DEPARTMENT OF THE AIR FORCE
Headquarters US Air Force
Washington DC 20330-1680

Air Force Job Qualification
Standard XXXXX-213U
XXXXX-213.21
1 October 1999

TACTICAL GENERATOR OPERATION FOR NON-POWER PRODUCTION PERSONNEL

SECTION A: GENERAL

1. This Air Force Job Qualification Standard (AFJQS) and attached Air Force Qualification Training Package (AFQTP) standardize on-the-job training (OJT) tasks and constitute an approved training program for Tactical Generator Operation. The AFJQS and AFQTP are used by unit training managers, supervisors, trainers, trainees, and other training functions to plan, conduct, and document OJT on this function.

2. Maintain the AFJQS IAW AFIs 36-2201 and 36-2233. Routine changes will be accomplished via page changes and urgent changes will be disseminated via message. Enter additional local tasks in the blank areas on the AFJQS or add forms. Develop Task Training Guides for added tasks; they should be consistent in content and format with those in the AFQTP. Submit recommended AFJQS/AFQTP improvements/corrections to the 81 TRSS Qualification Training Flight (81 TRSS/TSQS), 601 D Street, Keesler AFB MS 39534-2229.

3. Review Air Force publishing bulletins and AFIND8 to identify available training materials. Use this AFJQS in conjunction with other applicable JQSs or the Career Field Education and Training Plan (CFETP) and locally-assigned tasks to identify work center duty positions. Also, use this AFJQS along with other applicable JQSs and the CFETP to evaluate newly assigned personnel and identify individual training requirements.

4. Tasks listed on the AFJQS have been selected IAW the Instructional System Development (ISD) process and are the minimum, mandatory AF training requirements for this equipment. The "X" code in the Core Task column of the AF Form 797 is used to indicate that the individual must be trained and certified on that particular task. The "X*" code identifies tasks that may not be common to all equipment configurations; however, the task must be trained if it is assigned to the individual's duty position. The "—" code is used to indicate that training on this task is a local determination while ensuring 100% task coverage within the work center.

5. Trainees must accurately perform each assigned task unassisted IAW Technical References (TRs) prior to being certified. To qualify for skill-level upgrade, trainees must be certified on assigned tasks, satisfactorily complete career knowledge training, and meet mandatory specialty qualifications IAW AFI 36-2101 and AFMAN 36-2108. After upgrade, assign individuals to other work center duty positions and continue qualification training.

Supersedes AFJQS XXXXX-213U, dated 12 Dec 1996
OPR: HQ USAF/ILMM
OCR: 81 TRSS/TSQO
DISTRIBUTION: X

SECTION B: DOCUMENTATION

1. AFJQS/CFETP tasks will be compiled in an automated training management system, such as the Core Automated Maintenance System (CAMS), if available. The system must contain each AFJQS/CFETP title line with appropriate AFJQS/CFETP numbers, titles, and dates. AFJQS/CFETP and automated documentation requirements are listed below. The alphanumeric AFJQS number is converted to a dotted decimal number for use in CAMS. Alphanumeric numbers have been converted by retaining the 200 series number and changing the alphacharacter to the corresponding number, i.e., -200B becomes -200.2 and -201LB becomes -201.12.2.

a. Load applicable tasks in the automated training system or identify training requirements by circling the task numbers on each individual's AFJQS/CFETP.

b. If task statements contain more than one noun or action verb which precludes certification on the entire task, load/circle the noun or verb to indicate the individual is being trained only on that portion of the task.

c. When training is started on a task, enter the start date in the appropriate place. When training is complete, document training and task certification IAW local certification procedures.

2. The identification blocks listed below are to be used when the trainer is other than the trainee's immediate supervisor.

TRAINEE'S NAME	INITIALS	SSN
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		

BY ORDER OF THE SECRETARY OF THE AIR FORCE

OFFICIAL

JOHN W. HANDY, Lieutenant General, USAF
Deputy Chief of Staff/Installations and Logistics

4 Atch
1. AF Form 797
2. Trainer's Guide
3. Skill Training Material
4. Knowledge Evaluation Pamphlet

JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY	AETC		COMPLETION DATE
213.21.1 PERFORM GENERATOR PRE-OPERATION INSPECTION								
213.21.1.1 MEP-003A TR: 35C2-3-455-1, Tables 2-1 and 3-2	X*							
213.21.1.2 MEP-004A TR: 35C2-3-445, para 2-8, 2-10, 3-3b, 3-3c, 3-8a(1), 3-9, 3-11, 3-14a, 3-15a, 3-16a, 3-17, 3-18, 3-19, 3-20, 3-25b, 3-90c(2), and Table 3-1, items 1 thru 3	X*							
213.21.1.3 MEP005A TR: 35C2-3-446-1, para 2-8, 2-10, 3-3b, 3-3c, 3-8a(1), 3-9, 3-11, 3-14a, 3-15a, 3-16a, 3-17, 3-18, 3-19, 3-20, 3-25b, 3-90c(2), and Table 3-1, items 1 thru 7	X*							
213.21.1.4 MEP-006A TR: 35C2-3-444-1, para 2-12a, 3-3c, 3-3d, 3-4a(2), 3-9a, 3-10, 3-11, 3-12, 3-14, thru 3-27, 3-46a, 3-47, and Table 3-1, items 1 and 4, and Table 3-1.1, item 7, and Figure 2-5	X*							
213.21.1.5 MEP-007B TR: 35C2-3-442-11, para 2-3b, 3-3d, 3-3e, 3-3e(1) thru 3-3e(3), 3-14b(1), 4-107a, and Tables 2-1 and 2-2, and Table 3-2, items 1 thru 9 and 23 thru 25	X*							
213.21.1.6 MEP-016B TR: 35C2-3-386-31, para 2-6.1, 4-36a, and Table 2-1	X*							
213.21.1.7 MEP-017A TR: 35C2-3-424-1, para 2-2b(1), Table 2-1, and Table 3-2, items 1, 4, and 5; 38G2-89-21, Table 3-1, items 1, 2, and 3	X*							
213.21.1.8 MEP-026A TR: 35C2-3-386-1, para 2-2b(1), Table 3-2, item 1, Figure 2-4; 38G2-90-1, Table 3-2, item 1	X*							
213.21.2 PERFORM GENERATOR START OPERATION								

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EXCEPTION APPROVED BY: SAFAA/DPS, 30 OCT 87

JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY	AETC		COMPLETION DATE
213.21.2.1 MEP-003A TR: 35C2-3-455-1, para 2-4	X*							
213.21.2.2 MEP-004A TR: 35C2-3-445-1, para 2-10b	X*							
213.21.2.3 MEP-005A TR: 35C2-3-446-1, para 2-10b	X*							
213.21.2.4 MEP-006A TR: 35C2-3-444-1, para 2-12b	X*							
213.21.2.5 MEP-007B TR: 35C2-3-442-11, Figure 2-5	X*							
213.21.2.6 MEP-016B TR: 35C2-3-386-31, para 2-6.2	X*							
213.21.2.7 MEP-017A TR: 35C2-3-424-1, para 2-2a, 2-2b(2), and 2-2b(3)	X*							
213.21.2.8 MEP-026A TR: 35C2-3-386-1, para 2-2b(2), and 2-2b(3)	X*							
213.21.3 PERFORM GENERATOR SHUTDOWN OPERATION								
213.21.3.1 MEP-003A TR: 35C2-3-455-1, para 2-6	X*							
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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY			COMPLETION DATE
						AETC		
213.21.3.2 MEP-004A TR: 35C2-3-445-1, para 2-8w, 2-11a(1), 2-11b	X*							
213.21.3.3 MEP-005A TR: 35C2-3-445-1, para 2-8w, 2-11a(1), 2-11b	X*							
213.21.3.4 MEP-006A TR: 35C2-3-444-1, para 2-13a	X*							
213.21.3.5 MEP-007B TR: 35C2-3-442-11, para 2-6	X*							
213.21.3.6 MEP-016B TR: 35C2-3-386-31, para 2-7	X*							
213.21.3.7 MEP-017A TR: 35C2-3-424-1, para 2-2c(1)	X*							
213.21.3.8 MEP-026A TR: 35C2-3-386-1, para 2-2c	X*							
213.21.4 PERFORM GENERATOR OPERATION UNDER UNUSUAL CONDITIONS								
213.21.4.1 MEP-003A TR: 35C2-3-455-1, para 2-7 thru 2-10	X*							
213.21.4.2 MEP-004A TR: 35C2-3-445-1, para 2-15 thru 2-20, 2-22, and 2-23	X*							
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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY	AETC		COMPLETION DATE
213.21.4.3 MEP-005A TR: 35C2-3-446-1, para 2-15 thru 2-20, 2-22, and 2-23	X*							
213.21.4.4 MEP-006A TR: 35C2-3-444-1, para 2-16 thru 2-22, and Figures 2-11 and 2-12	X*							
213.21.4.5 MEP-007B TR: 35C2-3-442-11, para 2-8, 2-9, and 2-11 thru 2-17	X*							
213.21.4.6 MEP-016B TR: 35C2-3-386-31, para 2-9 thru 2-14	X*							
213.21.4.7 MEP-017A TR: 35C2-3-424-1, para 2-5 thru 2-10	X*							
213.21.4.8 MEP-026A TR: 35C2-3-386-1, para 2-5 thru 2-10	X*							
213.21.5 PERFORM GENERATOR PARALLEL (LOAD TRANSFER) OPERATION								
213.21.5.1 MEP-004A TR: 35C2-3-445-1, para 2-12d	X*							
213.21.5.2 MEP-005A TR: 35C2-3-446-1, para 2-12e	X*							
213.21.5.3 MEP-006A TR: 35C2-3-444-1, para B, and pages 2-26.1 and 2-26.2	X*							
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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY	AETC		COMPLETION DATE
213.21.5.4 MEP-007B TR: Local operating instructions	X*							
213.21.6 PERFORM GENERATOR INSPECTION DURING OPERATION								
213.21.6.1 MEP-003A TR: 35C2-3-455-1, Table 3-2	X*							
213.21.6.2 MEP-004A TR: 35C2-3-445-1, para 3-3b, and 3-4c, and Table 3-1, items 3 and 4	X*							
213.21.6.3 MEP-005A TR: 35C2-3-446-1, para 3-3b and 3-4c	X*							
213.21.6.4 MEP-006A TR: 35C2-3-444-1, para 3-4c, and 3-4c(1), and Table 3-1, items 2 and 4	X*							
213.21.6.5 MEP-007B TR: 35C2-3-442-11, para 3-3d(1), 3-3e, 3-3e(1), 3-3e(2), 3-3e(3), and Table 3-2, items 10 thru 13	X*							
213.21.6.6 MEP-016B TR: 35C2-3-386-31, Table 3-2, items 9 thru 14	X*							
213.21.6.7 MEP-017A TR: 35C2-3-424-1, Table 3-2, items 2 and 4; 38G2-89-21, Table 3-1, items 1 and 4	X*							
213.21.6.8 MEP-026A TR: 35C2-3-386-1, Table 3-2, item 2	X*							

