**

**INSTRUCTIONS:**

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

<b>DID THE TRAINEE.....?</b>	<b>YES</b>	<b>NO</b>
<b>Harvest Falcon:</b>		
1. Know the voltage requirements for the Harvest Falcon kitchen facilities		
2. Know the main power sources for the Harvest Falcon kitchen facilities		
3. Know main components of the Harvest Falcon kitchen facilities		
4. Know the layouts for the Harvest Falcon kitchen facilities		
5. Connect the equipment correctly		
6. Comply with all the safety requirements		
<b>Harvest Eagle:</b>		
1. Know the voltage requirements for the Harvest Eagle kitchen facilities		
2. Know the main power sources for the Harvest Eagle kitchen facilities		
3. Know main components of the Harvest Eagle kitchen facilities		
4. Know the layouts for the Harvest Eagle kitchen facilities		
5. Connect the equipment correctly		
6. 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.



**HARVEST FALCON ASSETS**  
**BARE BASE ELECTRICAL DISTRIBUTION SYSTEM**  
**INSTALL**

**MODULE 27**

**AFQTP UNIT 2**

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**PRIMARY DISTRIBUTION CENTER (PDC) (27.2.2.6.1.1.2.)**  
**SECONDARY DISTRIBUTION CENTER-HIGH VOLTAGE (SDC-  
HV SECTION) (27.2.2.6.1.1.3.)**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

## INSTALL PDC/SDC-HV SECTION

**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.2.6.1.1.2., Install bare base PDC. 27.2.2.6.1.1.3., Install bare base SDC-HV section.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA1-2-6-1, Operation and Maintenance Instructions, Primary Distribution Center.</a></li> <li>7. <a href="#">TO 35CA2-2-10-1, Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TOs 35CA1-2-6-1 and 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Hot sticks</li> <li>2. Rubber gloves</li> <li>3. Multimeter</li> <li>4. High voltage tester</li> <li>5. Megger</li> <li>6. Phase rotation meter</li> <li>7. Work gloves</li> <li>8. Hand tools</li> </ol>
<b>Learning Objective:</b>	The trainee will learn the steps required to safely install PDC/SDC-HV section.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to install a PDC/SDC-HV section.</li> <li>2. Trainee will know the safety requirements in install a PDC/SDC-HV section.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## INSTALL PDC/SDC-HV SECTION

**1. Background:** The Bare Base Electrical Distribution System is comprised of MEP 12 power generators rated at 750 kW with an output of 2400/ 4160. Power Distribution Centers (PDC) which provide switching control of up to 6 primary circuits distributed through out the base. Secondary Distribution Centers that step down the 4160V to 120/ 208V to supply power for tents, buildings, and other equipment. You may be required to set up a bare base electrical distribution system at any time or any place in the world. The purposes may range from natural disasters, such as Hurricane Andrew at Homestead AFB, Fla. to support military operations such as Desert Shield/Desert Storm.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on installing a PDC/SDC-HV section. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8127 Harvest Falcon Electrical Dist. System, Lessons 5. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA1-2-6-1.**

**Step 2: Install PDC/SDC-HV section.**

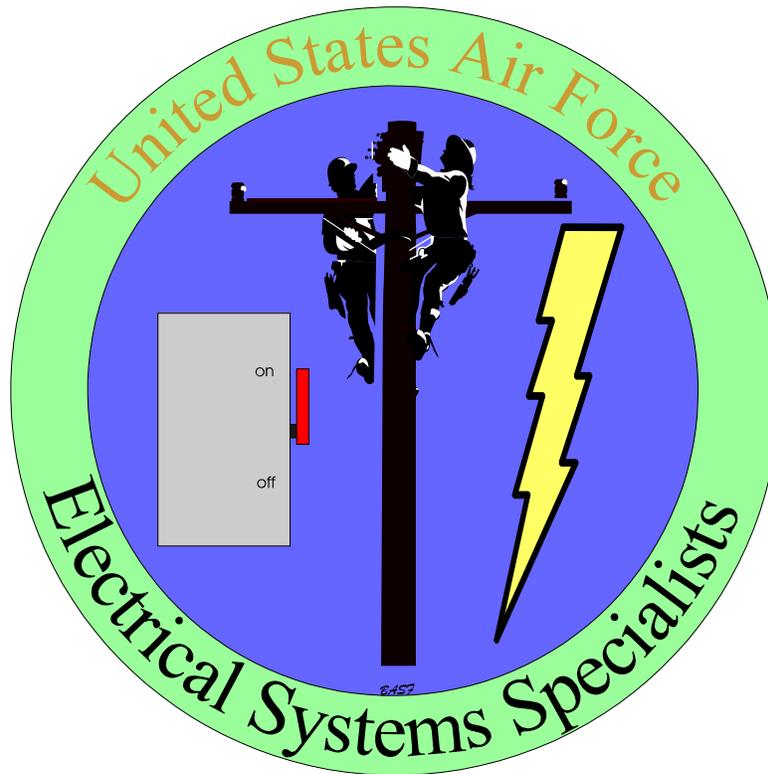
**2.1. Refer to TO 35CA1-2-6-1, Section III, paragraph 3-2.**

**INSTALL PDC/SDC-HV SECTION****PERFORMANCE CHECKLIST****INSTRUCTIONS:**

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

<b>DID THE TRAINEE...?</b>	<b>YES</b>	<b>NO</b>
1. Locate TO 35CA1-2-6-1.		
2. Properly follow the install procedure for a PDC/SDC-HV section		
3. 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.



**HARVEST FALCON (HF) ASSETS**  
**BARE BASE ELECTRICAL DISTRIBUTION SYSTEM**  
**INSTALL**

**MODULE 27**

**AFQTP UNIT 2**

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**HIGH VOLTAGE CABLE (27.2.2.6.1.1.4.)**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**INSTALL HIGH VOLTAGE CABLE**  
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.2.2.6.1.1.4., Install bare base high voltage cable.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA1-2-6-1, Operation and Maintenance Instructions, Primary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35CA1-2-6-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Hot stick.</li> <li>2. Rubber gloves.</li> <li>3. Multimeter.</li> <li>4. High voltage tester.</li> <li>5. Megger.</li> <li>6. Phase rotation meter.</li> <li>7. Work gloves.</li> <li>8. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely install, high voltage cable.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to install high voltage cable.</li> <li>2. Trainee will know the required steps to install high voltage cable.</li> </ol>
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>	

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

## INSTALL HIGH VOLTAGE CABLE

**1. Background:** Primary cables transmit 4160 VAC primary power from a commercial power source or 750kw generator to the PDC's and from the PDC's to the SDC's as required; primary cables also interconnect PDC's when they are used as bus ties. Each primary cable reel pallet contains three reels of primary cable, and cable can be laid from one, two, or all three reels simultaneously. Three primary cables are required, one for each phase.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on installing high voltage cable. After completing, the CD-ROM AFQTP see your *Unit Education and Training Manager* to take the mandatory CerTest # 8127 *Harvest Falcon Electrical Dist. System, Lessons 5*. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Place the primary cable reel pallet on the truck or forklift and secure in place.** (Either the 10K 463L Adverse Terrain Forklift or a suitable truck may be used to lay the cable.)

**Step 2: Secure the free cable end(s) to some solid object at or near the power source.** Leave sufficient cable to connect to the output terminals of power source.

