

AIR FORCE
QUALIFICATION TRAINING PACKAGE (AFQTP)



FOR
ELECTRICAL POWER PRODUCTION
(3E0X2)

MODULE 25
FIXED EMERGENCY STANDBY GENERATOR SET
OPERATION

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

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Pages: 34/Distribution F

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**AIR FORCE QUALIFICATION TRAINING PACKAGES
FOR
ELECTRICAL POWER PRODUCTION
(3E0X2)**

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:

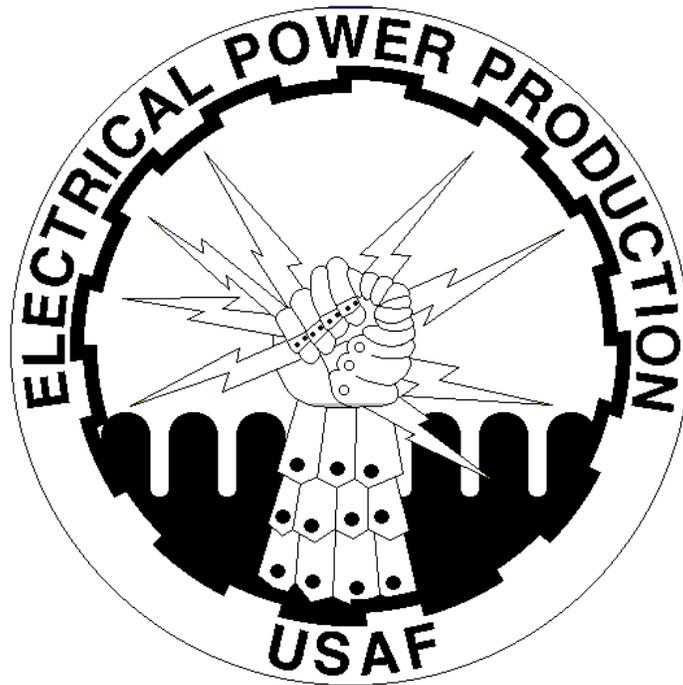
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training for Diamond Tasks 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 Career Field Manager at the address below.

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FIXED EMERGENCY STANDBY GENERATOR SET OPERATION

MODULE 25

AFQTP UNIT 1

PERFORM PRE-OPERATIONAL INSPECTION (25.1.1.)

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PERFORM PRE-OPERATIONAL INSPECTION
Task Training Guide

STS Reference Number/Title:	25.1.1., Pre-operational inspection (Perform).
Training References:	<ol style="list-style-type: none"> 1. 35C2 series Technical Orders (TOs). 2. Manufacture's Manuals. 3. National Fire Protection Agency Regulations. 4. Career Development Course (CDC) Electrical Power Production Journeyman 3E052A, Volume 1, Unit 6-2, Section 065: <i>Generator Operation</i>. 5. Air Force Instruction (AFI) 32-1062, Electrical Power Plants Generators. 6. AFI 32-1063, Electrical Power Systems. 7. AFI 32-1064, Electrical Safe Practices. 8. AFI 32-1065, Grounding Systems. 9. Air Force Qualification Training Package (AFQTP) Electrical Power Production Module 16, 1 Aug 02: <i>Generator Set Grounding Fundamentals</i>. 10. Local Procedures.
Prerequisites:	<ol style="list-style-type: none"> 1. Possess as a minimum a 3E032 AFSC. 2. Review the following references: <ol style="list-style-type: none"> 2.1. Applicable TOs and manufacture's manuals. 2.2. AFIs 32-1062, 32-1063, 32-1064, and 32-1065. 2.3. National Fire Protection Agency Regulations. 2.4. CDC Electrical Power Production Journeyman 3E0X2A, Volume 1, Section 065. 3. Complete AFQTP Electrical Power Production Module 16, 1 Aug 02: <i>Generator Set Grounding Fundamentals</i>.
Equipment/Tools Required:	<ol style="list-style-type: none"> 1. Computer to support AFQTP CD-ROMs. 2. Applicable technical references. 3. General tool kit. 4. 200 KW generator or less. 5. Personal safety equipment.
Learning Objective:	Given applicable technical references and local directives, perform generator pre-operational inspection IAW prescribed procedures.
Samples of Behavior:	<ol style="list-style-type: none"> 1. Trainee will be able to perform a pre-operational inspection to include: <ol style="list-style-type: none"> 1.1. Correct generator fluid level requirements. 1.2. Battery inspection requirements. 1.3. Properly inspect fan belts. 1.4. Requirement for draining condensation from the fuel system. 1.5. Inspection requirements for generator set control panel.
Notes:	<ol style="list-style-type: none"> 1. To successfully complete this element follow the steps outlined in the applicable technical manual, manufactures manual or local procedures. 2. Any safety violation is an automatic failure.

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PERFORM PRE-OPERATIONAL INSPECTION

1. Background: A pre-operational inspection is required prior to starting the generator. It is in this inspection that you are looking for any deficiencies or problems that can occur during operation. Exactly what is a pre-operational inspection? Knowing the prefix "pre" means before, you should be able to determine that a pre-operational inspection is an inspection that is done before the generator is operated. But why do you need to do a pre-operational inspection? Actually, there are several reasons why it's necessary, but the main reason is to ensure that the generator set is capable of operating. If you don't check to make sure that there is fuel in the fuel tank, obviously the generator isn't going to start. If the generator doesn't start, the communications facility isn't going to have any power, and you are going to be sitting in the dark unable to perform your mission. Let's go over the things you need to check before starting up the generator set.

1.1. The very first thing you must check when performing a pre-operational inspection is the Generator/Equipment Operation/Maintenance Log. The log is often kept in a pouch, which is attached to the generator set or in accordance with (IAW) local procedures. The log is used to document generator operation as well as record all maintenance actions for that particular generator. Look at the maintenance log to see if there are any open jobs.

1.2. After you have reviewed the Generator/Equipment Operation/Maintenance Log and verified that the generator set is considered operational, you are ready to continue on with the next step of the pre-operational inspection. The *generator ground* is one of the most important items to check during the pre-operational check.

2. To perform this task, following these steps:

Step 1: Perform safety inspection:

- 1.1.** Place the unit in STOP/OFF position before starting any inspection.
- 1.2.** Check to ensure guards and/or precautions taken around moving parts shield danger points.
- 1.3.** Ensure equipment ground system is connected. Refer to AFQTP Electrical Power Production Module 16, Generator Set Grounding Fundamentals.