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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY	AETC		COMPLETION DATE
213.21.7 Document Generator Forms and Records TR: AFI 32-1062, para 7; Local operating instructions								
213.21.8 PERFORM GENERATOR POST-OPERATIONAL INSPECTION								
213.21.8.1 MEP-003A TR: 35C2-3-455-1, Table 3-2, items 5 and 6	X*							
213.21.8.2 MEP-004A TR: 35C2-3-445-1, para 3-25b, and Table 3-1, item 5	X*							
213.21.8.3 MEP-005A TR: 35C2-3-446-1, para 3-25b, and Table 3-1, items 5, 8, 9, and 10	X*							
213.21.8.4 MEP-006A TR: 35C2-3-444-1, Table 3-1, items 3 and 5	X*							
213.21.8.5 MEP-007B TR: 35C2-3-442-11, Table 3-2, items 14 thru 19, 21, 22, 26, 27, and 28	X*							
213.21.8.6 MEP-016B TR: 35C2-3-386-31, Table 3-2, items 15 thru 18	X*							
213.21.8.7 MEP-017A TR: 35C2-3-424-1, Table 3-2, items 1 and 3	X*							
213.21.8.8 MEP-026A TR: 35C2-3-386-1, Table 3-2, item 3	X*							

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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY	AETC		COMPLETION DATE
213.21.9 PERFORM GENERATOR EMERGENCY OPERATION								
213.21.9.1 MEP-004A TR: 35C2-3-445-1, para 2-8w, 2-11b; Local operating instructions	X*							
213.21.9.2 MEP-005A TR: 35C2-3-446-1, para 2-8w, 2-11b; Local operating instructions	X*							
213.21.9.3 MEP-006A TR: 35C2-3-444-1, para 2-14c	X*							
213.21.9.4 MEP-007B TR: 35C2-3-442-1, para 2-18	X*							
213.21.10 PERFORM GENERATOR EMERGENCY SHUTDOWN PROCEDURES								
213.21.10.1 MEP-003A TR: 35C2-3-455-1, para 2-6d	X*							
213.21.10.2 MEP-004A TR: Local operating instructions	X*							
213.21.10.3 MEP-005A TR: Local operating instructions	X*							
213.21.10.4 MEP-006A TR: 35C2-3-444-1, para 2-13c	X*							
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TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY	AETC		COMPLETION DATE
213.21.10.5 MEP-007A TR: 35C2-3-442-11, para 2-18c	X*							
213.21.10.6 MEP-016B TR: 35C2-3-386-31, para 2-8	X*							
213.21.10.7 MEP-017A TR: 35C2-3-424-1, para 2-10	X*							
213.21.10.8 MEP-026A TR: Local operating instructions	X*							
213.21.11 PERFORM GENERATOR MINOR MAINTENANCE								
213.21.11.1 MEP-003A TR: 35C2-3-455-1, para 3-18b(1), 3-18b(2), 3-18c(1), 4-20b(1), 2-20b(2), 4-21b, and Figure 3-1; Local operating instructions	X*							
213.21.11.2 MEP-004A TR: 35C2-3-445-1, para 3-4c(3), thru 3-4c(10), 3-24b, 3-26b, 3-31b(3), 3-43b, and 3-78c; Local operating instructions	X*							
213.21.11.3 MEP-005A TR: 35C2-3-446-1, para 3-4c(3), thru 3-4c(10), 3-24b, 3-26b, 3-31b(3), 3-43b, and 3-78c; Local operating instructions	X*							
213.21.11.4 MEP-006A TR: 35C2-3-444-1, para 3-4c(3) thru 3-4c(9), 3-4d, 3-32b, 3-34b, 3-56b, and 3-165a; Local operating instructions	X*							
213.21.11.5 MEP-007A TR: 35C2-3-442-11, para 4-11, 4-12, 4-84b, 4-85a, 4-86a, 4-87, 4-102a, and 4-115	X*							

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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY	AETC		COMPLETION DATE
213.21.11.6 MEP-016B TR: 35C2-3-386-31, para 3-29b, 4-7, 4-34b, 4-35b, 4-35c, and 4-36a; Local operating instructions	X*							
213.21.11.7 MEP-017A TR: 38G2-89-21, para 3-4d, 3-7, and 3-8; Local operating instructions	X*							
213.21.11.8 MEP-026A TR: 38G2-90-1, para 3-2e, 4-14a, 4-14b, and 4-16a; Local operating instructions	X*							
213.21.12 PERFORM GENERATOR MINOR TROUBLESHOOTING								
213.21.12.1 MEP-003A TR: 35C2-3-455-1, Table 3-3; Local operating instructions	X*							
213.21.12.2 MEP-004A TR: 35C2-3-445-1, Table 3-2; Local operating instructions	X*							
213.21.12.3 MEP-005A TR: 35C2-3-446-1, Table 3-2; Local operating instructions	X*							
213.21.12.4 MEP-006A TR: 35C2-3-444-1, Table 3-3; Local operating instructions	X*							
213.21.12.5 MEP-007A TR: 35C2-3-442-11, Table 3-3; Local operating instructions	X*							
213.21.12.6 MEP-016B TR: 35C2-3-386-31, Table 3-3; Local operating instructions	X*							
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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	CERTIFICATION							
	CORE TASK	START DATE	CERTIFYING OFFICIAL'S INITIALS	TRAINEE'S INITIALS	MAJCOM DIRECTED USE ONLY			COMPLETION DATE
						AETC		
213.21.12.7 MEP-017A TR: 35C2-3-424-1, Table 3-4; 38G2-89-21, Table 4-4; Local operating instructions	X*							
213.21.12.8 MEP-026A TR: 38G2-90-1, Table 4-2; Local operating instructions	X*							

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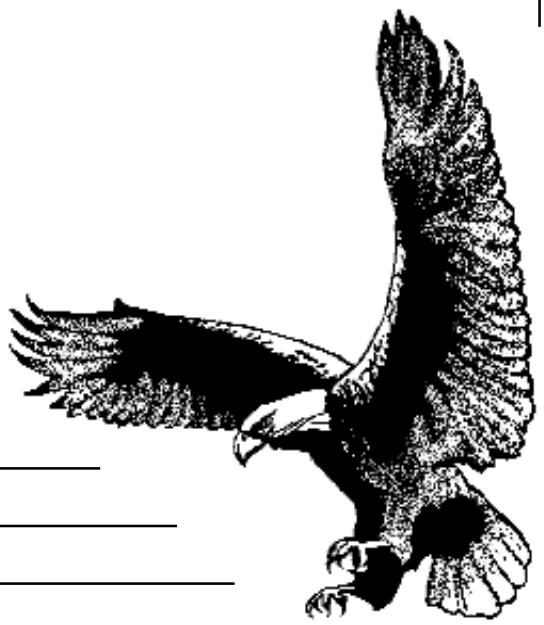
AIR FORCE QUALIFICATION TRAINING PACKAGE

000X0-213U

PART OF AFJQS 000X0-213U

TACTICAL GENERATOR OPERATION FOR NON-POWER PRODUCTION PERSONNEL

TRAINER'S GUIDE



1 OCTOBER 1999

SUPERSEDES AFJQS 000X0-213U
DATED 12 Dec 96

FOR OJT USE ONLY

TRAINER'S GUIDE

CONTENTS

ABOUT THIS TRAINING PACKAGE

This training package was developed by TSgt James E. Wachlin, 81 TRSS Qualification Training Flight, Keesler AFB, MS. The Training and Education Specialist was Mr. Hugh L. Frazier. It was validated by 2 CCGP/CCT, Patrick AFB, FL; 3 CCGP/LGDP, Tinker AFB, OK; and 5 CCGP/CCT, Robbins AFB, GA.