**WARNING:**

**EXCESSIVE SPEED OF THE CABLE-LAYING VEHICLE CAN CAUSE THE CABLE REEL(S) TO CONTINUE TO SPIN AFTER THE VEHICLE STOPS. ATTEMPTING TO STOP THE REEL CAN CAUSE SERIOUS INJURY TO PERSONNEL.**

**Step 3: Move the cable-laying vehicle slowly along the predetermined cable route, allowing the cable to pay out freely. When nearing the end of the cable path, decelerate slowly to minimize cable reel spin.**

**Step 4: When the primary cable has been laid as required, return the primary cable reel pallet to the storage area.**

**WARNING:**

**DO NOT ATTEMPT TO CONNECT THE PRIMARY CABLES WHEN POWER IS APPLIED TO ANY PART OF THE SYSTEM. LETHAL SHOCK TO HANDLING PERSONNEL CAN RESULT.**

**Step 5: Check the primary cable connection to be sure they are in good condition, and that cable wires are properly connected to cable connector terminals. Cable termination and connection to the SDC may be accomplished at this time if desired.**

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

## INSTALL HIGH VOLTAGE CABLE

### 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. Secure the cable reels		
2. Secure the free cable end (s) to a solid object		
3. Leave enough cable to connect to the output terminals of the power source		
4. Lay the cable on predetermined route		
5. Have the vehicle to decelerate slowly when nearing the end of the cable route		
6. Return the primary cable reel pallet to the storage area		
7. Check the cable connectors		
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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

#### OPERATE

MODULE 27

AFQTP UNIT 2

---

**PRIMARY DISTRIBUTION CENTER (PDC) (27.2.2.6.1.2.2.)**  
**SECONDARY DISTRIBUTION CENTER-HIGH VOLTAGE (SDC-  
HV) SECTION (27.2.2.6.1.2.3.)**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

## OPERATE PDC/SDC-HV SECTION

**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.2.6.1.2.2., Operate bare base PDC.. 27.2.2.6.1.2.3., Operate bare base SDC-HV section.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA1-2-6-1, Operation and Maintenance Instructions, Primary Distribution Center.</a></li> <li>7. TO 35CA2-2-10-1, <i>Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</i></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TOs 35CA1-2-6-1 and 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Hot stick.</li> <li>2. Rubber gloves.</li> <li>3. Multimeter.</li> <li>4. High voltage tester.</li> <li>5. Megger.</li> <li>6. Phase rotation meter.</li> <li>7. Work gloves.</li> <li>8. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely operate PDC/SDC-HV section.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to operate PDC/SDC-HV section.</li> <li>2. Trainee will know the required steps to operate PDC/SDC-HV section.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## OPERATE PDC/SDC-HV SECTION

**1. Background:** The PDC acts as a control and director of power from various sources. It will accept up to four inputs. These inputs are combined on a three-phase main bus assembly. The power from the main bus assembly is routed to six fuse/switch assemblies. These fuse/switch assemblies act as overcurrent protection and switching control for output (load) circuits. Each fuse/switch assembly handles all three phases for one output.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on operating a PDC/SDC-HV section. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8127 Harvest Falcon Electrical Dist. System, Lessons 5. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA1-2-6-1.**

**Step 2: Operate PDC/SDC-HV section.**

**2.1. Refer to TO 35CA1-2-6-1, Section IV, paragraph 4-2.**

**OPERATE PDC/SDC-HV SECTION****PERFORMANCE CHECKLIST****INSTRUCTIONS:**

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

<b>DID THE TRAINEE....?</b>	<b>YES</b>	<b>NO</b>
1. Locate TO 35CA1-2-6-1		
2. Operate PDC/SDC-HV section in accordance with TO instructions		
3. 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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

#### MAINTAIN

MODULE 27

AFQTP UNIT 2

---

**PRIMARY DISTRIBUTION CENTER (PDC) (27.2.2.6.1.3.1.)**  
**SECONDARY DISTRIBUTION CENTER-HIGH VOLTAGE (SDC-  
HV) SECTION (27.2.2.6.1.3.2.)**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

## MAINTAIN PDC/SDC-HV SECTION

### *Task Training Guide*

<b>STS Reference Number/Title:</b>	27.2.2.6.1.3.1., Maintain bare base PDC. 27.2.2.6.1.3.2., Maintain bare base SDC-HV section.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA1-2-6-1, Operation and Maintenance Instructions, Primary Distribution Center.</a></li> <li>7. TO 35CA2-2-10-1, <i>Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</i></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TOs 35CA1-2-6-1 and 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Hot stick.</li> <li>2. Rubber gloves.</li> <li>3. Multimeter.</li> <li>4. High voltage tester.</li> <li>5. Megger.</li> <li>6. Phase rotation meter.</li> <li>7. Work gloves.</li> <li>8. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely maintain PDC/SDC-HV section.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to maintain PDC/SDC-HV section.</li> <li>2. Trainee will know the required steps to maintain PDC/SDC-HV section.</li> </ol>
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>	

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

## MAINTAIN PDC/SDC-HV SECTION

**1. Background:** To ensure that the PDC/SDC-HV section is ready for operation at all times it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary inspections and preventive maintenance procedures are listed and described in this unit.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on operating a PDC/SDC-HV section. After completing, the CD-ROM AFQTP see your *Unit Education and Training Manager* to take the mandatory CerTest # 8127 *Harvest Falcon Electrical Dist. System, Lessons 5*. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA1-2-6-1.**

**Step 2: Perform inspection and maintenance on PDC/SDC-HV section.**

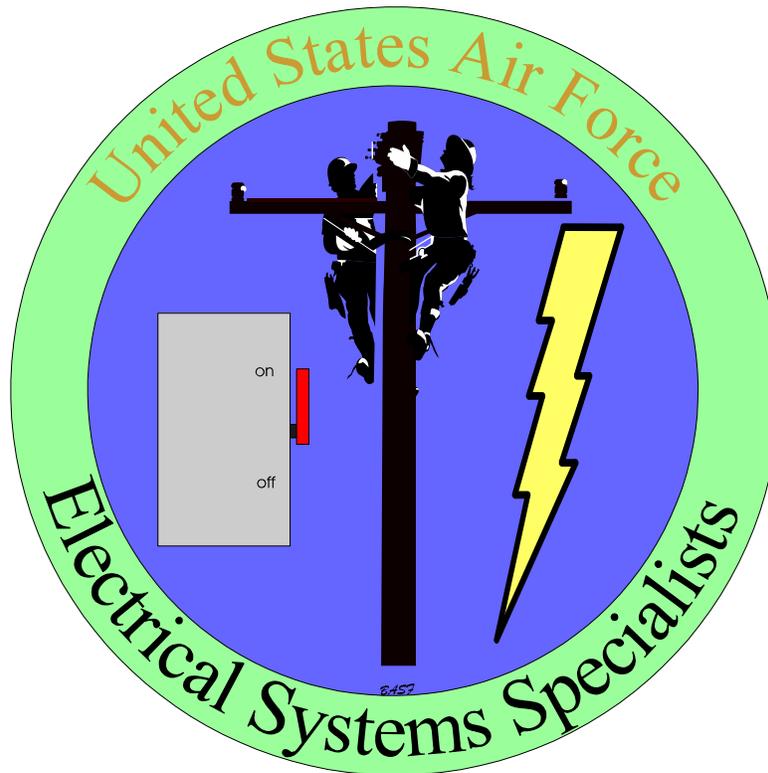
**2.1. Refer to TO 35CA1-2-6-1, Section V, paragraph 5-3.**

**MAINTAIN PDC/SDC-HV SECTION****PERFORMANCE CHECKLIST****INSTRUCTIONS:**

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

<b>DID THE TRAINEE....?</b>	<b>YES</b>	<b>NO</b>
1. Locate TO 35CA1-2-6-1		
2. Perform inspections in accordance with TO reference		
3. 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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

### TROUBLESHOOT

MODULE 27

AFQTP UNIT 2

PRIMARY DISTRIBUTION CENTER (PDC) (27.2.2.6.1.4.1.)