HINT:

Ensure the Emergency Stop switch is depressed; in addition you may want to place a CAUTION tag "Men At Work" on the control panel, especially on commercial units.

Step 2: Check/Inspect fuel system:

- 2.1.** Fuel lines, filter casings, and fuel tank for leaks and security.
- 2.2.** Fuel level in main tank (Refill if less than 1/2 full.)
- 2.3.** If equipped, manually start transfer motor on day tank to ensure proper operation.
- 2.4.** Dip the tank for water content/drain water from tank if drain valve if provided.

Step 3: Check/Inspect oil system:

- 3.1.** Oil lines, filters, and filter casings for cracks, leaks and security.
- 3.2.** Oil level - add as needed.
- 3.3.** Governor oil level and linkage if applicable, add if needed.

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Step 4: Check/Inspect cooling system:

- 4.1. Coolant hoses for cracks, leaks and security.
- 4.2. Coolant level - add as needed. (Proper level is two inches below the overflow pipe).
- 4.3. Engine heaters. If equipped, heater will be on at 90 degrees or less.
- 4.4. Fan belt(s), i.e., wear, cracks, proper tension.

CAUTION:

NEVER ATTEMPT TO CHECK THE COOLANT LEVEL WHEN IT IS HOT. THE COOLING SYSTEM IS PRESSURIZED AND SERIOUS BURNS COULD RESULT IF THE RADIATOR CAP IS REMOVED UNDER THIS CONDITION.

CAUTION:

NEVER CHECK FAN BELT TENSION WHILE THE GENERATOR SET IS IN OPERATION. THE REASON FOR THIS SHOULD BE OBVIOUS. ALSO, ALWAYS CHECK THE FAN BELT TENSION USING THE BACK OF THE HAND. THIS IS MERELY A SAFETY PRECAUTION IN THE EVENT THE UNIT IS ACCIDENTALLY STARTED WHILE PERFORMING THIS INSPECTION. BY USING THE BACK OF THE HAND, IT IS LESS LIKELY THAT YOUR HAND WILL BE PULLED INTO THE PULLEY AND/OR FAN.

Step 5: Check/Inspect battery system:

- 5.1. Battery electrolyte level - add as needed.
- 5.2. Alternator belt for condition and deflection, adjust as needed.
- 5.3. Battery voltage and annotate on AF Form 487.
 - 5.3.1. 12-volt system – 12.5 to 13.5 volts.
 - 5.3.2. 24-volt system – 25 to 27.5 volts.

CAUTION:

USE EXTREME CAUTION ANYTIME YOU ARE WORKING ON THE BATTERIES. THE ACID IN THE ELECTROLYTE SOLUTION CAN CAUSE SEVERE BURNS. IF THE ELECTROLYTE SOLUTION COMES IN CONTACT WITH THE SKIN, IMMEDIATELY RINSE OFF THE AFFECTED AREA WITH PLENTY OF CLEAN WATER. DON'T WIPE IT OFF ON YOUR CLOTHING, AS THE ACID IN THE SOLUTION WILL QUICKLY EAT THROUGH THE MATERIAL. IF IT GETS IN YOUR EYES, DO NOT RUB THEM. QUICKLY SEEK ASSISTANCE TO FLUSH OUT YOUR EYES WITH CLEAN WATER.

Step 6: Check/Inspect intake/exhaust system:

- 6.1. Exhaust extension for condition, tightness, and leakage at seams and point of coupling.
- 6.2. Drain exhaust condensate trap if provided.
- 6.3. Air filter for cleanliness and restrictions.

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Step 7: Miscellaneous inspections/checks:

- 7.1. All linkages, hose clamps, and lines for wear or damage.
- 7.2. Access doors for proper opening and closing. Inspect weather stripping for condition and security.
- 7.3. Ensure unit is placed in normal configuration after inspection - Auto or Remote position for Auto start units and STOP/OFF for Manual Start units.

Step 8: Check/Inspect electrical:

- 8.1. Fix any defective wiring, if repair takes longer than five minutes refer to higher level.
- 8.2. Unit for loose, burned, or frayed wiring and connectors for security.
- 8.3. For loose nuts, bolts, and connections.

Step 9: Check/Inspect generator control panel:

- 9.1. Wiring for damage and security of connections.
- 9.2. Ensure Lights operating properly.
- 9.3. Ensure electrical switches are in the proper position.

Step 10. Check/Inspect auxiliary fuel tank:

- 10.1. To ensure fuel tank is properly grounded and secured.
- 10.2. To ensure fuel tank dipstick is available or fuel gauge is properly working.
- 10.3. To ensure fuel tank dike area is clean and drain valve secured.
- 10.4. To ensure fuel tank is properly marked with fuel type, tank size, and building number.

Step 11: Check/Inspect generator site room:

- 11.1. Check to ensure room heaters are operating properly.
- 11.2. Ensure generator facilities are clean and no one is using them as storage areas, sweep and clean if necessary.
- 11.3. Ensure the emergency light(s) is operating properly.
- 11.4. Ensure the unit, automatic transfer switch (ATS), fuel tank, associated switchgear, and site/facility is clean and corrosion free.

Step 12: Check/Inspect fire extinguisher:

- 12.1. Operational, convenient location, and proper mounting.
- 12.2. Annotate inspect on inspection form (monthly).
- 12.3. Identified through the Fire Department.

Step 13: Ensure unit folder has the following current items:

- 13.1. Operating instructions for starting, operating, transferring load, shutting unit down, and procedures to notify Power Production.
- 13.2. One line-Connection diagrams.
- 13.3. Point marked and identified with phase Rotation, Volts, and KW rating.
- 13.4. Training letter.
- 13.5. Most recent AF Form 487.