For more information on the 81 TRSS Qualification Training Flight and a list of other products that are available, feel free to visit our home page at http://www.keesler.af.mil/81trss/qflight.

IMPORTANT INFORMATION

The following training guidance is intended for use by qualified trainers. It is highly recommended that inexperienced trainers complete Air Force Training Course J4AJS3S2X1 00X, available on computer disk through your wing/unit training manager,
before attempting to train anyone on this material.

This training package was developed with four objectives in mind:

- Standardize on-the-job training.
- Reduce training time while maintaining proficiency standards.
- Provide trainers and trainees with a logically organized training plan which yields immediate and measurable feedback.
- Provide a standard to measure task knowledge and performance during personnel evaluations.

HOW TO USE THIS TRAINING PACKAGE

PACKAGE DESCRIPTION

This training package consists of

- an AF Form 797 which lists all tasks performed during development of OJT material that require structured training and certification.
- a Trainer's Guide which provides the trainer instructions on how to effectively conduct on-the-job training using this training package. The Trainer's Guide includes Task Training Guides (TTGs) which cover every task listed on the AF Form 797. The task evaluation checklists reflect the major areas of a task which must be performed satisfactorily before certification. A Training Certificate is attached.
- Skill Training Material which contains training modules, review questions, performance procedures, and a review question confirmation key.
- a Knowledge Evaluation Pamphlet which contains a test for each module. Keep the pamphlet separate until you are ready to administer the tests. Detach and store the KEP Key and Answer Sheet(s) in a secure place to ensure the KEP is not compromised.

INSTRUCTIONS FOR USING THIS TRAINING PACKAGE

- Review the trainee's training record (AF Form 623) and determine the trainee's previous training and certification.
- Assign the trainee to a duty position and develop the trainee's individual training plan (ITP) (see Figure 1 for an example of a computer-generated plan). Using the ITP, select the first task for training and review the applicable TTG.
- Ensure all training references are available and all prerequisites for that task are met.
- Discuss with trainee the task objective(s) and training steps. Assign corresponding STM module for the trainee to complete.
- When you are satisfied with the trainee's knowledge of the material, administer the Knowledge Evaluation Pamphlet. (Normally, the trainee is NOT permitted to use TRs but if TR use is permitted, it will be stated at the beginning of each KEP test and a score of 100% required. Otherwise, the trainee must score a minimum of 70% on the KEP tests.) Check the trainee's answers against the KEP Confirmation Key and review missed questions with trainee to ensure understanding of the material. If the score is less than what is required, have the trainee restudy the module and retake the test. Using TRs and the Task Evaluation Checklist as guidance, explain the task performance procedures to the trainee. Demonstrate the task procedures to the trainee and answer any questions. Have the trainee practice and explain the task procedures to you.
- Have the trainee perform the task procedures unassisted. Using the Task Evaluation Checklist, evaluate the trainee's performance. Should the trainee fail, determine the cause of unsatisfactory performance. Reevaluate the trainee when you are satisfied the task can be performed unassisted. When the trainee performs the task at the desired level of proficiency without assistance, document training and task certification IAW local certification procedures.
- Using the ITP, assign additional tasks until the trainee completes the requirements for the duty position. If, before completing this training package, the trainee is reassigned to another location which has a need for this training, we recommend you forward the training material to the gaining work center.
- Schedule periodic evaluations after the trainee is task certified. You may use the performance procedures, task evaluation checklists, or the KEP.
- When training is completed, remove the attached Training Certification document and give it to the trainee so he/she may make recommendations, suggestions, or corrections to the training package in the comments section. Upon receipt of a properly completed certification document, a Certificate of Training will be forwarded through channels to the trainee.

INDIVIDUAL TRAINING PLAN

TRAINEE: Amn Smith TRAINER: SSgt Jones

AFJQS NUMBER/ TASK NUMBER	ESTIMATED TRAINING TIME	ESTIMATED START TIME	DATE TRAINING COMPLETED	REMARKS
XXXXX-XXXX /1	2 days	21 Jun 96	23 Jun 96	
/2	4 hours	24 Jun 96	25 Jun 96	

EXAMPLE **EXAMPLE**

This Individual Training Plan is an example only. It does not reflect accurate training times.

Figure 1. Individual Training Plan

GENERATOR PRE-OPERATIONAL INSPECTION
TASK TRAINING GUIDE

TRAINEE'S NAME: _____

AFJQS TASK NUMBER(S): 213.21.1

ESTIMATED TASK TRAINING TIME: _____

TRAINING REFERENCE(S):

- TO 35C2-3-455-1
- TO 35C2-3-445-1
- TO 35C2-3-446-1
- TO 35C2-3-444-1
- TO 35C2-3-442-11
- TO 35C2-3-386-31
- TO 35C2-3-424-1
- TO 35C2-3-386-1
- TO 38G2-89-21
- TO 38G2-90-1
- AFQTP Modules 1 and 2

PREREQUISITE(S):

- Test equipment to be used: None
- Downtime/user release is not required.

TRAINING OBJECTIVE(S):

Given applicable technical references (listed below) and local directives, perform generator pre-operational inspection IAW prescribed procedures.

- MEP-003A - TO 35C2-3-455-1, Tables 2-1 and 3-2
- MEP-004A - TO 35C2-3-445-1, para 2-8, 2-10, 3-3b, 3-3c, 3-8a(1), 3-9, 3-11, 3-14a, 3-15a, 3-16a, 3-17, 3-18, 3-19, 3-20, 3-25b, 3-90c(2), and Table 3-1, items 1 thru 3
- MEP-005A - TO 35C2-3-446-1, para 2-8, 2-10, 3-3b, 3-3c, 3-8a(1), 3-9, 3-11, 3-14a, 3-15a, 3-16a, 3-17, 3-18, 3-19, 3-20, 3-25b, 3-90c(2), and Table 3-1, items 1 thru 7
- MEP-006A - TO 35C2-3-444-1, para 2-12a, 3-3c, 3-3d, 3-4a(2), 3-9a, 3-10, 3-11, 3-12, 3-14 thru 3-27, 3-46a, 3-47; Table 3-1, items 1 and 4; Table 3-1.1, item 7; and Figure 2-5

- MEP-007B - TO 35C2-3-442-11, para 2-3b, 3-3d, 3-3e, 3-3e(1) thru 3-3e(3), 3-14b(1), 4-107a; and Table 3-2, items 1 thru 9 and 23 thru 25; and Tables 2-1 and 2-2
- MEP-016B - TO 35C2-3-386-31, para 2-6.1, 4-36a; and Table 2-1
- MEP-017A - TO 35C2-3-424-1, para 2-2b(1); Table 2-1, and Table 3-2, items 1, 4, and 5; and TO 38G2-89-21, Table 3-1, items 1, 2, and 3
- MEP-026A - TO 35C2-3-386-1, para 2-2b(1); Table 3-2, item 1; Figure 2-4; and TO 38G2-90-1, Table 3-2, item 1

INITIAL TRAINING STEPS (Check when completed):

☐ Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

☐ Assign AFQTP Module 1.

☐ Discuss the review questions and answers with the trainee.

☐ Administer the KEP.

☐ Check the KEP answers and review missed questions.

☐ Assign AFQTP Module 2.

☐ Discuss the review questions and answers with the trainee.

☐ Administer the KEP.

☐ Check the KEP answers and review missed questions.

OBJECTIVE TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Discuss control panel instrument locations.

☐ Explain fuel selector valve operation.

☐ Show trainee location of drain valves.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.1 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Grounded the generator set.

☐ Inspected and serviced all fluid levels.

☐ Inspected and serviced batteries (when applicable).

☐ Positioned generator access doors (when applicable).

☐ Drained sediment/condensation from fuel system components.

☐ Inspected generator control panel instruments and controls.

☐ Pre-positioned all necessary control panel instruments and controls.

☐ Inspected convenience and slave receptacles.

☐ Positioned fuel selector valve.

☐ Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

☐ Assign the next task for training.

GENERATOR START/SHUTDOWN OPERATION
TASK TRAINING GUIDE

TRAINEE'S NAME: _____

AFJQS TASK NUMBER(S): 213.21.2, 213.21.3, 213.21.9, and 213.21.10

ESTIMATED TASK TRAINING TIME: _____

TRAINING REFERENCE(S):

- TO 35C2-3-455-1
- TO 35C2-3-445-1
- TO 35C2-3-446-1
- TO 35C2-3-444-1
- TO 35C2-3-442-11
- TO 35C2-3-386-31
- TO 35C2-3-424-1
- TO 35C2-3-386-1
- AFQTP Module 3

PREREQUISITE(S):

- Test equipment to be used: None

- Downtime/user release is/is not required.