SECONDARY DISTRIBUTION CENTER-HIGH VOLTAGE (SDC-HV) SECTION (27.2.2.6.1.4.2.)

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

## TROUBLESHOOT PDC/SDC-HV SECTION

**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.2.6.1.4.1., Maintain bare base PDC. 27.2.2.6.1.4.2., Maintain bare base SDC-HV section.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA1-2-6-1, Operation and Maintenance Instructions, Primary Distribution Center.</a></li> <li>7. <a href="#">TO 35CA2-2-10-1, Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TOs 35CA1-2-6-1 and 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Hot stick.</li> <li>2. Rubber gloves.</li> <li>3. Multimeter.</li> <li>4. High voltage tester.</li> <li>5. Megger.</li> <li>6. Phase rotation meter.</li> <li>7. Work gloves.</li> <li>8. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely troubleshoot PDC/SDC-HV section.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to troubleshoot PDC/SDC-HV section.</li> <li>2. Trainee will know the required steps to troubleshoot PDC/SDC-HV section.</li> </ol>
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> <li>3. Trainer must develop an exercise scenario to validate ability of trainee to meet learning objective and samples of behavior.</li> </ol>	

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

## TROUBLESHOOT PDC/SDC-HV SECTION

**1. Background:** Troubleshooting is the orderly process of checking and eliminating possible causes of trouble until the exact cause of the trouble is found. As a rule, the best place to start looking for the cause of trouble in a circuit or system is at the source of power or supply. Continue testing or checking the circuit or system, step-by-step, in an orderly manner, until the cause of the trouble is located. The troubleshooting charts provided in technical orders provide information useful in diagnosing and correcting certain troubles which cause unsatisfactory operation or failure of the equipment.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on operating a PDC/SDC-HV section. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8127 Harvest Falcon Electrical Dist. System, Lessons 5. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA1-2-6-1.**

**Step 2: Perform troubleshooting on PDC/SDC-HV section.**

**2.1. Refer to TO 35CA1-2-6-1, Section V, paragraph 5-5.**

**TROUBLESHOOT PDC/SDC-HV SECTION****PERFORMANCE CHECKLIST****INSTRUCTIONS:**

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

<b>DID THE TRAINEE....?</b>	<b>YES</b>	<b>NO</b>
1. Locate TO 35CA1-2-6-1		
2. Locate the trouble		
3. Correct the problem		
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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

### INSTALL

MODULE 27

AFQTP UNIT 2

---

## SECONDARY DISTRIBUTION CENTER-LOW VOLTAGE (SDC-LV) SECTION (27.2.2.6.2.1.2.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**INSTALL SDC-LV SECTION**  
**Task Training Guide**

<b>STS Reference Number/Title:</b>	26.2.2.6.2., Install bare base secondary distribution system (SDC-LV section).
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA2-2-10-1, Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: Harvest Falcon Electrical Distribution System.</b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Multimeter.</li> <li>2. High voltage tester.</li> <li>3. Megger.</li> <li>4. Phase rotation meter.</li> <li>5. Work gloves.</li> <li>6. Hand tools.</li> </ol>
<b>Learning Objective:</b>	Trainee will be able to install SDC-LV section.
<b>Samples of Behavior:</b>	Trainee will know the required steps to install SDC-LV section.
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## INSTALL SDC-LV SECTION

**1. Background:** The SDC consists of a distribution transformer, which steps down the 4,160-V primary to 120/208-V, 3-phase, 60-Hz, 5-wire secondary distribution. The SDC is capable of accepting power directly from a PDC or a loop feed from another SDC. A manual transfer switch enables the SDC to accept power directly from a mission essential power (MEP) generator or from commercial power by changing from base source to the alternate source. Therefore, in the case of a primary power failure, the SDC can accept power from any 120/208-v, 3-phase, 60-Hz source including the EMU, MB, or MEP series generators.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on installing a SDC-LV section. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8128 *Harvest Falcon Electrical Dist. System, Lessons 6 and 7*. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA2-2-10-1.**

**Step 2: Install SDC-LV Section.**

**2.1. Refer to TO 35CA2-2-10-1, Section III, paragraph 3-2.**

## INSTALL SDC-LV SECTION

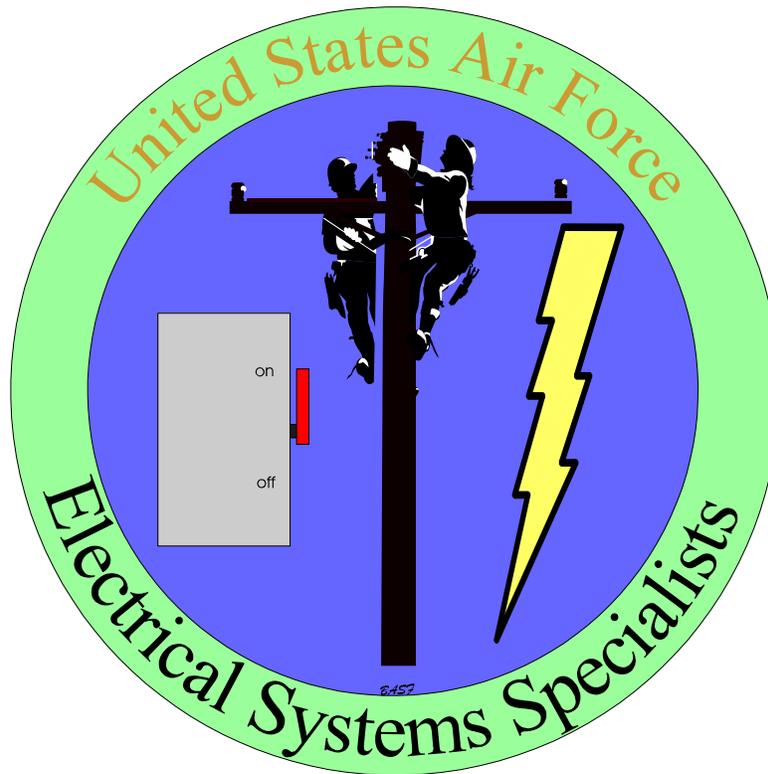
### PERFORMANCE CHECKLIST

#### 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. Locate TO 35CA2-2-10-1.		
2. Properly install the SDC-LV section		
3. 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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

### INSTALL

MODULE 27

AFQTP UNIT 2

---

### POWER DISTRIBUTION PEDESTAL (PDP) (27.2.2.6.2.1.3.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**INSTALL PDP**  
**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.2.6.2.1.3., Install bare base PDP.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA6-1-101, Combined Operation, Maintenance, and Overhaul Instructions, Power Distribution Panel (PDP).</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Multimeter.</li> <li>2. High voltage tester.</li> <li>3. Megger.</li> <li>4. Phase rotation meter.</li> <li>5. Work gloves.</li> <li>6. Hand tools.</li> </ol>
<b>Learning Objective:</b>	Trainee will be able to install PDP.
<b>Samples of Behavior:</b>	Trainee will know the required steps to install PDP section.
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## INSTALL PDP

**1. Background:** The PDP receives 60-Hz AC power by way of a cylindrical connector on its outside panel. Power, at 120/208 volts, 3-phase, is distributed and controlled in a panelboard under a weather resistant cover, or deadfront panel. Individual 3 phase and single-phase circuit breakers control power output to military-style Class L connectors and MEMA-style “twist Lock” connectors, for connection by cable to users’ equipment. All circuit breakers are of the thermal magnetic trip type, which open if one or more phases overloaded. In addition to the thermal magnetic trip, all of the 20-amper, single phase circuit breakers are of the Ground Fault Circuit Interruption (GFCI) type which trip when a small leakage circuit to ground is detected.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on installing a PDP. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8128 Harvest Falcon Electrical Dist. System, Lessons 6 and 7. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA6-1-101.**

**Step 2: Install PDP.**

**2.1. Refer to TO 35CA6-1-101, Section III, paragraph 3-1.**

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

## INSTALL PDP

### 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. Locate TO 35CA6-1-101.		
2. Properly set up PDP for installation		
3. 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.