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Step 14: Signs:

14.1. Check to ensure unit, site, area, or facility has the following signs:

14.1.1. No Smoking within 50 feet.

14.1.2. Caution Hazardous Noise-Hearing Protection Required.

14.1.3. Warning-Unit Starts Automatically (if automatic).

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**REVIEW QUESTIONS
FOR
PERFORM PRE-OPERATIONAL INSPECTION**

QUESTION	ANSWER
1. What is the purpose of the Pre-operational inspection?	<ul style="list-style-type: none"> a. Ensure that the generator set is capable of operating. b. Ensure the generator set has no outstanding job orders and the status is green. c. Ensure the generator can start. d. Ensure the generator has fuel.
2. What is the first thing you need to check prior to performing a pre-operational check?	<ul style="list-style-type: none"> a. Fuel. b. Grounding. c. Electrical distribution is connected. d. Generator Log.
3. What is one of the most important steps when performing an operational check?	<ul style="list-style-type: none"> a. Fuel. b. Grounding. c. Electrical distribution is connected. d. Generator Log.
4. Why do need to be cautious when working on batteries?	<ul style="list-style-type: none"> a. The acid in the electrolyte solution can cause severe burns. b. The acid can damage the generator. c. If you spill acid, you will need to report it to EPA. d. There is no hazard.
5. When is the cooling system check?	<ul style="list-style-type: none"> a. Hot. b. While unit is running. c. Before generator start. d. While the cooling system is warm.
6. How are belts tension checked?	<ul style="list-style-type: none"> a. Check the belt tension using the back of the hand. b. Check the belt tension using the front of the hand "In a grasping motion". c. Check the belt tension using a tachometer. d. Check the belt tension using a ruler.
7. Where do annotate the battery voltage reading?	<ul style="list-style-type: none"> a. AF Form 719. b. AF Form 487. c. Back of your hand. d. In the manufacturer's manual.

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PERFORM PRE-OPERATIONAL INSPECTION

PERFORMANCE CHECKLIST

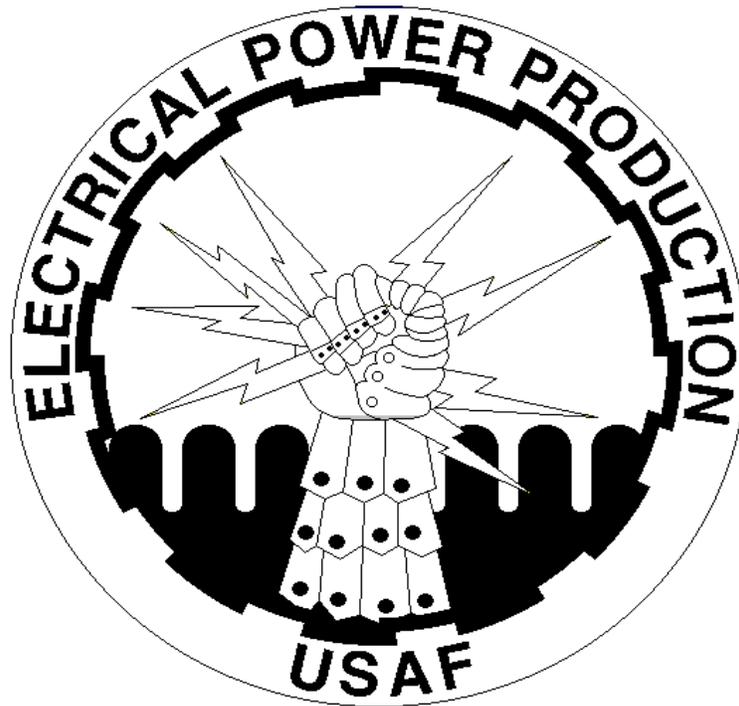
INSTRUCTIONS:

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

DID THE TRAINEE....?	YES	NO
1. Perform safety checks		
2. Insure the generator was grounded correctly		
3. Perform fuel system checks		
4. Perform oil system checks		
5. Perform cooling system checks		
6. Perform battery system checks		
7. Perform intake/exhaust system checks		
8. Perform all miscellaneous checks		
9. Perform electrical system checks		
10. Perform control panel checks		
11. Perform fuel tank checks		
12. Perform generator site checks		
13. Perform fire extinguisher checks		
14. Perform generator folder checks		
15. Perform sign checks		

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

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FIXED EMERGENCY STANDBY GENERATOR SET OPERATION

MODULE 25

AFQTP UNIT 1

DURING OPERATION INSPECTION (25.1.2.)

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PERFORM DURING OPERATION INSPECTION

Task Training Guide

STS Reference Number/Title:	25.1.2., During operation inspection (Perform).
Training References:	<ol style="list-style-type: none"> 1. Commercial Manuals. 2. National Fire Protection Agency Regulations, NFPA 110 Table A-6-3-1. 3. 35C2 series Technical Orders (TOs). 4. AFI 32-1062, Electrical Power Plants and Generators. 5. AFI 32-1063, Electric Power Systems. 6. AFI 32-1064, Electrical Safe Practices. 7. Career Development Course (CDC) Electrical Power Production Journeyman 3E052A, Volume 1, Unit 6-2, Section 065: <i>Generator Operation</i>. 8. Air Force Qualification Training Package (AFQTP) Electrical Power Production Module 16, 1 Aug 02: <i>Generator Set Grounding Fundamentals</i>. 9. Local Procedures.
Prerequisites:	<ol style="list-style-type: none"> 1. Possess as a minimum a 3E032 AFSC. 2. Review the following references: <ol style="list-style-type: none"> 2.1. Review CDC Electrical Power Production Journeyman 3E052A, Volume 1, Section 065. 2.2. AFIs 32-1062, 32-1063, and 32-1064. 2.3. National Fire Protection Agency Regulations. 2.4. Applicable TOs and manufacture's manuals. 3. Complete AFQTP Electrical Power Production Module 16, 1 Aug 02: <i>Generator Set Grounding Fundamentals</i>.
Equipment/Tools Required:	<ol style="list-style-type: none"> 1. Computer to support AFQTP CD-ROMs. 2. Applicable technical references and forms. 3. Generic generator set. 4. Personal safety equipment.
Learning Objective:	<ol style="list-style-type: none"> 1. Given applicable technical references and local directives, perform generator inspection during operation IAW prescribed procedures. 2. Given AFI 32-1062, paragraph 7; generator operating forms; a logbook; and local operating instructions; document generator forms and records IAW prescribed procedures.
Samples of Behavior:	<ol style="list-style-type: none"> 1. Trainee will be able to perform a during operation inspection to include: <ol style="list-style-type: none"> 1.1. Control Panel inspection requirements. 1.2. Fluid level inspection requirements. 1.3. Conducting an overall visual inspection of the generator set. 1.4. Purpose of generator operating forms and generator logbook. 1.5. Complete generator operating forms and generator logbook.
Notes:	
<ol style="list-style-type: none"> 1. To successfully complete this element follow the steps outlined in the applicable technical manual, manufactures manual or local procedures. 2. Any safety violation is an automatic failure. 	