- Ensure trainee has completed AFQTP Modules 1 and 2.

TRAINING OBJECTIVE(S):

- OBJECTIVE 1: Given applicable technical references (listed below) and local directives, perform generator start operation IAW prescribed procedures.

- MEP-003A - TO 35C2-3-455-1, para 2-4
- MEP-004A - TO 35C2-3-445-1, para 2-10b
- MEP-005A - TO 35C2-3-446-1, para 2-10b
- MEP-006A - TO 35C2-3-444-1, para 2-12b
- MEP-007B - TO 35C2-3-442-11, Figure 2-5
- MEP-016B - TO 35C2-3-386-31, para 2-6.2
- MEP-017A - TO 35C2-3-424-1, para 2-2a, 2-2b(2), and 2-2b(3)
- MEP-026A - TO 35C2-3-386-1, para 2-2b(2) and 2-2b(3)
-
- OBJECTIVE 2: Given applicable technical references (listed below) and local directives, perform generator emergency operation IAW prescribed procedures.

- MEP-004A - TO 35C2-3-445-1, para 2-8w and 2-11b
- MEP-005A - TO 35C2-3-446-1, para 2-8w and 2-11b
- MEP-006A - TO 35C2-3-444-1, para 2-14c
- MEP-007B - TO 35C2-3-442-11, para 2-18

- OBJECTIVE 3: Given applicable technical references (listed below) and local directives, perform generator shutdown operation IAW prescribed procedures.

- MEP-003A - TO 35C2-3-455-1, para 2-6
- MEP-004A - TO 35C2-3-445-1, para 2-8w, 2-11a(1), and 2-11b
- MEP-005A - TO 35C2-3-446-1, para 2-8w, 2-11a, and 2-11b
- MEP-006A - TO 35C2-3-444-1, para 2-13a
- MEP-007B - TO 35C2-3-442-11, para 2-6
- MEP-016B - TO 35C2-3-386-31, para 2-7
- MEP-017A - TO 35C2-3-424-1, para 2-2c(1)
- MEP-026A - TO 35C2-3-386-1, para 2-2c

- OBJECTIVE 4: Given applicable technical references (listed below) and local directives, perform generator emergency shutdown operation IAW prescribed procedures.

- MEP-003A - TO 35C2-3-455-1, para 2-6d
- MEP-004A - Local Operating Instructions
- MEP-005A - Local Operating Instructions
- MEP-006A - TO 35C2-3-444-1, para 2-13c
- MEP-007B - TO 35C2-3-442-11, para 2-18c
- MEP-016B - TO 35C2-3-386-31, para 2-8
- MEP-017A - TO 35C2-3-424-1, para 2-10
- MEP-026A - Local Operating Instructions

INITIAL TRAINING STEPS (Check when completed):

☐ Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

☐ Assign AFQTP Module 3.

☐ Discuss the review questions and answers with the trainee.

☐ Administer the KEP.

☐ Check the KEP answers and review missed questions.

OBJECTIVE 1 TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Explain how to configure generator set for auxiliary fuel operation.

☐ Show the trainee the location of the oil pan baffle rod.

☐ Explain how to adjust the frequency meter on generator model MEP-017A.

☐ Explain how to adjust the tachometer on generator model MEP-026A.

☐ Tell the trainee the correct voltage and frequency settings.

☐ Explain voltage and ammeter selector switch operation and correct positioning requirements.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.2 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Used proper hearing protection.

☐ Properly operated all switches and controls.

☐ Followed correct start procedures.

☐ Started the generator set electrically and manually, as applicable.

☐ Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

☐ Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Stress the importance of using the Battle Short switch for true emergency situations and not on a routine basis.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.9 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Operated the Battle Short switch for emergency generator operation.

☐ Started the standby generator set after the on-line generator has been placed into emergency operation.

☐ Notified power production personnel when use of the Battle Short switch was required.

☐ Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

☐ Assign the next task for training.

OBJECTIVE 3 TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 3 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Explain requirement for coordinating with using facility when shutting down the generator.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.3 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Coordinated with using facility when shutting down generator (if applicable).

☐ Operated generator set for cool-down period.

☐ Followed correct sequence of events for stopping the generator set.

☐ Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

☐ Assign the next task for training.

OBJECTIVE 4 TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 4 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Explain to the trainee the types of emergency situations which may require emergency shut down of the generator set.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.10 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

- [ ] Followed correct procedures for shutting down the generator set in emergency situations.
- [ ] Transferred load from the on-line to the standby unit correctly (if applicable).
- [ ] Trainee is ready to be certified on AFJQS task. Follow local certification procedures.
- [ ] Assign the next task for training.

OPERATION UNDER UNUSUAL CONDITIONS
TASK TRAINING GUIDE

TRAINEE'S NAME: _____

AFJQS TASK NUMBER(S): 213.21.4

ESTIMATED TASK TRAINING TIME: _____

TRAINING REFERENCE(S):

- TO 35C2-3-455-1
- TO 35C2-3-445-1
- TO 35C2-3-446-1
- TO 35C2-3-444-1
- TO 35C2-3-442-11
- TO 35C2-3-386-31
- TO 35C2-3-424-1
- TO 35C2-3-386-1
- AFQTP Module 4

PREREQUISITE(S):

- Test equipment to be used: None
- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 through 3.

TRAINING OBJECTIVE(S):

Given applicable technical references (listed below) and local directives, perform generator operation under unusual conditions IAW prescribed procedures.

- MEP-003A - TO 35C2-3-455-1, para 2-7 through 2-10
- MEP-004A - TO 35C2-3-445-1, para 2-15 through 2-20, 2-22, and 2-23
- MEP-005A - TO 35C2-3-446-1, para 2-15 through 2-20, 2-22, and 2-23
- MEP-006A - TO 35C2-3-444-1, para 2-16 through 2-22, and Figures 2-11 and 2-12.
- MEP-007B - TO 35C2-3-442-11, para 2-8, 2-9, and 2-11 through 2-17
- MEP-016B - TO 35C2-3-386-31, para 2-9 through 2-14
- MEP-017A - TO 35C2-3-424-1, para 2-5 through 2-10
- MEP-026A - TO 35C2-3-386-1, para 2-5 through 2-10

INITIAL TRAINING STEPS (Check when completed):

- ☐ Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.
- ☐ Assign AFQTP Module 4.
- ☐ Discuss the review questions and answers with the trainee.
- ☐ Administer the KEP.
- ☐ Check the KEP answers and review missed questions.

OBJECTIVE TRAINING STEPS:

- ☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

SPECIAL NOTE TO TRAINER: Explain to the trainee that the performance of some portions of this task may be **simulated**.

- ☐ Explain the frequency of servicing fuel filters and strainer in cold climate conditions.
- ☐ Tell the trainee which valves are to be positioned, which position to place them in, and where each valve is located for heater operation.
- ☐ Explain to the trainee what constitutes extreme hot weather conditions in your particular location.
- ☐ Reemphasize to the trainee the necessity of observing the specified waiting period between starting attempts on the Fuel Burning Heater which if not observed could cause an explosion inside the heater (if applicable).
- ☐ Show the trainee where the Oil Pan Baffle Rod is located (if applicable).
- ☐ Show the trainee the location of the Air Intake Shutter (if applicable).
- ☐ Identify the location of the heater exhaust plate on the MEP-007B (if applicable).
- ☐ Demonstrate correct task performance.
- ☐ Review task steps with trainee and answer any questions.
- ☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.4 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Operated Fuel Burning Heater (if applicable).

☐ Operated Electric Heater (if applicable).

☐ Operated generator in extreme hot climate (**simulated** if necessary).

☐ Operated generator in extreme cold climate (**simulated** if necessary).

☐ Operated generator in rainy and humid climate (**simulated** if necessary).

☐ Operated generator in salt water area (**simulated** if necessary).

☐ Operated generator in dusty and sandy climate (**simulated** if necessary).

☐ Operated generator at high altitude (**simulated** if necessary).

☐ Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

☐ Assign the next task for training.

GENERATOR PARALLEL (LOAD TRANSFER) OPERATION TASK TRAINING GUIDE

TRAINEE'S NAME: _____

AFJQS TASK NUMBER(S): 213.21.5

ESTIMATED TASK TRAINING TIME: _____

TRAINING REFERENCE(S):

- TO 35C2-3-445-1
- TO 35C2-3-446-1
- TO 35C2-3-444-1
- Local operating instructions
- AFQTP Module 5

PREREQUISITE(S):

- Test equipment to be used: None
- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 through 4.

TRAINING OBJECTIVE(S):

Given applicable technical references (listed below) and local directives, perform generator parallel (load transfer) operation IAW prescribed procedures.

- MEP-004A - TO 35C2-3-445-1, para 2-12d
- MEP-005A - TO 35C2-3-446-1, para 2-12e
- MEP-006A - TO 35C2-3-444-1, para B, pages 2-26.1 and 2-26.2
- MEP-007B - Local Operating Instructions

INITIAL TRAINING STEPS (Check when completed):

☐ Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

☐ Assign AFQTP Module 5.

☐ Discuss the review questions and answers with the trainee.

☐ Administer the KEP.

☐ Check the KEP answers and review missed questions.