**HARVEST FALCON (HF) ASSETS**  
**BARE BASE ELECTRICAL DISTRIBUTION SYSTEM**  
**INSTALL**

**MODULE 27**

**AFQTP UNIT 2**

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**LOW VOLTAGE CABLE (27.2.2.6.2.1.4.)**

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**INSTALL LOW VOLTAGE CABLE**  
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.2.2.6.2.1.4., Install bare base low voltage cable.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA1-2-6-1, Operation and Maintenance Instructions, Primary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35CA1-2-6-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Multimeter.</li> <li>2. High voltage tester.</li> <li>3. Megger.</li> <li>4. Phase rotation meter.</li> <li>5. Work gloves.</li> <li>6. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely install, low voltage cable.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to install low voltage cable.</li> <li>2. Trainee will know the required steps to install low voltage cable.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## INSTALL LOW VOLTAGE CABLE

**1. Background:** Low voltage cable assemblies in 50- and 100-foot lengths are stored in bins in each secondary distribution center (SDC), remote area light system (RALS), in shelters, and on pallets. The 100-foot lengths weigh 97 pounds each, and the 50-foot lengths weigh 52 pounds each. Each RALS container also contains one 50-foot and two 100-foot low voltage cable assemblies to connect the RALS to the SDC; also contained in the RALS container are four 375-foot loop cord assemblies, each weighing 135 pounds.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on installing low voltage cable. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8128 *Harvest Falcon Electrical Dist. System, Lessons 5 and 6*. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**WARNING:**

**COILED CABLES ARE HEAVY. GET HELP WHEN NECESSARY AND LIFT CAREFULLY TO PREVENT INJURY WHEN REMOVING OR RETURNING CABLES TO THE STORAGE AREA.**

**Step 1: Remove the low voltage cable assemblies from the stowage spaces.**

**1.1.** Cable assemblies for shelters are stowed in the shelter requiring electrical power.

**WARNING:**

**DO NOT CONNECT THE SECONDARY CABLE ASSEMBLIES TO THE OUTPUT RECEPTACLES OF THE SDC UNTIL THE ENTIRE SYSTEM HAS BEEN INSTALLED AND POST-INSTALLED CHECKS HAVE BEEN MADE. POWERED CABLES REPRESENT A SHOCK HAZARD TO INSTALLING PERSONNEL.**

**Step 2: Lay out the low voltage cable assemblies along predetermined paths to the various loads starting at the SDC.**

**NOTE:**

Be sure to start with the plug (male) end of the cable assembly at the SDC, and leave enough cable at the SDC to permit insertion into the output receptacle.

**Step 3: Connect additional lengths of cable as necessary to reach the shelters, hangers, or other loads.**

**3.1.** As the cable is laid, check the cable connectors to be sure they are clean and that the terminals are in good condition.

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

**CAUTION:**

**CABLE-RUNS OVER 150 FEET EXCEED THE WORST-CASE CRITERIA. INSURE THAT VOLTAGE AT LOAD DOES NOT DROP BELOW 114 VAC.**

**Step 4: Connect the load ends of the low voltage cable assemblies to the input receptacles at the loads.**

## INSTALL LOW VOLTAGE CABLE

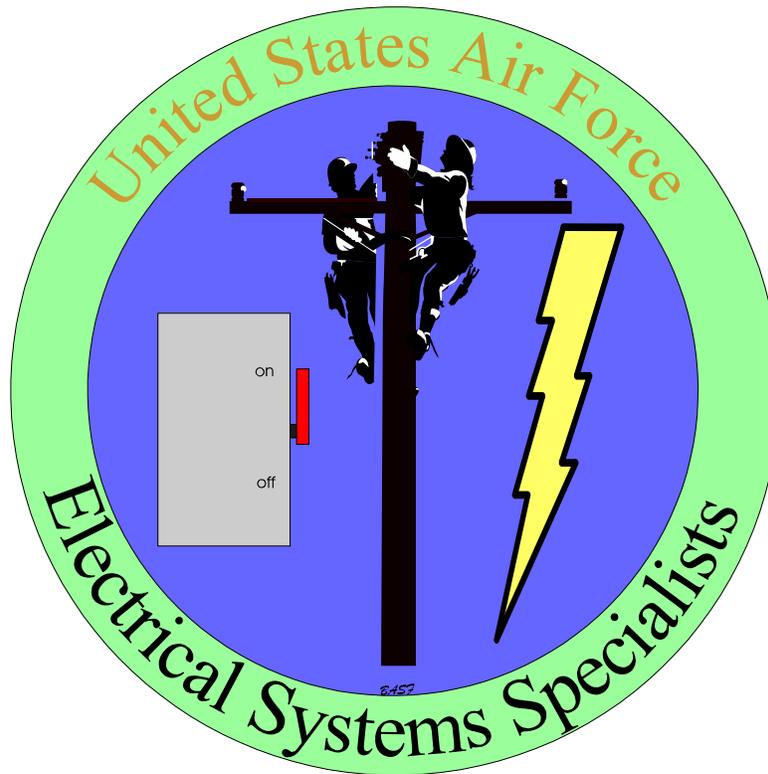
### PERFORMANCE CHECKLIST

#### 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. Remove the cable assembly from stowage spaces		
2. Lay the cable assemblies on predetermined paths		
3. Leave enough cable assembly (male end) to connect to the output receptacle of the SDC		
4. Connect the load ends cable assemblies to input receptacles at the load		
5. Check the cable assemblies for defects		
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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

### OPERATE

MODULE 27

AFQTP UNIT 2

---

### SECONDARY DISTRIBUTION CENTER-LOW VOLTAGE (SDC-LV) SECTION (27.2.2.6.2.2.2.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**OPERATE SDC-LV SECTION**  
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.2.2.6.2.2.2., Operate bare base SDC-LV section.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA2-2-10-1, Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Multimeter.</li> <li>2. High voltage tester.</li> <li>3. Megger.</li> <li>4. Phase rotation meter.</li> <li>5. Work gloves.</li> <li>6. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to operate SDC-LV section.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to operate SDC-LV section.</li> <li>2. Trainee will know the required steps to operate SDC-LV section.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## OPERATE SDC-LV SECTION

**1. Background:** The SDC is designed to accept 4160 VAC three-phase, 60-Hz primary power from a generator or commercial power source, step the voltage down through transformer and distribute the resulting 120/208 VAC power to various loads such as airfield lighting systems, shelters, hangers, remote area lighting systems, and other systems requiring 120/208 VAC electrical power.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on operating a SDC-LV section. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8128 *Harvest Falcon Electrical Dist. System, Lessons 6 and 7*. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA2-2-10-1.**

**Step 2: Operate SDC-LV section.**

**2.1. Refer to TO 35CA2-2-10-1, Section IV, paragraph 4-2.**

## OPERATE SDC-LV SECTION

### PERFORMANCE CHECKLIST

#### INSTRUCTIONS:

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

STEP	YES	NO
1. Locate TO 35CA2-2-10-1		
2. Operate the SDC-LV section in accordance with TO reference		
3. 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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

### OPERATE

MODULE 27

AFQTP UNIT 2

---

POWER DISTRIBUTION PEDESTAL (PDP) (27.2.2.6.2.2.3.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**OPERATE PDP**  
**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.2.6.2.2.3., Operate bare base PDP.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA6-1-101, Combined Operation, Maintenance, and Overhaul Instructions, Power Distribution Panel.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35CA5-1-101.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: Harvest Falcon Electrical Distribution System.</b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Multimeter.</li> <li>2. High voltage tester.</li> <li>3. Megger.</li> <li>4. Phase rotation meter.</li> <li>5. Work gloves.</li> <li>6. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to operate PDP.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to operate PDP.</li> <li>2. Trainee will know the required steps to operate PDP.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## OPERATE PDP

**4. Background:** They are six configurations of the PDP; 15kW, 25kW, 30kW, 60kW, 100kW, or 200kW. The PDP is completely self-contained in a single assembly, and required no auxiliary items of equipment. Power input and distribution lines must be equipped with connectors which are compatible with the connectors mounted on the PDP's.