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PERFORM DURING OPERATION INSPECTION

1. Background: While the generator set is operating, you are required to make on-line inspections. The inspections are to ensure the generator set is operating properly and to detect any impending trouble. The generator should be inspected IAW local procedures, usually once every 2 hours during periods of extended operation. There are several areas to be checked during this inspection. However documentation is critical. Without documentation how can anyone realize that the inspection was completed?

1.1. Overall Visual Inspection: Walk around the generator set, open all access doors (if applicable), and use your senses of sight, smell, and hearing to aid in making this inspection. Do you see any leaks? Is there a burning or abnormal smell? Do you hear any loose parts rattling? If you detect minor problems, that can be easily corrected, go ahead and correct them. Major problems, such as broken parts or severe leaks, should be referred to Power Production personnel for repair. Do not attempt to make these major repairs yourself.

CAUTION:

IF YOU ATTEMPT TO WIPE UP SPILLAGE FROM A LEAK, USE EXTREME CARE TO AVOID CONTACT WITH HOT ENGINE COMPONENTS. AS A RULE OF THUMB, IF THE SPILLAGE IS NOT CAUSING A PROBLEM, DON'T ATTEMPT TO CLEAN IT UP UNTIL THE UNIT IS STOPPED AND HAS COOLED DOWN.

1.2. Power Plant Documentation: No matter what type of job you do, there is usually paper work involved. Generator set operation must be documented on the appropriate form. A generator logbook must also be maintained to document certain information.

1.2.1. Power plant documentation varies from plant to plant, Major Command (MAJCOM) to MAJCOM, and even state to state. Whether the plant is standby or prime, composed of MEP-012s or Caterpillars, or fueled by diesel or turbine power, this has a bearing on the type and extent of documentation. State and local environmental laws may pose special requirements; therefore you should contact your base environmental section for these concerns. For Air Force and MAJCOM forms, you will have to rely heavily on local procedures and your MAJCOM functional manager for guidance on the documentation requirements for your plant. This AFQTP focuses on the documentation required in AFI 36-1062, Electrical Power Plants and Generators.

1.2.2. Good record keeping is essential for effective equipment analysis. Base electrical power production personnel and maintenance engineers maintain and analyze the operation and maintenance records of power plants to ensure the mission receives reliable electrical support and that the equipment follows minimum life-cycle cost trends. Follow your major command policy for determining who gets distribution of power plant records, when they review the records, and how the reviewer provides feedback to base personnel. Consult administrative personnel on the procedures for the maintenance and disposal of records. Now, lets take a look at some of the different types of documentation involved in the operation and maintenance of Air Force power plants.

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1.2.2.1. AF Form 487: Emergency Generator Operating Log (Inspection and Testing). The AF Form 487 or another MAJCOM-approved form will be used for standby power plants, Real Property Installed Equipment (RPIE) generators and Equipment Automated Inventory Data (EAID) generators requiring bi-hourly monitoring. Record the following information as a minimum:

- a. Operating data.
- b. Condition of lube oil (viscosity test).
- c. Condition of plant and subsystems.
- d. Deficiencies.
- e. Corrective measures.

1.2.2.2. A *custom log* can be developed and used when the standard log is inadequate or not available. This custom log must be approved by your MAJCOM and a copy forwarded to HQ AFCEA/CESE identifying what improvements you made as a result of this local log.

1.2.3. Historical Records. An *AF Form 719*, Historical Record Diesel Electric Generators and System, should be maintained by the maintenance organization for each RPIE and EAID generator. Use it to show the date, the cumulative number of engine operating hours, a description of all maintenance and inspections, and parts replaced. When transferring a generator set from one organization to another, send the associated historical records with it. This will provide the gaining organization with the background information necessary to properly maintain their new asset.

1.2.4. Maintaining Forms and Records. Proper documentation and maintenance of generator operating forms and the generator logbook is your responsibility. The generator operating forms will remain with the generator set, under a protective cover, until the front of the form is completely filled. When starting a new form, make sure the maintenance actions that are "open" on the completed form get transferred to the new form. Only the "open" items need to be transferred. Safely store all completed generator operations forms; they will be included in the unit historical records.

The *generator logbook* is a permanent record. Care must be taken to ensure no damage occurs to this book. Normally, the same logbook is used until it has been completely filled. Once the book is completely filled, it will remain in the power production work center. The information found in this logbook may be needed at some future date when preparing an historical report or when determining future maintenance requirements. This is why it is stressed that all entries be accurate, legible, and as detailed as possible.

NOTE:

A wide range of generators and references was used to develop the following steps.

2. To perform this task, following these steps:

Step 1: Perform the control panel inspection. The generator Control Panel houses all the necessary controls and instruments to operate the generator set. These controls and instruments also provide the operator with important information concerning proper operation of the generator set. Make a visual inspection of all Control Panel instrumentation when completing your During Operation Inspection. Primarily, you are checking to see that all gauges are indicating correctly. In order to check for correct indications you must first know the correct indication for each gauge. Following is a list of Control Panel instruments and the correct indication for each.

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- 1.1. Voltmeter - 120/208 volts, 277/480 volts, 120/240 volts, etc.
- 1.2. Frequency meter - 50Hz or 60Hz (depending on your particular operating conditions).
- 1.3. Load meter/KW meter (if provided) - can read anywhere between 0 to rated load.
- 1.4. Ammeter - can read anywhere between 0 to rated load.
- 1.5. Battery volt meter – 12 volt system (13.2-14 volts), 24 volt system (26 to 27.5 volts).
- 1.6. Oil Pressure gauge – anywhere between 25 to 75 psi.
- 1.7. Coolant Temperature gauge – 165 to 200 degrees Fahrenheit.
- 1.8. Fuel Level gauge - recommended fuel level be no less than one half of tank.
- 1.9. Check the Fault Indicator Panel on generator models equipped with one, to ensure no fault lights are illuminated.

Step 2: Verify that the Air Cleaner restrictor telltale is not indicating a clogged filter.

Step 3: Visually inspect coolant level in overflow tank.

Step 4: Perform an overall visual inspection.

Step 5: Take a walk around the facility that the generator is running to verify that the load transferred, and talk to the facility manager about any problems that they might have during generator transfer of load, or any additional load that he/she may want the generator to run.