OBJECTIVE TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Explain motorization, how to identify motorized condition, and how to correct it.

☐ Explain local procedures for notifying appropriate personnel when transferring load.

☐ Make sure the trainee knows when to close the AC breaker on the on-coming unit.

☐ Explain correct Manual Speed Control Knob operation.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.5 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Performed pre-operational inspection on on-coming generator set.

☐ Performed start procedures on on-coming generator set.

☐ Notified using facility prior to transferring load.

☐ Verified proper operation of on-coming generator.

☐ Placed the Operations switch in the correct position for both units.

☐ Accurately performed load transfer procedures.

☐ Operated the out-going unit for cool-down.

☐ Completed on-line adjustments for the on-line generator.

- [ ] Checked with the using facility after placing the unit on-line.
- [ ] Performed shutdown procedures on the out-going generator set.
- [ ] Trainee is ready to be certified on AFJQS task. Follow local certification procedures.
- [ ] Assign the next task for training.

GENERATOR INSPECTION DURING OPERATION
TASK TRAINING GUIDE

TRAINEE'S NAME: _____

AFJQS TASK NUMBER(S): 213.21.6 and 213.21.7

ESTIMATED TASK TRAINING TIME: _____

TRAINING REFERENCE(S):

- AFI 32-1062
- TO 35C2-3-455-1
- TO 35C2-3-445-1
- TO 35C2-3-446-1
- TO 35C2-3-444-1
- TO 35C2-3-442-11
- TO 35C2-3-386-31
- TO 35C2-3-424-1
- TO 35C2-3-386-1
- TO 38G2-89-21
- AFQTP Module 6

PREREQUISITE(S):

- Test equipment to be used: None.

- Downtime/user release is/is not required.

- Ensure trainee has completed AFQTP Modules 1 through 5.

TRAINING OBJECTIVE(S):

- OBJECTIVE 1: Given applicable technical references (listed below) and local directives, perform generator inspection during operation IAW prescribed procedures.

- MEP-003A - TO 35C2-3-455-1, Table 3-2
- MEP-004A - TO 35C2-3-445-1, para 3-3b and 3-4c, and Table 3-1, items 3 and 4
- MEP-005A - TO 35C2-3-446-1, para 3-3b and 3-4c
- MEP-006A - TO 35C2-3-444-1, para 3-4c and 3-4c(1), and Table 3-1, items 2 and 4
- MEP-007B - TO 35C2-3-442-11, para 3-3d(1), 3-3e, 3-3e(1), 3-3e(2), and 3-3e(3), and Table 3-2, items 10 through 13
- MEP-016B - TO 35C2-3-386-31, Table 3-2, items 9 through 14

- MEP-017A - TO 35C2-3-424-1, Table 3-2, items 2 and 4; TO 38G2-89-21, Table 3-1, items 1 and 4
- MEP-026A - TO 35C2-3-386-1, Table 3-2, item 2

- OBJECTIVE 2: Given AFI 32-1062, para 5.1 and 5.4; generator operating forms; a log book; and local operating instructions, document generator forms and records IAW prescribed procedures.

INITIAL TRAINING STEPS (Check when completed):

☐ Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

☐ Assign AFQTP Module 6.

☐ Discuss the review questions and answers with the trainee.

☐ Administer the KEP.

☐ Check the KEP answers and review missed questions.

OBJECTIVE 1 TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Explain local requirement for how often the during operation inspection is performed.

☐ Explain requirement for accurate verification of generator fuel level.

☐ Remind the trainee to wear hearing protection when performing inspection.

☐ Explain safety precautions concerning working around hot engine components.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.6 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Used hearing protection.

☐ Verified correct Control Panel instrument operation.

☐ Made adjustment to Control Panel instruments (if required).

☐ Checked engine oil level (if required).

☐ Replenished oil supply (if needed).

☐ Verified fuel level (aux. and/or set tank, as required).

☐ Conducted a thorough overall visual inspection.

☐ Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

☐ Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Explain operation of the "AMPS-VOLTS" switch.

☐ Explain how to request a job control number from the Job Control Section and what the purpose of the number is (if required).

☐ Explain how to complete an AF Form 2005 (if required).

☐ Explain how to obtain a supply document number (if required).

☐ Explain local requirements for various types of information recorded in the generator log book.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.7 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Documented local generator operating/ maintenance form.

☐ Documented generator log book.

☐ Properly maintained forms and records.

☐ Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

☐ Assign the next task for training.

GENERATOR POST-OPERATIONAL INSPECTION TASK TRAINING GUIDE

TRAINEE'S NAME: _____

AFJQS TASK NUMBER(S): 213.21.8

ESTIMATED TASK TRAINING TIME: _____

TRAINING REFERENCE(S):

- TO 35C2-3-455-1
- TO 35C2-2-445-1
- TO 35C2-3-446-1
- TO 35C2-3-444-1
- TO 35C2-3-442-11
- TO 35C2-3-386-31
- TO 35C2-3-424-1
- TO 35C2-3-386-1
- AFQTP Module 7

PREREQUISITE(S):

- Test equipment to be used: None.
- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 through 6.

TRAINING OBJECTIVE(S):

Given applicable technical references (listed below) and local directives, perform generator post-operational inspection IAW prescribed procedures.

- MEP-003A - TO 35C2-3-455-1, Table 3-2, items 5 and 6
- MEP-004A - TO 35C2-3-445-1, para 3-25b, and Table 3-1, item 5
- MEP-005A - TO 35C2-3-446-1, para 3-25b, and Table 3-1, items 5, 8, 9, and 10
- MEP-006A - TO 35C2-3-444-1, Table 3-1, items 3 and 5
- MEP-007B - TO 35C2-3-442-11, Table 3-2, items 14 thru 19, 21, 22, 26, 27, and 28
- MEP-016B - TO 35C2-3-386-31, Table 3-2, items 15 thru 18
- MEP-017A - TO 35C2-3-424-1, Table 3-2, items 1 and 3
- MEP-026A - TO 35C2-3-386-1, Table 3-2, item 3

INITIAL TRAINING STEPS (Check when completed):

☐ Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

☐ Assign AFQTP Module 7.

☐ Discuss the review questions and answers with the trainee.

☐ Administer the KEP.

☐ Check the KEP answers and review missed questions.

OBJECTIVE TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Explain requirement for checking the breather tube on the MEP-007B (if required).

☐ Explain any local post-operational requirements to trainee.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.8 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Drained sediment/condensation from fuel system components.

☐ Checked and serviced all fluid levels as needed.

☐ Utilized appropriate safety equipment.

☐ Checked and serviced generator batteries as needed.

- [ ] Made an overall visual inspection of the generator set.
- [ ] Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

- [ ] Assign the next task for training.

GENERATOR MINOR MAINTENANCE
TASK TRAINING GUIDE

TRAINEE'S NAME: _____

AFJQS TASK NUMBER(S): 213.21.11

ESTIMATED TASK TRAINING TIME: _____

TRAINING REFERENCE(S):

- TO 35C2-3-455-1
- TO 35C2-3-445-1
- TO 35C2-3-446-1
- TO 35C2-3-444-1
- TO 35C2-3-442-11
- TO 35C2-3-386-31
- TO 38G2-89-21
- TO 38G2-90-1
- Local Operating Instructions
- AFQTP Module 8

PREREQUISITE(S):

- Test equipment to be used: None.
- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 through 7.

TRAINING OBJECTIVE(S):

Given applicable technical references (listed below) and local directives, perform generator minor maintenance IAW prescribed procedures.

- MEP-003A - TO 35C2-2-455-1, para 3-18b(1), 3-18b(2), 3-18c(1), 4-20b(1), 4-20b(2), 4-21b, and Figure 3-1
- MEP-004A - TO 35C2-3-445-1, para 3-4c(3) through 3-4c(10), 3-24b, 3-26b, 3-31b(3), 3-43b, and 3-78c
- MEP-005A - TO 35C2-3-446-1, para 3-4c(3) through 3-4c(10), 3-24b, 3-26b, 3-31b(3), 3-43b, and 3-78c
- MEP-006A - TO 35C2-3-444-1, para 3-4c(3) through 3-4c(9), 3-4d, 3-32b, 3-34b, 3-56b, and 3-165a
- MEP-007B - TO 35C2-3-442-11, para 4-11, 4-12, 4-84b, 4-85a, 4-86a, 4-87, 4-102a, and 4-115
- MEP-016B - TO 35C2-3-386-31, para 3-29b, 4-7, 4-34b, 4-35b, 4-35c, and 4-36a

- MEP-017A - TO 38G2-89-21, para 3-4d, 3-7, and 3-8
- MEP-026A - TO 38G2-90-1, para 3-2e, 4-14a, 4-14b, and 4-16a

INITIAL TRAINING STEPS (Check when completed):

☐ Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

☐ Assign AFQTP Module 8.

☐ Discuss the review questions and answers with the trainee.

☐ Administer the KEP.

☐ Check the KEP answers and review missed questions.

OBJECTIVE TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Show trainee the location of the oil pan drain valve/plug.

☐ Explain the purpose and how to disconnect the negative battery lead on the MEP-006A, if applicable.

☐ Identify the location and explain the operation of the Dead Crank switch for the MEP-006A, if applicable.