**5. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: Harvest Falcon Electrical Distribution System for detailed instruction on operating a PDP. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8128 Harvest Falcon Electrical Dist. System, Lessons 6 and 7. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**6. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA6-1-101.**

**Step 2: Operate PDP.**

**2.1. Refer to TO 35CA6-1-101, Section IV, paragraph 4-1.**

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

## OPERATE PDP

### 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. Locate TO 35CA6-1-101		
2. Operate the PDP in accordance with TO reference		
3. 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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

### MAINTAIN

MODULE 27

AFQTP UNIT 2

---

## SECONDARY DISTRIBUTION CENTER-LOW VOLTAGE (SDC-LV) SECTION (27.2.2.6.2.3.1.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**MAINTAIN SDC-LV SECTION**  
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.2.2.6.2.3.1., Maintain bare base SDC-LV section.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA2-2-10-1, Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Multimeter.</li> <li>2. High voltage tester.</li> <li>3. Megger.</li> <li>4. Phase rotation meter.</li> <li>5. Work gloves.</li> <li>6. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to maintain SDC-LV section.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to maintain SDC-LV section.</li> <li>2. Trainee will know the required inspection and preventive maintenance to maintain SDC-LV section.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## MAINTAIN SDC-LV SECTION

**1. Background:** To ensure that the SDC is ready for operation at all times it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on maintaining a SDC-LV section. After completing, the CD-ROM AFQTP see your *Unit Education and Training Manager* to take the mandatory CerTest # 8128 *Harvest Falcon Electrical Dist. System, Lessons 6 and 7*. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA2-2-10-1.**

**Step 2: Perform inspection and maintenance on SDC-LV section.**

**2.2. Refer to TO 35CA2-2-10-1, Section IV, paragraph 5-3.**

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

## MAINTAIN SDC-LV SECTION

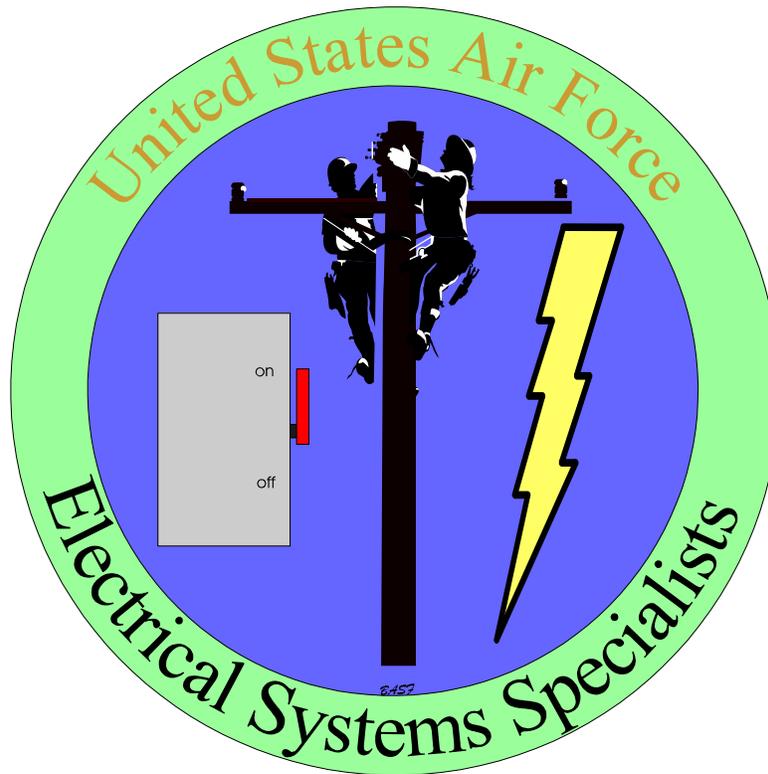
### PERFORMANCE CHECKLIST

#### 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. Locate TO 35CA2-2-10-1		
2. Perform inspection and preventive maintenance checks of the SDC-LV section in accordance with TO reference		
3. 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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

#### MAINTAIN

MODULE 27

AFQTP UNIT 2

---

### POWER DISTRIBUTION PEDESTAL (PDP) (27.2.2.6.2.3.2.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**MAINTAIN PDP**  
**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.2.6.2.3.2., Maintain bare base PDP.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA6-1-101, Combined Operation, Maintenance, and Overhaul Instructions, Power Distribution Panel.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35CA6-1-101.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: Harvest Falcon Electrical Distribution System.</b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Multimeter.</li> <li>2. High voltage tester.</li> <li>3. Megger.</li> <li>4. Phase rotation meter.</li> <li>5. Work gloves.</li> <li>6. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to maintain PDP.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to maintain PDP.</li> <li>2. Trainee will know the required steps to maintain PDP.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## MAINTAIN PDP

**1. Background:** Disassembly of the PDP preliminary to inspection, repair, and replacement of parts normally consists only of removing the deadfront panel. The deadfront panel is the operating of the PDP and, when removed, exposed all of the circuit breakers. The deadfront panel protects the user from exposure to internal voltages. Access to the panelboard interior is necessary for certain repair procedures.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on maintaining a PDP. After completing, the CD-ROM AFQTP see your *Unit Education and Training Manager* to take the mandatory CerTest # 8128 *Harvest Falcon Electrical Dist. System, Lessons 6 and 7*. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA6-1-101.**

**Step 2: Perform inspection and maintenance on PDP.**

**2.1. Refer to TO 35CA6-1-101, Section V, paragraph 5-2.**

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

## MAINTAIN PDP

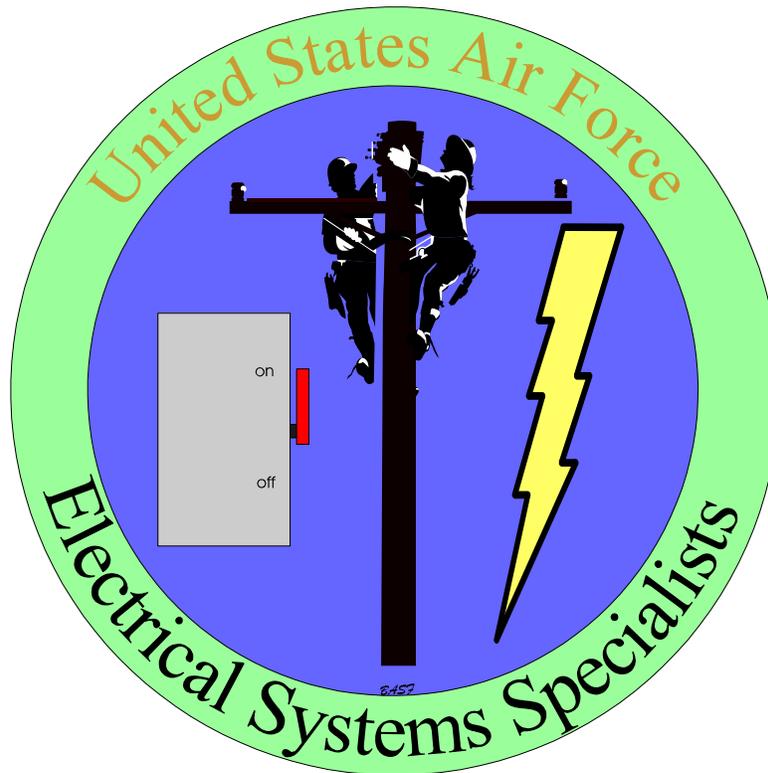
### PERFORMANCE CHECKLIST

#### 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. Locate TO 35CA6-1-101		
2. Perform inspection and maintenance in accordance with TO reference		
3. 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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