Step 6: Determine required documentation.

Step 7: Complete required operations records.

Step 8: Complete required maintenance records.

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**REVIEW QUESTIONS
FOR
PERFORM DURING OPERATION INSPECTION**

QUESTION	ANSWER
1. Generator documentation is standard throughout the Air Force?	a. True. b. False.
2. Why is good record keeping essential to equipment analysis?	a. For reliable electrical support and show maintenance trends. b. Detect gradual changes that will signal engine deterioration. c. Eliminate the need for unscheduled maintenance. d. Both a and b.
3. What is the importance or reason for maintaining generator operations logs?	a. Record performance during operation, inspection, and testing. b. Determine the need for additional generators. c. Provide customer feedback. d. All of the above.
4. Which form is used for standby plants or RPIE and EAID generators requiring bi-hourly monitoring?	a. AF Form 731, Crankshaft Deflection Record. b. AF Form 1167, Daily Power Plant Operating Log. c. AF Form 487, Emergency Generator Operating Log. d. AF Form 734, Cylinder Liner and Ring Wear Record.
5. Which form should be maintained for each RPIE and EAID generator for the purpose of documenting engine hours and maintenance performed?	a. AF Form 719, Historical Record Diesel Electric Generators. b. AF Form 487, Emergency Generator Operating Log. c. AF Form 1167, Daily Power Plant Operating Log. d. AF Form 731, Crankshaft Deflection Record.

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PERFORM DURING OPERATIONAL INSPECTION

PERFORMANCE CHECKLIST

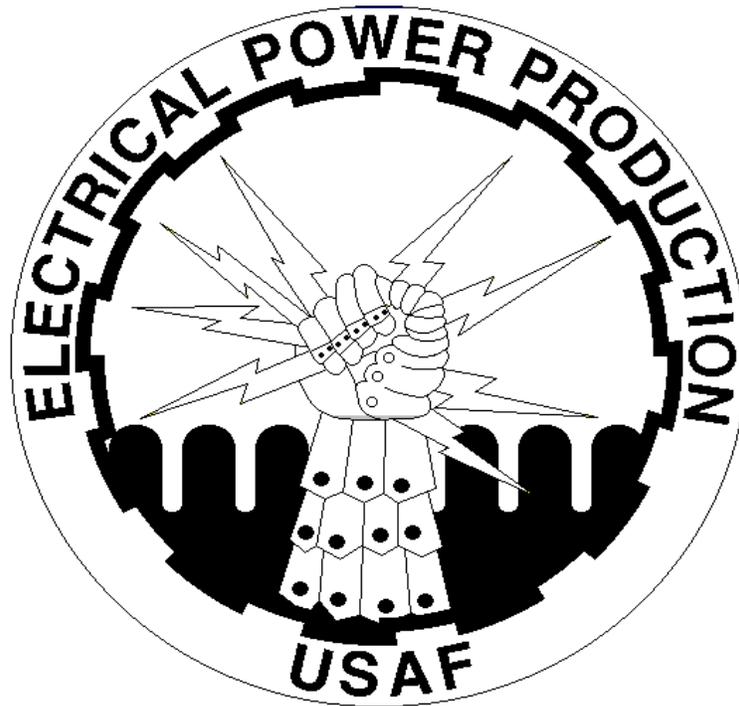
INSTRUCTIONS:

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. Determine required documentation		
2. Complete required operations records		
3. Complete required maintenance records		
4. Perform the control panel inspection		
5. Inspect coolant fluid levels in overflow tank		
6. Perform an overall visual inspection		

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

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FIXED EMERGENCY STANDBY GENERATOR SET OPERATION

MODULE 25

AFQTP UNIT 1

POST-OPERATIONAL INSPECTION (25.1.3.)

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PERFORM POST-OPERATIONAL INSPECTION
Task Training Guide

STS Reference Number/Title:	25.1.3., Post-operation inspection (Perform).
Training References:	<ol style="list-style-type: none"> 1. Commercial Manuals. 2. National Fire Protection Agency Regulations, NFPA 110 Table A-6-3-1. 3. 35C2 series Technical Orders (TOs). 4. AFI 32-1062, <i>Electrical Power Plants and Generators</i>. 5. AFI 32-1063, <i>Electric Power Systems</i>. 6. AFI 32-1064, <i>Electrical Safe Practices</i>. 7. Career Development Course (CDC) Electrical Power Production Journeyman 3E052A, Volume 1, Unit 6-2, Section 065: <i>Generator Operation</i>. 8. Air Force Qualification Training Package (AFQTP) Electrical Power Production Module 16, 1 Aug 02: <i>Generator Set Grounding Fundamentals</i>. 9. Local Procedures.
Prerequisites:	<ol style="list-style-type: none"> 1. Possess as a minimum a 3E032 AFSC. 2. Review the following references: <ol style="list-style-type: none"> 2.1. Review CDC Electrical Power Production Journeyman 3E052A, Volume 1, Section 065. 2.2. AFIs 32-1062, 32-1063, and 32-1064. 2.3. National Fire Protection Agency Regulations. 2.4. Applicable TOs and manufacture's manuals. 3. Complete AFQTP Electrical Power Production Module 16, 1 Aug 02: <i>Generator Set Grounding Fundamentals</i>.
Equipment/Tools Required:	<ol style="list-style-type: none"> 1. Computer to support AFQTP CD-ROMs. 2. Applicable technical references and forms. 3. Generic generator set. 4. Personal safety equipment.
Learning Objective:	Given applicable technical references and local directives, perform generator post-operational inspection IAW prescribed procedures
Samples of Behavior:	<ol style="list-style-type: none"> 1. Trainee will be able to perform a post-operational inspection to include: <ol style="list-style-type: none"> 1.1. Drain condensation/sediment from fuel system components. 1.2. Service generator fluid systems. 1.3. Service generator set batteries. 1.4. Making an overall inspection of the generator.
Notes:	<ol style="list-style-type: none"> 1. To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. 2. Any safety violation is an automatic failure.

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

PERFORM POST-OPERATIONAL INSPECTION

1. Background: After each period of generator operation, a post-operational inspection is performed once the set has been shut off and allowed to cool. The purpose of the post-operational inspection is to service the generator set and make it ready for future operation. The post-operational inspection is similar to the pre-operational inspection. Both inspections are to ensure the generator set is ready for operation. You may wonder why it is necessary to do two inspections involving basically the same things. The difference between the two inspections is that during a post-operational inspection, the unit is inspected for damage and serviced ensuring its readiness for immediate operation, whereas a pre-operational inspection just verifies everything is ready to go.