☐ Show trainee where the fuel transfer pump(s) is/are located.

☐ Show trainee the location of the fuel drain tube and explain its function.

☐ Explain methods for removing hard to remove radiator hoses.

☐ Explain the difference between the Fuel Transfer Pump and the Auxiliary Fuel Pump on the MEP-016B, if applicable.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.11 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Changed engine oil, including filters.

☐ Serviced fuel filter(s)/strainer.

☐ Bled fuel system of trapped air.

☐ Changed the air filter.

☐ Cleaned the air filter (if applicable).

☐ Changed radiator hose(s).

☐ Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

☐ Assign the next task for training.

GENERATOR MINOR TROUBLESHOOTING
TASK TRAINING GUIDE

TRAINEE'S NAME: _____

AFJQS TASK NUMBER(S): 213.21.12

ESTIMATED TASK TRAINING TIME: _____

TRAINING REFERENCE(S):

- TO 35C2-3-455-1
- TO 35C2-3-445-1
- TO 35C2-3-446-1
- TO 35C2-3-444-1
- TO 35C2-3-442-11
- TO 35C2-3-386-31
- TO 35C2-3-424-1
- TO 38G2-89-21
- TO 38G2-90-1
- AFQTP Module 9

PREREQUISITE(S):

- Test equipment to be used: None.
- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 through 8.

TRAINING OBJECTIVE(S):

Given specific generator malfunctions; applicable technical references (listed below); and local operating instructions, perform generator minor troubleshooting IAW prescribed procedures.

- MEP-003A - TO 35C2-3-455-1, Table 3-3
- MEP-004A - TO 35C2-3-445-1, Table 3-2
- MEP-005A - TO 35C2-3-446-1, Table 3-2
- MEP-006A - TO 35C2-3-444-1, Table 3-3
- MEP-007B - TO 35C2-3-442-11, Table 3-3
- MEP-016B - TO 35C2-3-386-31, Table 3-3
- MEP-017A - TO 35C2-3-424-1, Table 3-4
- MEP-017A - TO 38G2-89-21, Table 4-4
- MEP-026A - TO 38G2-90-1, Table 4-2
- AFQTP Module 9

INITIAL TRAINING STEPS (Check when completed):

☐ Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

☐ Assign AFQTP Module 9.

☐ Discuss the review questions and answers with the trainee.

☐ Administer the KEP.

☐ Check the KEP answers and review missed questions.

OBJECTIVE TRAINING STEPS:

☐ Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

☐ Demonstrate correct task performance.

☐ Review task steps with trainee and answer any questions.

☐ Restore system to normal operating configuration.

☐ Have trainee practice steps and assist as necessary.

TASK 213.21.12 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

☐ Identified generator malfunction(s).

☐ Took appropriate action to correct generator malfunction(s).

☐ Documented generator malfunction(s) in the appropriate location.

☐ Trainee is ready to be certified on AFJQS task. Follow local certification procedures.

TRAINING CERTIFICATION FOR
AFJQS/AFQTP 000X0-213U
TACTICAL GENERATOR OPERATION FOR NON-POWER PRODUCTION PERSONNEL

I certify that _____

(Please print trainee's full name and rank)

completed all requirements for the above AFJQS/AFQTP.

_____

SUPERVISOR'S NAME, RANK, DUTY TITLE, DSN **(Please Print)**

_____

UNIT MAILING ADDRESS, INCLUDING ZIP CODE **(Please Print)**

_____

E-MAIL ADDRESS **(Please Print)**

_____

SUPERVISOR'S SIGNATURE

Please complete the above information, attach the completed and graded KEP answer sheet(s), and submit to 81 TRSS/TSQS, 601 D Street, Keesler AFB MS 39534-2229 (or FAX your answer sheet(s) to 597-9043).

TRAINER/TRAINEE: You have completed an AFJQS/AFQTP, and we need your feedback. Please fill out the following survey. If you found any errors or have suggestions for improvements, please tell us. Take advantage of this opportunity to express your ideas directly to the AFJQS/AFQTP development teams. List the errors you discovered in as much detail as possible. If you have product improvement suggestions, describe your ideas clearly and in a logical order. Thank you for your time and interest.

In the space provided, indicate your preference by placing the number corresponding to the following scale:

1. STRONGLY AGREE 2. AGREE 3. UNCERTAIN 4. DISAGREE 5. STRONGLY DISAGREE

TRAINEE

1. <u>Training Material</u>

a. The objectives were easy to understand. ___

b. The instructions were easy to understand. ___

c. The review and test questions reinforced the objective statement. ___

d. This is a high quality training package. ___

2. Training Material Presentation

a. I have easy access to a computer in my workplace. ___

b. Material was easy to read and presented in a logical sequence. ___

3. In my opinion

a. The Q Flight web page helps me stay current with training issues. ___

b. This training package accurately reflects my job requirements. ___

c. This package will help me be proficient in my career field. ___

d. After completing this package, I can do my job better. ___

TRAINER

1. Training Material

a. Instructions in the Trainer's Guide were clear and concise. ___

b. The objectives in this package were clear and attainable. ___

c. I have all the technical references listed for this package. ___

d. The figures, diagrams, and flowcharts helped student understanding. ___

e. The KEP questions measured the attainment of the objective. ___

2. In my opinion

a. This training package accurately reflects trainee job requirements. ___

b. This package helped make trainees proficient in their career field. ___

c. The Q Flight web page helps me stay current with training issues. ___

d. After completing this package, trainees can do their job better. ___

e. QTPs meet training needs. ___

3. In general

a. How do you receive our products?

QMAIL
Web Page
Other (Specify)

b. Which method of delivery do you prefer?

Electronic
Hard copy

OTHER COMMENTS OR SUGGESTIONS FOR IMPROVEMENT:

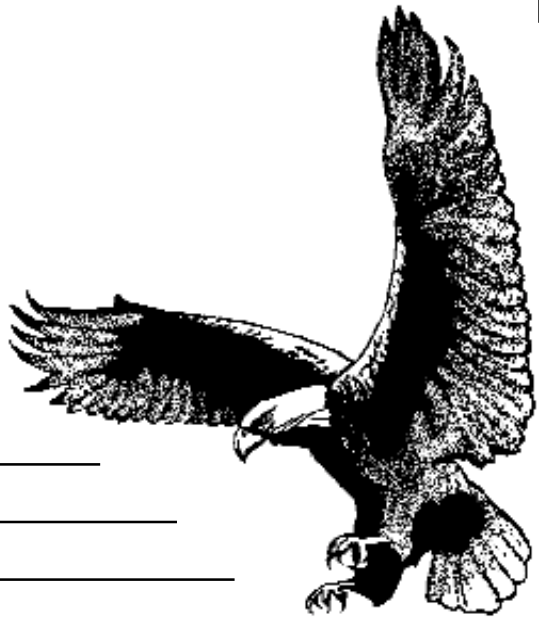
AIR FORCE QUALIFICATION TRAINING PACKAGE

000X0-213U

PART OF AFJQS 000X0-213U

TACTICAL GENERATOR OPERATION FOR NON-POWER PRODUCTION PERSONNEL

SKILL TRAINING MATERIAL



1 OCTOBER 1999

SUPERSEDES AFJQS 000X0-213U
DATED 12 Dec 96

SKILL TRAINING MATERIAL

CONTENTS

ABOUT THIS TRAINING PACKAGE

The purpose of this Air Force Qualification Training Package (AFQTP) is to

- standardize on-the-job training.
- reduce training time while maintaining proficiency standards.
- provide individuals with a logically organized training plan. which yields immediate and measurable feedback.
- provide a standard to measure task knowledge and performance during personnel evaluations.

This training package was developed by TSgt James E. Wachlin, 81 TRSS Qualification Training Flight, Keesler AFB, MS. The Training and Education Specialist was Mr. Hugh L. Frazier. It was validated by 2 CCGP/CCT, Patrick AFB, FL; 3 CCGP/LGDP, Tinker AFB, OK; and 5 CCGP/CCT, Robbins AFB, GA.

For more information on the 81 TRSS Qualification Training Flight and a list of other products that are available, feel free to visit our home page at http://www.keesler.af.mil/81trss/qflight.

HOW TO USE THIS TRAINING PACKAGE

INSTRUCTIONS FOR THE TRAINEE

- Ensure your trainer explains how to complete this training package.
- As you read each section in the module, answer the review questions pertaining to that section. You may use the module and technical references to answer the questions. You'll find the answers to these review questions at the end of each module.
- When you finish the module, your trainer will administer the Knowledge Evaluation Pamphlet (KEP). Answer all KEP questions and give the answer sheet to your trainer for grading. Your trainer will discuss any incorrect answers with you.
- When you complete the AFQTP, your trainer should give you the Training Certification document so you may make any recommendations, suggestions, or corrections to the training package in the comments section. Your inputs provide us with valuable feedback which enables us to give our customers the best possible training materials.

MODULE 1
GENERATOR FAMILIARIZATION

ABOUT THIS MODULE

This module explains the necessity for developing this AFQTP. It also covers your responsibilities as a non-power production person, and also what power production personnel are responsible for. The module provides information about generator component functions, and locations for each of eight MEP-series generator sets. Applicable safety precautions concerning generator operation are also covered.