### TROUBLESHOOT

MODULE 27

AFQTP UNIT 2

---

## SECONDARY DISTRIBUTION CENTER-LOW VOLTAGE (SDC-LV) (27.2.2.6.2.4.1.)

### LOW VOLTAGE (LV) CABLES (27.2.2.6.2.4.3.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

## TROUBLESHOOT SDC-LV SECTION/LV CABLES

**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.2.6.2.4.1., Troubleshoot bare base SDC-LV section. 27.2.2.6.2.4.3., Troubleshoot LV cables.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA1-2-6-1, Operation and Maintenance Instructions, Primary Distribution Center.</a></li> <li>7. <a href="#">TO 35CA2-2-10-1, Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TOs 35CA1-2-6-1 and 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Hot stick.</li> <li>2. Rubber gloves.</li> <li>3. Multimeter.</li> <li>4. High voltage tester.</li> <li>5. Megger.</li> <li>6. Phase rotation meter.</li> <li>7. Work gloves.</li> <li>8. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely troubleshoot SDC-LV section and LV cables.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to troubleshoot SDC-LV section and LV cables.</li> <li>2. Trainee will know the required steps to troubleshoot SDC-LV section and LV cables.</li> </ol>
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> <li>3. Trainer must develop an exercise scenario to validate ability of trainee to meet learning objective and samples of behavior.</li> </ol>	

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

## TROUBLESHOOT SDC-LV SECTION/LV CABLES

**1. Background:** Troubleshooting is the orderly process of checking and eliminating possible causes of trouble until the exact cause of the trouble is found. As a rule, the best place to start looking for the cause of trouble in a circuit or system is at the source of power or supply. Continue testing or checking the circuit or system, step-by-step, in an orderly manner, until the cause of the trouble is located. The troubleshooting charts provided in technical orders provide information useful in diagnosing and correcting certain troubles which cause unsatisfactory operation or failure of the equipment.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on troubleshooting a SDC-LV section/LV cables. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8128 Harvest Falcon Electrical Dist. System, Lessons 6 and 7. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA2-2-10-1.**

**Step 2: Perform troubleshooting on SDC-LV section/LV cables.**

**2.1. Refer to TO 35CA2-2-10-1, Section V, paragraph 5-5.**

**TROUBLESHOOT SDC-LV SECTION/LV CABLES****PERFORMANCE CHECKLIST****INSTRUCTIONS:**

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

<b>DID THE TRAINEE....?</b>	<b>YES</b>	<b>NO</b>
1. Locate TO 35CA2-2-10-1		
2. Locate the trouble		
3. Correct the problem		
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.



## HARVEST FALCON (HF) ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

### TROUBLESHOOT

MODULE 27

AFQTP UNIT 2

---

### POWER DISTRIBUTION PANEL (PDP) (27.2.2.6.2.4.2.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**TROUBLESHOOT PDP**  
**Task Training Guide**

<b>STS Reference Number/Title:</b>	27.2.2.6.2.4.2., Troubleshoot bare base PDP.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>6. <a href="#">Technical Order (TO) 35CA6-1-101, Combined Operation and Maintenance Instructions, Power Distribution Panel (PDP).</a></li> <li>7. <a href="#">TO 35CA2-2-10-1, Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TOs 35CA6-1-101 and 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: Harvest Falcon Electrical Distribution System.</b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Multimeter.</li> <li>2. Megger.</li> <li>3. Phase rotation meter.</li> <li>4. Work gloves.</li> <li>5. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely troubleshoot PDP.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to troubleshoot PDP.</li> <li>2. Trainee will know the required steps to troubleshoot PDP.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> <li>3. Trainer must develop an exercise scenario to validate ability of trainee to meet learning objective and samples of behavior.</li> </ol>

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

## TROUBLESHOOT PDP

**1. Background:** Troubleshooting is the orderly process of checking and eliminating possible causes of trouble until the exact cause of the trouble is found. As a rule, the best place to start looking for the cause of trouble in a circuit or system is at the source of power or supply. Continue testing or checking the circuit or system, step-by-step, in an orderly manner, until the cause of the trouble is located. The troubleshooting charts provided in technical orders provide information useful in diagnosing and correcting certain troubles which cause unsatisfactory operation or failure of the equipment.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on troubleshooting a PDP. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8128 Harvest Falcon Electrical Dist. System, Lessons 6 and 7. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**Step 1: Locate TO 35CA6-1-101.**

**Step 2: Perform troubleshooting on PDP.**

**2.1. Refer to TO 35CA6-1-101, Section V, paragraph 5-3.**

## TROUBLESHOOT PDP

### 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. Locate TO 35CA6-1-101		
2. Locate the trouble		
3. Correct the problem		
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.



## HARVEST FALCON ASSETS

### BARE BASE ELECTRICAL DISTRIBUTION SYSTEM

MODULE 27

AFQTP UNIT 2

---

### INSTALL GROUNDS (27.2.2.6.3.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

## INSTALL GROUNDS

### *Task Training Guide*

<b>STS Reference Number/Title:</b>	26.2.2.6.3., Install grounds for bare base electrical distribution systems.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">AFI 32-1065, Grounding Systems.</a></li> <li>6. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>7. <a href="#">Technical Order (TO) 35CA1-2-6-1, Operation and Maintenance Instructions, Primary Distribution Center.</a></li> <li>8. <a href="#">TO 35CA2-2-10-1, Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064 and 32-1065.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TOs 35CA6-1-101 and 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Hand tools.</li> <li>2. Ground rods.</li> <li>3. Sledge hammer.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the appropriate grounding methods of the bare base electrical distribution system.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to identify the various types grounding methods for the bare base electrical distribution system.</li> <li>2. Trainee will know the required steps to ground the bare base electrical distribution system.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the trainee must be able to identify proper procedures to ground the bare base electrical distribution system.</li> <li>2. Any major discrepancy constitutes failure.</li> </ol>

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

## INSTALL GROUNDS

**1. Background:** In any electric power generation and distribution system, appropriate electrical grounding of equipment such as generator sets, transformers, junction boxes, and bus bars is generally very important to insure safe and reliable operation of the system. Traditional guidance requires 25 ohms resistance to ground, or less, at all normally grounded locations. However, the nature of the soils in many locations will not permit this level of assured grounding with traditional ground rods or expedient techniques. In especially dry, rocky, or sandy regions, 25 ohm or less grounding to earth can only be obtained using more involved and equipment-intensive methods that may not be available to bare base engineers.