1.1. In addition to the inspection items shown in the applicable tech manuals, there are other items you may be required to inspect, according to local operating instructions.

NOTE:

A wide range of generators and references was used to develop the following steps.

2. To perform this task, following these steps:

Step 1: Verify that the control switches on the generator and ATS are in the “Auto”, “Remote”, or “Normal” settings to be able to start automatically during an unscheduled outage.

Step 2: Check generator fluid levels:

2.1. Oil Supply. Maintaining an adequate engine oil supply is critical to the continued operation of the generator set. Whenever the generator set is operated, some oil consumption is expected. This oil is lost through evaporation, while some is forced out through the exhaust. Additionally, oil is lost as a result of small oil leaks. Before checking the engine oil level, make sure the generator set has cooled. This allows the oil to drain back into the oil sump and permits a more accurate reading. The correct reading should be at the “full” mark. If it is necessary to add oil, do so in small amounts to avoid over filling.

2.2. Fuel Level. A refueling schedule is usually set up with POL for refueling auxiliary storage tanks. The fueling schedule should ensure there is always an adequate fuel supply on hand. You should remember the golden rule of any power production person is “NEVER RUN OUT OF FUEL.” This is the first CARDINAL SIN in Power Production!!!

2.3. Coolant Level. Once the generator set has completely cooled down, slowly open the radiator cap. The correct level is two inches below the top of the filler neck tube. Replenish the coolant level with a 60/40, or 50/50 mixture of water and antifreeze.

Step 3: Check/Inspect battery:

3.1. After the generator set has been shut down, you should check the generator batteries for proper electrolyte level, tightness of connections, and overall cleanliness. If a good pre-operational inspection was performed, you should find few problems with the batteries. Normally, the only thing you should have to do to the batteries is replenish the electrolyte lost through evaporation during generator operation. Always make sure the electrolyte is at the correct level. Over a period of time, a low electrolyte level will reduce the life span of the battery. Don't forget the appropriate safety gear when working on the batteries.

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Step 4: Overall Inspection:

4.1. Visually inspect the generator set noting any discrepancies. Some things to look for are: loose or missing hardware, fluid leaks, loose electrical connections, dirty air cleaner, and overall cleanliness of the unit. Local operating procedures will identify any additional items that must be inspected.

Step 5: Document:

5.1. Finish filling out AF Form 487, noting any discrepancies noted during the pre-operational, during, and post-operational inspections on the back of the generator operating form. In addition let your supervisor know that the generator has a discrepancies.

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**REVIEW QUESTIONS
FOR
PERFORM POST-OPERATIONAL INSPECTION**

QUESTION	Answer
1. When is a post-operational inspection performed?	<ul style="list-style-type: none"> a. Once the set has been shut off and allowed to cool. b. Immediately after Shut-down. c. Before Starting the generator. d. Supervisor Directed.
2. What is the purpose of the post-operational inspection?	<ul style="list-style-type: none"> a. Make it ready for the future. b. It is to service the generator set and make it ready for future operation. c. To repair any damage cause the run. d. To service the generator set.
3. Why do we verify that the generator and ATS control switches are in Auto, Remote, or Normal position?	<ul style="list-style-type: none"> a. Generator will not start during maintenance. b. To fill fuel tank to full. c. Start generator, but not transfer load. d. Start generator and transfer during outage.
4. What is the golden rule of any power production person?	<ul style="list-style-type: none"> a. "NEVER RUN OUT OF FUEL." b. "NEVER LOST POWER." c. "DON'T BE LATE." d. "ANY TIME ANY PLACE."
5. When do you check the coolant?	<ul style="list-style-type: none"> a. Once the generator set has completely cooled down. b. Immediately after Shut-down. c. Before Starting the generator. d. Supervisor Directed.
6. Over a period of time what will reduce the life span of the battery?	<ul style="list-style-type: none"> a. A low electrolyte level. b. An extended generator run condition. c. A generator run that is too short. d. Continuously cranking generator.
7. What should you do if you find discrepancies after performing a post-operational inspection?	<ul style="list-style-type: none"> a. Annotate in the log book only. b. Tell your supervisor only. c. Annotate on the back of the AF Form 487 only. d. All of the above.

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PERFORM POST OPERATIONAL INSPECTION

PERFORMANCE CHECKLIST

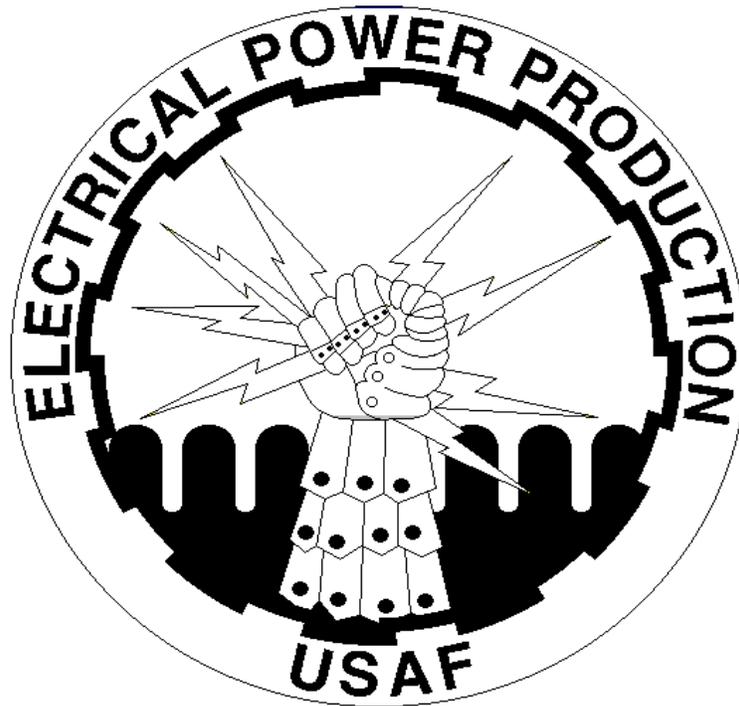
INSTRUCTIONS:

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. Check the generator fluid levels: 1.1. Oil Supply 1.2. Fuel Level 1.3. Coolant Level		
2. Perform a battery Inspection		
3. Perform overall inspection		
4. Properly report and document discrepancies		

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

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FIXED EMERGENCY STANDBY GENERATOR SET OPERATION

MODULE 25

AFQTP UNIT 1

SINGLE UNIT OPERATION (25.1.4.)