MODULE OUTLINE

- Explain the purpose of training non-power production personnel to operate tactical utility generator sets.
- Explain non-power production personnel responsibilities.
- Explain power production personnel responsibilities.
- Identify the different generator models and their leading particulars.
- Explain the function of the major components of a typical generator set.
- Explain safety requirements/precautions associated with the operation of tactical generator sets.

TRAINING REFERENCES

MEP-003A - TO 35C2-3-455-1, Figures 1-1, 1-2, and 1-2.2
MEP-004A - TO 35C2-3-445-1, Figures 1-1 and 1-2
MEP-005A - TO 35C2-3-446-1, Figures 1-1 and 1-2
MEP-006A - TO 35C2-3-444-1, Figures 1-1 and 1-2
MEP-007B - TO 35C2-3-442-11, Figures 1-1 and 1-2
MEP-016B - TO 35C2-3-386-31, Figures 1-1 and 1-2
MEP-017A - TO 35C2-3-424-1, Figures 1-1 and 1-2
MEP-026A - TO 35C2-3-386-1, Figure 1-3; TO 38G2-90-1, Figure 4-19

CROSS-UTILIZATION

Have you ever heard of the term cross-utilization? If not, you will be hearing it in the near future. Cross-utilization, as it applies in the Air Force environment, simply means making maximum use of

assigned personnel by training them to do not only their job but also specific tasks associated with other AFSCs.
Due to recent and projected manning reductions, the Air Force is faced with a very serious problem. We don't have enough qualified personnel to adequately operate and maintain Air Force equipment. Unfortunately, power production is one of the career fields severely hit with manpower reductions. This is where you, the non-power production person, can step in to take up some of the slack. With the aid of this AFQTP and a qualified trainer you can learn to accomplish certain tasks related to tactical generator set operation. Don't panic; we realize some of you have little or no electrical/ mechanical training or experience. The tasks selected for inclusion in this AFQTP are broken down step-by-step and are presented in a manner that makes learning the task very easy.

You will normally not be responsible for performing every aspect of the power production duties. Both parties, non-power production and qualified power production individuals, will have their specific responsibilities. We will look at these responsibilities individually so that you can get a better idea of who is responsible for what.

?

1. What is cross-utilization as applied in the Air Force environment?

2. Why is cross-utilization necessary in the Air Force?

NON-POWER PRODUCTION RESPONSIBILITIES

More than likely, you are already trained on a few of the tasks outlined in this AFQTP. Operations personnel are required to receive generator operator training annually. Other non-power production personnel are taught tasks, such as generator pre-start, start, and shutdown procedures. These are the basic and more commonly performed generator operation tasks. This AFQTP also identifies additional tasks which non-power production personnel can readily learn and perform with a minimum of training. Exactly which tasks you will be required to perform, we can't answer. That will be determined largely by local policy. This AFQTP is not all

inclusive. You are not restricted to learning only the tasks presented. Other situations may arise which require you to learn and perform additional generator operation tasks. It will be the responsibility of your supervisor to ensure you receive this additional training. Now, let's take a look at the other side of the coin and see what tasks the power production individual is responsible for.

?

3. Why is it impossible to pinpoint exact non-power production responsibilities?

POWER PRODUCTION PERSONNEL RESPONSIBILITIES

Power production personnel are responsible for providing the training necessary to qualify the non-power production individuals on each specific task. As mentioned earlier, after initial task certification, refresher training is administered on a recurring annual basis. Power production personnel are also responsible for maintaining the generator set. This includes corrosion control, major part replacement, scheduled and non-scheduled preventive maintenance inspections (PMIs), etc. (Note: Don't forget those non-scheduled

maintenance inspections.) When not deployed, the generator set is maintained at the power production work center.

?

4. Who is responsible for providing generator training for the non-power production personnel?

GENERATOR TYPE AND LEADING PARTICULARS

A generator is a combination of two main components: an engine and an alternator. The engine supplies the mechanical energy to drive the alternator. The alternator is attached to the back of the engine and produces the electrical output. In this manner, all generators are the same. The only significant differences between models is their size and their kW output. Generators are rated in kilowatts (kW). The kW rating determines the electrical load

capacity of the unit. A 30kW generator set has a greater load capacity than a 10kW generator. In addition, the larger the kW rating of the unit, the larger the actual physical size of the generator set.

This AFQTP will include eight different generator sets which are commonly used in the tactical environment. Even though you may require certification on only one model, go ahead and read over the leading particulars for each model. This will give you a basis for comparison between models.

MEP-003A. The MEP-003A is a 10kW, 50/60 Hertz, AC, air-cooled diesel engine driven unit. An air-cooled unit is one that does not have a radiator. A fan mounted on the engine end of the unit is used to help keep the unit at the desired operating temperature.

MEP-004A. Model MEP-004A is a 3-phase, 15kW, 50/60 Hertz, AC, diesel engine driven unit.

MEP-005A. This model is a 3-phase, 30kW, 50/60 Hertz, AC, diesel engine driven unit.

MEP-006A. The MEP-006A is a 3-phase, 60kW, 50/60 Hertz, AC, diesel engine driven unit.

MEP-007B. Model MEP-007B is a 3-phase, 100kW, 50/60 Hertz, AC, diesel engine driven unit. This is the largest of the generator models discussed in this AFQTP.

MEP-016B. This is a 3kw, 60 Hertz, AC, air-cooled, diesel engine driven unit. Notice that this unit can only be operated in the 60 Hertz mode.

MEP-017A. This is a 5kW, 60 Hertz, AC, air-cooled unit. This unit differs from previously discussed models in that it's equipped with a gasoline engine rather than a diesel engine. This unit also only operates in the 60 Hertz mode.

MEP-026A. The MEP-026A is a 3kW unit. The output voltage of the MEP-026A is 28VDC. This generator set uses a gasoline engine. The MEP-026A is not equipped with a battery for electrical starting and is normally started manually by using a pull rope. However, the MEP-026A can be started by electrical means with the addition of an electric starting kit.

You can see that the differences between models are very small; however, these differences are important. We are now going to take a look at some of the major components and their functions. These components and their functions are common to all models and, therefore, will be discussed in general terms rather than pertaining to a specific model.

STOP

Select the applicable TO reference and review component location for the generator set you require certification on. After you have finished return to this module.

- MEP-003A - TO 35C2-3-455-1, Figures 1-1, 1-2, and 1-2.2
- MEP-004A - TO 35C2-3-445-1, Figures 1-1 and 1-2
- MEP-005A - TO 35C2-3-446-1, Figures 1-1 and 1-2
- MEP-006A - TO 35C2-3-444-1, Figures 1-1 and 1-2
- MEP-007B - TO 35C2-3-442-11, Figures 1-1 and 1-2
- MEP-016B - TO 35C2-3-386-31, Figures 1-1 and 1-2
- MEP-017A - TO 35C2-3-424-1, Figures 1-1 and 1-2
- MEP-026A - TO 35C2-3-386-1, Figure 1-3; TO 38G2-90-1, Figure 4-19

Following is a list of generator components that you are required to be familiar with and a brief explanation of their functions.

- CONTROL PANEL. Houses the instruments and controls necessary to operate the generator.
- MANUAL SPEED CONTROL KNOB. Controls the speed at which the generator operates. The engine speed is measured in terms of frequency.
- AC CIRCUIT BREAKER. When closed, enables power to be applied to the equipment.
- FUEL FILTERS. Filters out small particles of dirt suspended in the fuel.
- FUEL STRAINER. Filters out the larger, coarse particles of dirt contained in the fuel.
- SET TANK. External storage location for fuel.
- ELECTRIC FUEL PUMP. Pumps fuel from the fuel set tank to the day tank.
- OIL FILLER TUBE. The oil filler tube is where the engine oil is added when required.
- DIPSTICK. Used to measure engine oil level.
- OIL FILTER. Serves the same purpose as the fuel filters, but filters the small dirt particles out of the oil.
- GROUND STUD. Location for attaching the generator ground strap for electrically grounding the unit.
- BATTERIES. A DC power supply used for electrical starting of the unit.
- AIR CLEANER. Filters the incoming air before it enters the combustion chamber.

- RADIATOR. Used for cooling a circulating fluid which, in turn, cools the engine during operation.

- STARTING ROPE PULLEY. Where the pull rope is wound for manual starting of specific generator models.
- FAULT CONTROL PANEL. Identifies, by illuminating a red light, that the generator is experiencing some type of malfunction.

This concludes generator component functions, and locations. Hopefully, you now have a better understanding of the type of components you can expect to find on a typical generator set; refer to this information as often as needed. You will find as you progress through this AFQTP, that you will gradually start to remember the name, function, and location of the majority of components listed.

?