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on the installation of grounds for the PDC and SDC. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8127 and 8128 Harvest Falcon Electrical Dist. System, Lessons 5, 6, and 7. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**3.1. For the primary distribution center (PDC):**

**Step 1: Locate TO 35CA1-2-6-1.**

**Step 2: Ground installation.**

**2.1. Refer to TO 35CA1-2-6-1, Section III, paragraph 3-2h(1).**

**3.2. For the secondary distribution center (SDC):**

**Step 1: Locate TO 35CA2-2-10-1.**

**Step 2: Ground installation.**

**2.1. Refer to TO 35CA2-2-10-1, Section III, paragraph 3-2b.**

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## INSTALL GROUNDS

### 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
<b>PDC Ground:</b>		
1. Locate installation site of ground rods within 3 feet of ground lugs mounted on each of the PDC		
2. Attach coupling to end of one ground rod		
3. Attach driving stud to end of rod with coupling		
4. Drive ground rod as deep as possible, leaving five inches above ground in order to attach second rod		
5. Remove driving stud from installed rod and attach existing coupling to second ground rod		
6. Drive second rod into the ground, leaving five inches above ground		
7. Remove driving stud from second rod and attach existing coupling to third ground rod		
8. Drive third rod into the ground, leaving five inches above ground		
9. Remove driving stud		
10. Attach copper ground wire to exposed portion of ground rod and secure with a ground rod clamp		
11. Cut ground wire to proper length and attach to ground lug on skid of PDC		
12. Test ground rod for proper ohmic value of 25 ohms or less		
13. If resistance is not within tolerance, did the trainee drive an additional rod or rods near the first rod and connect in parallel as necessary to obtain a proper resistance reading		
14. Comply with all safety requirements		
<b>SDC Ground:</b>		
1. Locate the ground rods on the high voltage side of the SDC		
2. Attach coupling to end of one ground rod		
3. Attach driving stud to end of rod with coupling		
4. Drive ground rod as deep as possible, leaving five inches above ground in order to attach second rod		
5. Remove driving stud from installed rod and attach existing coupling to second ground rod		
6. Drive second rod into the ground, leaving five inches above ground		
7. Remove driving stud from second rod and attach existing coupling to third ground rod		
8. Drive third rod into the ground, leaving five inches above ground		
9. Remove driving stud		

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**INSTALL GROUNDS PERFORMANCE CHECKLIST (CONTINUED)**

10. Attach copper ground wire to exposed portion of ground rod and secure with a ground rod clamp		
11. Feed the other end of the wire into opening at the bottom of the high voltage compartment of the SDC		
12. Attach the end of the wire to ground bus, on bottom of primary mounting panel.		
13. Test ground rod for proper ohmic value of 25 ohms or less		
14. If resistance is not within tolerance, did the trainee drive an additional rod or rods near the first rod and connect in parallel as necessary to obtain a proper resistance reading		
15. 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.



## HARVEST FALCON (HF) ASSETS

### ELECTRICAL SUPPORT

MODULE 27

AFQTP UNIT 2

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### EXPEDIENT GENERATOR INSTALLATION (27.2.3.1.2.)

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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 if equipment is available. It is to be used in conjunction with these for training purposes only.

**EXPEDIENT GENERATOR INSTALLATION**  
***Task Training Guide***

<b>STS Reference Number/Title:</b>	27.2.3.1.2., Bare base expedient generator installation.
<b>Training References:</b>	<ol style="list-style-type: none"> <li>1. <a href="#">Air Force Pamphlet (AFPAM) 10-219, Volume 5, Bare Base Conceptual Planning.</a></li> <li>2. CD-ROM Air Force Qualification Training Package (AFQTP) 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></li> <li>3. Career Development Course (CDC) 3E051B Volume 4, Unit 4-1, Section 614: <i>Bare Base Electrical Distribution System.</i></li> <li>4. <a href="#">Air Force Instructions (AFI) 32-1064, Electrical Safety Practices.</a></li> <li>5. <a href="#">AFI 32-1065, Grounding Systems.</a></li> <li>6. <a href="#">Air Force Manual (AFMAN) 32-1185, Electrical Worker Safety.</a></li> <li>7. <a href="#">TO 35CA2-2-10-1, Operation, Maintenance, and Overhaul Instructions, Secondary Distribution Center.</a></li> </ol>
<b>Prerequisites:</b>	<ol style="list-style-type: none"> <li>1. <b>Possess as a minimum a 3E031 AFSC.</b></li> <li>2. <b>Review the following references:</b> <ol style="list-style-type: none"> <li>2.1. Review CDC 3E051B Volume 4, Unit 4-1, Section 614.</li> <li>2.2. AFPAM 10-219, Volume 5.</li> <li>2.3. AFI 32-1064 and 32-1065.</li> <li>2.4. AFMAN 32-1185.</li> <li>2.5. TO 35CA2-2-10-1.</li> </ol> </li> <li>3. <b>Complete CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: <i>Harvest Falcon Electrical Distribution System.</i></b></li> </ol>
<b>Equipment/Tools Required:</b>	<ol style="list-style-type: none"> <li>1. Multimeter.</li> <li>2. High voltage tester.</li> <li>3. Megger.</li> <li>4. Work gloves.</li> <li>5. Hand tools.</li> </ol>
<b>Learning Objective:</b>	The trainee will know the steps required to safely install generator to SDC.
<b>Samples of Behavior:</b>	<ol style="list-style-type: none"> <li>1. Trainee will be able to name the safety equipment required to connect generator to SDC.</li> <li>2. Trainee will know the required steps to install bare base generator to the SDC.</li> </ol>
<b>Notes:</b>	<ol style="list-style-type: none"> <li>1. To successfully complete this element, the steps must be followed exactly--no exceptions.</li> <li>2. Any safety violation is an automatic failure.</li> </ol>

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

## EXPEDIENT GENERATOR INSTALLATION

**1. Background:** In the Harvest Falcon bare base electrical system, the SDC functions as a large step-down transformer. It is designed to accept 4,160 volts, three-phase, 60 hertz primary power from either a generator or commercial power source and steps that voltage down to 120/208 volts for subsequent secondary distribution.

**1.1.** In the event of loss of primary power, the SDC can also accept 120/208 volts, 60 hertz, 3-phase, 4-wire power from a mission essential power (MEP) generator through the Mission Essential receptacle and distribute it to various facilities. The SDC is also capable of accepting power directly by a loop feed from another SDC.

**1.2.** Proper operation of the SDC is not achievable without a thorough understanding of the purpose and function of the major controls and indicators of the SDC. Below is descriptive and operational information about these components.

**1.2.1. EFD Switches.** The three EFD switches, located at the top of the primary mounting panel, control the application of 4,160 VAC primary power to the transformer's primary windings. Each switch contains three poles; the center ones, containing a 30 Amp fuse may be pulled out with a hot stick to discontinue power to the transformer. The EFD switches may be accessed by unlocking and opening the high voltage compartment doors.

**1.2.2. Main Circuit Breaker.** The main circuit breaker, the left hand breaker located under the interlock set at the bottom of the circuit breaker panel, applies 120/208 VAC power to the panel board bus. Setting the circuit breaker to the **ON** position readies the SDC to deliver power to all loads connected to it. Setting the circuit breaker to the **OFF** position shuts down the entire SDC.

**1.2.3. Mission Essential Circuit Breaker.** The mission essential circuit breaker, which is the right hand breaker located under the interlock set at the bottom of the circuit breaker panel, applies 120/208 VAC power from a mission essential generator to the panel board bus in order to power essential loads when primary power is not available. This circuit breaker is used in lieu of the main circuit breaker, with the interlock set designed to prevent the simultaneous use of both.

**1.2.4. Bus Energized Indicator Lights (6-25c.BMP).** These indicator lights, which are located at the top-center of the circuit breaker panel, illuminate when the bus for the designated phase is energized.