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

PERFORM SINGLE UNIT OPERATION
Task Training Guide

STS Reference Number/Title:	25.1.4., Single unit operation (Perform).
Training References:	<ol style="list-style-type: none"> 1. Commercial Manuals. 2. National Fire Protection Agency Regulations, NFPA 110 Table A-6-3-1. 3. 35C2 series Technical Orders (TOs). 4. AFI 32-1062, <i>Electrical Power Plants and Generators</i>. 5. AFI 32-1063, <i>Electric Power Systems</i>. 6. AFI 32-1064, <i>Electrical Safe Practices</i>. 7. Career Development Course (CDC) Electrical Power Production Journeyman 3E052A, Volume 1, Unit 6-2, Section 065: <i>Generator Operation</i>. 8. Air Force Qualification Training Package (AFQTP) Electrical Power Production Module 16, 1 Aug 02: <i>Generator Set Grounding Fundamentals</i>. 9. Local Procedures.
Prerequisites:	<ol style="list-style-type: none"> 1. Possess as a minimum a 3E032 AFSC. 2. Review the following references: <ol style="list-style-type: none"> 2.1. Review CDC Electrical Power Production Journeyman 3E052A, Volume 1, Section 065. 2.2. AFIs 32-1062, 32-1063, and 32-1064. 2.3. National Fire Protection Agency Regulations. 2.4. Applicable TOs and manufacture's manuals. 3. Complete AFQTP Electrical Power Production Module 16, 1 Aug 02: <i>Generator Set Grounding Fundamentals</i>.
Equipment/Tools Required:	<ol style="list-style-type: none"> 1. Computer to support AFQTP CD-ROMs. 2. Applicable technical references. 3. Generic generator set. 4. Personal safety equipment.
Learning Objective:	Given applicable technical references and local directives, perform generator single unit operation inspection IAW prescribed procedures.
Samples of Behavior:	Trainee will be able to perform single unit operation.
Notes:	
<ol style="list-style-type: none"> 1. To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. 2. Any safety violation is an automatic failure. 	

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PERFORM SINGLE UNIT OPERATION

1. Background: This section deals with the automatic operation of a typical RPIE generator set applied to a facility load, as a scheduled monthly run outage. Be sure that you never start a unit until a pre-operation inspection is done in accordance with the applicable commercial manual and local references, unless generator is running due to an unscheduled outage. The pre-operational inspection has been spelled out earlier in this AFQTP in section #1.

2. To perform this task, follow these steps:

Step 1: Notify facility manager of your intentions of running the generator for the monthly operational check.

Step 2: Perform “Pre-operational Inspection” of the generator set as spelled out earlier in this AFQTP (25.1.1.).

2.1. Generator set (Verify unit is in the Auto or Remote mode).

2.2. Automatic Transfer Switch (Verify ATS is in the Auto or Normal mode).

Step 3: After facility manager has notified all building occupants of the generator run and gives you the go-ahead, start transfer process by either:

3.1. Putting the ATS in the “test” position.

3.1.1. This procedure only simulates a power outage, and generator starts.

3.1.2. ATS transfers designated facility load to the generator.

3.1.3. All other non-critical facility load is not affected.

3.1.4. If there were something to go wrong with the generator, the ATS would automatically retransfer back to commercial power.

3.2. Shut off ATS commercial power main switch.

3.3.1. This procedure induces a real power outage, and generator starts.

3.3.2. ATS transfers designated facility load to the generator.

3.3.3. All other non-critical facility load is not affected

3.3.4. If there were something to go wrong with the generator, the ATS would **not** retransfer back to commercial power.

3.3. Shut off commercial power main switch for the entire facility.

3.3.1. This procedure induces a real power outage, and generator starts.

3.3.2. ATS transfers designated facility load to the generator.

3.3.3. All other non-critical facility load **is** affected.

3.3.4. If there were something to go wrong with the generator, the ATS would **not** retransfer back to commercial power.

Step 4: Perform “During Operation Inspection” of the generator set as spelled out earlier in this AFQTP (25.1.2.).

Step 5: Notify facility manager of your intentions of retransferring the facility load back to commercial power.

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Step 6: After facility manager has notified all building occupants of the generator run and gives you the go-ahead, start retransfer process by either:

- 6.1. Putting the ATS in the “normal or auto” position.
 - 6.1.1. ATS retransfers designated facility load back to commercial power.
 - 6.1.2. All other non-critical facility load is not affected.
- 6.2. Reenergize ATS commercial power main switch.
 - 6.2.1. ATS retransfers designated facility load to the generator.
 - 6.2.2. All other non-critical facility load is not affected.
- 6.3. Reenergize commercial power main switch for the entire facility.
 - 6.3.1. ATS retransfers designated facility load to the generator.
 - 6.3.2. All other non-critical facility load **is** affected.

Step 7: After the ATS has retransferred load back to commercial power, the generator will shut down after cool-down timer has timed out (usually 5 minutes).

Step 8: Perform “Post-operation Inspection” of the generator set as spelled out earlier in this AFQTP (25.1.3.).

Step 9: Secure unit access doors.

**REVIEW QUESTIONS
FOR
PERFORM SINGLE UNIT OPERATION**

QUESTION	ANSWER
1. Who do you notify before attempting to run a generator for a scheduled outage?	<ul style="list-style-type: none"> a. Supervisor. b. Commander. c. Facility manager. d. Command Post.
2. You should never start a unit _____ is done?	<ul style="list-style-type: none"> a. until a pre-operation inspection is done b. until a post-operation inspection is done c. before lunch d. until you clear the area
3. How long should let the generator run on cool-down?	<ul style="list-style-type: none"> a. 1 minute. b. 5 minutes. c. 10 minutes. d. 15 minutes.
4. How do you apply load to the generator?	<ul style="list-style-type: none"> a. Just start the generator. b. Energize circuit breaker. c. Turn off commercial power to ATS. d. Turn off light switch.
5. How do know that the generator has assumed the facility load?	<ul style="list-style-type: none"> a. Circuit Breaker indicator light illuminates. b. Note generator meters and walk around facility to verify. c. The Panel Lights illuminates. d. There is none indication.
6. How do remove load from the generator?	<ul style="list-style-type: none"> a. Just shut down the generator. b. Pull the DC circuit breaker. c. Open the load contactor. d. Switch the ATS back to "Normal."