**1.2.5. Transformer High Temp Light.** The transformer high temperature indicator light, which is located at the top-center of the circuit breaker panel, illuminates during excessively high transformer temperature. During normal operation, this light will remain out.

**CAUTION:**

**DO NOT CONTINUE TO OPERATE THE SDC IF THE XFMR HIGH TEMP LIGHT IS IN. SERIOUS DAMAGE TO THE EQUIPMENT CAN RESULT. (THE XFMR HIGH TEMP OVERRIDE SW IS FOR MAINTENANCE PURPOSES ONLY, NOT FOR ALLOWING OPERATION WHEN EXCESSIVE HIGH TRANSFORMER TEMPERATURES ARE ENCOUNTERED).**

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**1.2.6. Transformer High Temp Override Switch.** This two-position toggle switch, located at the top-center of the circuit breaker panel, permits closing the main circuit breaker to apply primary power to the transformer (**OVERRIDE** position) after the circuit breaker has been tripped due to excessive transformer temperature. During all operating conditions, the override switch must be maintained in the **NORMAL** position.

**1.2.7. Branch Circuit Breakers.** The sixteen branch circuit breakers, running up the left and right hand sides of the circuit breaker panel, control the application of 120/208 VAC secondary power to the sixteen feeder receptacles for distribution to shelters and other loads.

**1.2.8. Ground Fault Circuit Breakers.** The two ground fault circuit breakers, both of which are located on the lower right hand side of the circuit breaker panel directly above the interlock set, control the application of 120 VAC power to the two convenience outlets.

**CAUTION:**

**DO NOT ENERGIZE THE MEP GENERATOR UNTIL POST-INSTALLATION MISSION ESSENTIAL MODE CHECKS DESCRIBED IN PARAGRAPH 3 OF THIS AFQTP HAVE BEEN CONDUCTED FOR THE SDC, THE SECONDARY CABLE ASSEMBLIES, AND THE LOADS THEMSELVES. FAILURE TO COMPLETE POST-INSTALLATION CHECKS MAY RESULT IN DANGER TO INSTALLING PERSONNEL.**

**2. Complete the CD-ROM AFQTP 3E0X1 Electrical Systems, Version 1.0, Aug 97: *Harvest Falcon Electrical Distribution System* for detailed instruction on expedient generator installation. After completing, the CD-ROM AFQTP see your Unit Education and Training Manager to take the mandatory CerTest # 8128 Harvest Falcon Electrical Dist. System, Lessons 6, and 7. Trainee must score at least 80% to meet the minimum completion requirements for diamond tasks.**

**NOTE:**

The review questions for this material are in the above-mentioned CD-ROM.

**3. If the equipment is available, then perform the following steps:**

**3.1. Emergency Operation.** In an emergency such as loss of primary power, it is possible to operate Mission Essential Equipment with power from a MEP generator (208 VAC). MEP generators should be connected to SDCs providing power to essential equipment and/or facilities at all times, although the generator is not running. When such an emergency occurs, proceed as follows:

**Step 1: Immediately place all branch circuit breakers in the OFF position.**

**Step 2: Set the main circuit breaker to the OFF position.**

**Step 3: Position the mechanical circuit breaker interlock to lock out the main circuit breaker.**

**Step 4: Start the MEP generator (refer to the applicable generator TO).**

**Step 5: When the generator is operating properly and delivering power to the SDC, set the mission essential breaker to the ON position. The bus-energized lights in the SDC will come on.**

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**Step 6:** Set all of the branch circuit breakers that support critical equipment and/or facilities to the ON position.

**Step 7:** When primary power is again available, set the mission essential and all feeder receptacle breakers to the OFF position. Position the mechanical circuit breaker control interlock to lock out the mission essential circuit breaker.

**3.2.** When it is necessary that certain equipment be used before primary power is available or a power failure, and the mission essential generator has been connected to the SDC mission essential receptacle using the mission essential cable assembly, make the checks listed below before energizing the secondary power system.

**Step 1:** Check that the SDC is properly grounded.

**Step 2:** Check all mission essential loads to be sure the secondary cable assembly input connections are firmly in place in the load input receptacles.

**Step 3:** Check that mating ends of secondary cable assemblies linking the loads with the SDC have been connected properly.

**Step 4:** Check that output connectors to the loads on the SDC are firmly in place in the feeder receptacles.

**Step 5:** Check that all branch circuit breakers are OFF.

**Step 6:** Check that the mission essential circuit breaker, (CKT BKR MISSION ESSENTIAL) is OFF.

**Step 7:** Check that the main circuit breaker, (XFMR CKT BKR MAIN) is OFF. Position the mechanical circuit breaker interlock to lock out the main circuit breaker.

**Step 8:** Deploy MEP generator to the site and ground unit.

**Step 9:** Connect the 60-amp poser cable into the receptacles of the generator and the SDC. There no need to check phase rotation. It is already set-up properly.

**Step 10:** Check that the MEP generator is ready to operate (Refer to the applicable TO for MEP generator). The system is now ready for initial turn-on in the mission essential mode.

**Step 11:** Start the generator, when operating properly and delivering power to the SDC, set the mission essential breaker to the ON position. The bus-energized lights in the SDC will come on.

**Step 12:** Set all of the branch circuit breakers that support critical equipment and/or facilities to the ON position.

**Step 13:** When primary power is again available, set the mission essential and all feeder receptacle breakers to the OFF position. Position the mechanical circuit breaker control interlock to lock out the mission essential circuit breaker.

**CAUTION:**

**TO PROTECT PERSONNEL FROM INJURY, BE SURE THAT THE MISSION ESSENTIAL GENERATOR IS PROPERLY GROUNDED.**

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

## EXPEDIENT GENERATOR INSTALLATION

### 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
<b>Generator Already Connected to SDC:</b>		
1. Place all branch circuit breakers in the off position		
2. Set the main circuit breaker to the off position		
3. Position the mechanical circuit breaker interlock to lock out the main circuit breaker		
4. Start the MEP generator		
5. Set the mission essential breaker to the on position after generator was operating properly and delivering power to the SDC		
6. Set the branch circuit breakers to the on position that support critical equipment and/or facilities		
7. When primary power was restored, set the mission essential breaker and all feeder receptacle breakers to the off position		
8. Position the mechanical circuit breaker control interlock to lock out the mission circuit breaker		
9. Comply with all safety requirements		
<b>Connecting Generator to SDC:</b>		
1. Check the SDC for proper grounding		
2. Check all mission essential loads to be sure the secondary cable assembly input connections were firmly in place in the load input receptacles		
3. Check to see that the mating ends of the secondary cable assemblies linking the loads with the SDC were properly connected		
4. Check the SDC feeder receptacles to ensure the output connectors to the loads were firmly in place		
5. Check to see if all branch circuit breakers were off		
6. Check to see if the mission essential circuit breaker is off		
7. Check to see if the main circuit breaker is off		
8. Position the mechanical circuit breaker interlock to lock out the main circuit breaker		
9. Ground MEP generator		
10. Connect the 60-amp poser cable into the receptacles of the generator and the SDC		
11. Start generator and perform operational checks		
12. Set the mission essential breaker to the on position after generator was operating properly and delivering power to the SDC		

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**EXPEDIENT GENERATOR INSTALLATION PERFORMANCE CHECKLIST  
(CONTINUED)**

13. Set the branch circuit breakers to the on position that support critical equipment and/or facilities		
14. When primary power was restored, set the mission essential breaker and all feeder receptacle breakers to the off position		
15. Position the mechanical circuit breaker control interlock to lock out the mission circuit breaker		
16. 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.

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

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

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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](mailto:ceof.helpdesk@tyndall.af.mil).

5. Thank you for your time and interest.

YOUR NAME, RANK, USAF  
Title/Position