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PERFORM SINGLE UNIT OPERATION

PERFORMANCE CHECKLIST

INSTRUCTIONS:

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

DID THE TRAINEE....?	YES	NO
1. Perform a pre-operational inspection		
2. Notify facility manager of intentions		
3. Started the generator set		
4. Applied load to the generator		
5. Perform a during operation inspection		
6. Observed kilowatts meter, and verify ATS changed over in facility		
7. Monitored engine performance		
8. Perform a post-operational inspection		
9. Document all actions on the AF Form 487/log book		

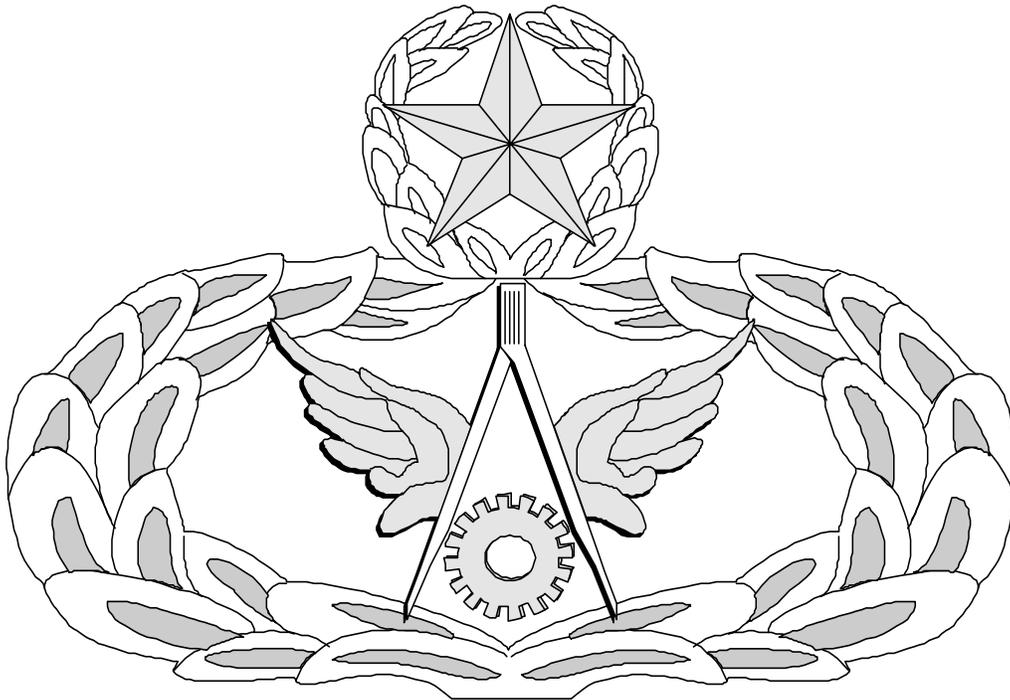
FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



FOR
ELECTRICAL POWER PRODUCTION
(3E0X2)

MODULE 25
FIXED EMERGENCY STANDBY GENERATOR SET
OPERATION

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

Key-1

**PERFORM PRE-OPERATIONAL INSPECTION
(3E0X2-25.1.1.)**

QUESTION	ANSWER
1. What is the purpose of the Pre-operational inspection?	a. Ensure that the generator set is capable of operating.
2. What is the first thing you need to check prior to performing a pre-operational check?	d. Generator Log.
3. What is one of the most important steps when performing an operational check?	b. Grounding.
4. Why do need to be cautious when working on batteries?	a. The acid in the electrolyte solution can cause severe burns.
5. When is the cooling system check?	c. Before generator start
6. How are belts tension checked?	a. Check the belt tension using the back of the hand.
7. Where do annotate the battery voltage reading?	b. AF Form 487.

**PERFORM DURING OPERATION INSPECTION
(3E0X2-25.1.2.)**

QUESTION	ANSWER
1. Generator documentation is standard throughout the Air Force?	a. True.
2. Why is good record keeping essential to equipment analysis?	d. Both a and b.
3. What is the importance or reason for maintaining generator operations logs?	d. All of the above.
4. Which form is used for standby plants or RPIE and EAID generators requiring bi-hourly monitoring?	c. AF Form 487, Emergency Generator Operating Log.
5. Which form should be maintained for each RPIE and EAID generator for the purpose of documenting engine hours and maintenance performed?	a. AF Form 719, Historical Record Diesel Electric Generators.

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**PERFORM POST-OPERATIONAL INSPECTION
(3E0X2-25.1.3.)**

QUESTION	ANSWER
1. When is a post-operational inspection performed?	a. Once the set has been shut off and allowed to cool.
2. What is the purpose of the post-operational inspection?	b. It is to service the generator set and make it ready for future operation.
3. Why do we verify that the generator and ATS control switches are in Auto, Remote, or Normal position?	d. Start generator and transfer during outage.
4. What is the golden rule of any power production person?	a. "NEVER RUN OUT OF FUEL."
5. When do you check the coolant?	a. Once the generator set has completely cooled down.
6. Over a period of time what will reduce the life span of the battery?	a. A low electrolyte level.
7. What should you do if you find discrepancies after performing a post-operational inspection?	d. All of the above.

**PERFORM SINGLE UNIT OPERATION
(3E0X2-25.1.4.)**

QUESTION	ANSWER
1. Who do you notify before attempting to run a generator for a scheduled outage?	c. Facility manager.
2. You should never start a unit _____ is done?	a. until a pre-operation inspection is done
3. How long should let the generator run on cool-down?	b. 5 minutes.
4. How do you apply load to the generator?	c. Turn off commercial power to ATS.
5. How do know that the generator has assumed the facility load?	b. Note generator meters and walk around facility to verify.
6. How do remove load from the generator?	d. Switch the ATS back to "Normal".

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

FROM:

SUBJECT: Qualification Training Package Improvement

1. Identify module.

Module # and title _____

2. Identify improvement/correction section(s):

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

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

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

5. Thank you for your time and interest.

YOUR NAME, RANK, USAF
Title/Position