5. How is the MEP-003A engine cooled?

6. Which generator component is used to control engine speed?

7. How does the generator's physical size correspond to its load capacity?

8. What is indicated when a red light illuminates on the generator fault indicator panel?

9. What is the purpose of the engine dipstick?

10. Which generator set is normally started manually utilizing a starter pull rope?

11. What are the most significant differences between the generator set models?

SAFETY

As a member of the Air Force, you constantly receive safety briefings on a variety of things. So many that you sometimes tend to tune-out when safety is mentioned. For your own sake, don't let this be one of those occasions. Electricity can be deadly--it's just that simple. An attitude that says "it won't happen to me" could very well end your life. Electricity is something to be respected. Following is a list of rules to be used when working around electricity and electrical components:

- Never perform work without a qualified safety observer.
- Remove all jewelry.
- Never leave tools lying near electrical components.
- Never work on an energized circuit.
- Ensure equipment is properly grounded.
- Never attempt to perform work unless you know what you are doing.

Electrical safety is not your only concern when working on generator equipment. The generator set operates at very hot temperatures and care must be taken to avoid coming in contact with those hot engine components, such as oil lines, exhaust pipes, etc. Otherwise, very serious burns can result. Another area of concern deals with rotating machinery, which includes the radiator fan. Other than for checking the engine oil level, you should never put your hands inside the generator when it is operating. Even the most experienced person sometimes gets careless. This is just human nature. That is why it's so important to stress safety over and over. The best advice is to always pay attention, be aware of what you are doing, and THINK before you do it. To help you work more safely, special safety equipment has been developed and made available for your use. Let's take a look at some of the safety items used by power production personnel.

When working around generator equipment, special safety equipment is mandatory. Whenever the generator is operating, some type of hearing protection must be worn. This hearing protection may be in the form of ear plugs, headsets, or a combination of both. When working on the generator set batteries, you should wear eye protection such as goggles as well as a rubber

apron and gloves to prevent battery acid from coming in contact with your skin. Additionally, steel-toed electrical safety boots are a "must" when working around generator equipment.

?

12. In addition to electrical safety, which other two areas of safety should you be concerned with when operating a generator set?

13. What are the two different types of hearing protection that can be worn when operating a generator set?

SUMMARY

This module explained the necessity for developing this AFQTP. It also covered your responsibilities as a non-power production person, and also what power production personnel are responsible for. The module provided you information about generator component functions, and locations for each of eight MEP-series generator sets. Applicable safety precautions concerning generator operation were also covered.

ADDITIONAL INSTRUCTIONS

When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, your trainer will assign the next module.

REVIEW QUESTIONS CONFIRMATION KEY

1. Making maximum use of assigned personnel by training them to do not only their job but also specific tasks associated with other AFSCs
2. Manpower reductions
3. Exact duties will vary based on local operating procedures and individual trainer/supervisors.
4. Power production personnel
5. Cooled externally by a fan mounted on the engine end of the unit
6. Manual Speed Control knob
7. The larger the physical size, the larger the load capacity
8. A generator fault
9. Used to determine the engine oil level
10. MEP-026A
11. Size and kW output
12. Hot temperature and rotating machinery
13. Headset or ear plugs

MODULE 2
GENERATOR PRE-OPERATIONAL INSPECTION

PERFORMANCE GOALS

Given applicable technical references and local directives, perform generator pre-operational inspection IAW prescribed procedures (AFJQS Task 213.21.1).

PREREQUISITE

Must have completed Module 1 of this AFQTP.

ABOUT THIS MODULE

This module explains pre-operational inspection requirements for eight different generator models. Although the majority of the information presented applies to all models, there is information that applies specifically to an individual generator set. Throughout this AFQTP, you will be directed to read information out of the technical order (TO). Read only the information in the TO that applies to the specific generator you require training on. For example, if you require training on only the MEP-004A generator set, there is no need for you to read the TO information on the MEP-005A. With that understood, you can now move ahead and get going on generator pre-operational inspections.

MODULE OUTLINE

AFJQS Task 213.21.1

- Explain generator grounding requirements.
- Explain correct generator fluid level requirements.
- Explain battery inspection requirements.
- Explain how to properly inspect fan belts.
- Explain access door position requirements.
- Explain requirement for draining condensation from the fuel system.
- Explain generator set control panel inspection requirements.
- Explain convenience/slave receptacle inspection requirements.

TRAINING REFERENCE(S)

MEP-003A - TO 35C2-3-455-1, Tables 2-1 and 3-2
MEP-004A - TO 35C2-3-445-1, para 2-8, 2-10, 3-3b, 3-3c, 3-8a(1), 3-9, 3-11, 3-14a, 3-15a, 3-16a, 3-17, 3-18, 3-19, 3-20, 3-25b, 3-90c(2), and Table 3-1, items 1 thru 3
MEP-005A - TO 35C2-3-446-1, para 2-8, 2-10, 3-3b, 3-3c, 3-8a(1), 3-9, 3-11, 3-14a, 3-15a, 3-16a, 3-17, 3-18, 3-19, 3-20, 3-25b, 3-90c(2), and Table 3-1, items 1 thru 7
MEP-006A - TO 35C2-3-444-1, para 2-12a, 3-3c, 3-3d, 3-4a(2), 3-9a, 3-10, 3-11, 3-12, 3-14 thru 3-27, 3-46a, 3-47; Table 3-1, items 1 and 4; Table 3-1.1, item 7; and Figure 2-5
MEP-007B - TO 35C2-3-442-11, para 2-3b, 3-3d, 3-3e, 3-3e(1) thru 3-3e(3), 3-14b(1), 4-107a; and Table 3-2, items 1 thru 9 and 23 thru 25; and Tables 2-1 and 2-2
MEP-016B - TO 35C2-3-386-31, para 2-6.1, 4-36a; and Table 2-1
MEP-017A - TO 35C2-3-424-1, para 2-2b(1); Table 2-1, and Table 3-2, items 1, 4, and 5; and TO 38G2-89-21, Table 3-1, items 1, 2, and 3
MEP-026A - TO 35C2-3-386-1, para 2-2b(1); Table 3-2, item 1; Figure 2-4; and TO 38G2-90-1, Table 3-2, item 1

PRE-OPERATIONAL INSPECTION

Exactly what is a pre-operational inspection? Any idea? 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 van 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.

STOP
Select the appropriate TO reading assignment from the list at the right. At this time, you need only read those items pertaining to **BEFORE** operation inspection. After you have finished return to this module.

- MEP-003A - TO 35C2-3-455-1, Table 3-2
- MEP-004A - TO 35C2-3-445-1, Table 3-1
- MEP-005A - TO 35C2-3-446-1, Table 3-1
- MEP-006A - TO 35C2-3-444-1, Table 3-1
- MEP-007B - TO 35C2-3-442-11, Table 3-2
- MEP-016B - TO 35C2-3-386-31, Table 3-2
- MEP-017A - TO 35C2-3-424-1, Table 3-2
- MEP-026A - TO 35C2-3-386-1, Figure 3-2

The very first thing you must check when performing a pre-operational inspection is the Mobile Generator/Equipment Operation/Maintenance Log. The log is often kept in a pouch which is attached to the generator set or 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.

NOTE

A job is **NOT** closed until corrective action has been taken and the job has been signed off by the individual responsible for correcting the discrepancy.

If there are open jobs, check the column next to the job marked "STATUS." There are three different codes that are placed in this column. These codes consist of "R" for Red, "A" for Amber, and "G" for Green. Whenever there is an open job with an "R" status, the generator set can **NOT** be operated. A status of "R" indicates the equipment is unsafe or unfit for operation until the discrepancy has been satisfactorily corrected. A status of "A" indicates that the generator is operational, but has a limited capability. In other words, the equipment is in unsatisfactory condition but isn't considered a hazard to operate. This status requires the operator to monitor the generator operation more closely. When the job status is marked "G", this signifies that there are very minor things wrong with the unit; however, these minor discrepancies in no way affect the operational capability of the unit. Such discrepancies would include items like, missing screws, broken door latch, etc. After you have reviewed the back of the Mobile Generator/Equipment Operation/Maintenance Log and verified that the generator set is operational, you are ready to continue on with the next step of the pre-operational inspection.

GROUNDING

Never attempt to operate a generator set without first ensuring it is properly grounded. Grounding the generator set is a safety requirement. The purpose of grounding it is to provide a path for current flow in the event of an electrical fault. Failure to properly ground the set could result in injury or even death.

On every tactical generator set, you will find a ground stud located somewhere near the bottom of the generator frame. Refer to Figure 2-1 for a close-up look of what this ground stud looks like. Simply loosen the nut on the stud, slide the ground wire in the opening, and tighten down the bolt. Make sure the ground wire is secure but not so secure that you strip the stud threads. A quick test for ensuring the ground wire is secure is to give it a good tug. If the ground wire stays in place, it's sufficiently secured. Next, you need to attach the other end of the ground wire to a suitable ground. Once again, look at Figure 2-1. Here you can see two different types of grounds. In the tactical environment, the ground rod is most commonly used. This may be because it's easier to install. The ground rod must be driven into the ground a minimum of 8 feet. In order to attach the ground wire to the ground rod, a clamp must be used. The clamp you use may look a little different than the one shown in the figure; however, they are all basically the same and serve the same purpose. The key thing is to make sure the ground wire is fastened securely to the ground rod. In addition to ensuring the security of the ground wire, you must also make sure the grounds are kept clean.

Now that you know why grounding is required and how to properly hook up a ground, you can press on and take a look at another pre-operational inspection requirement. This next item concerns checking the various generator fluid levels.

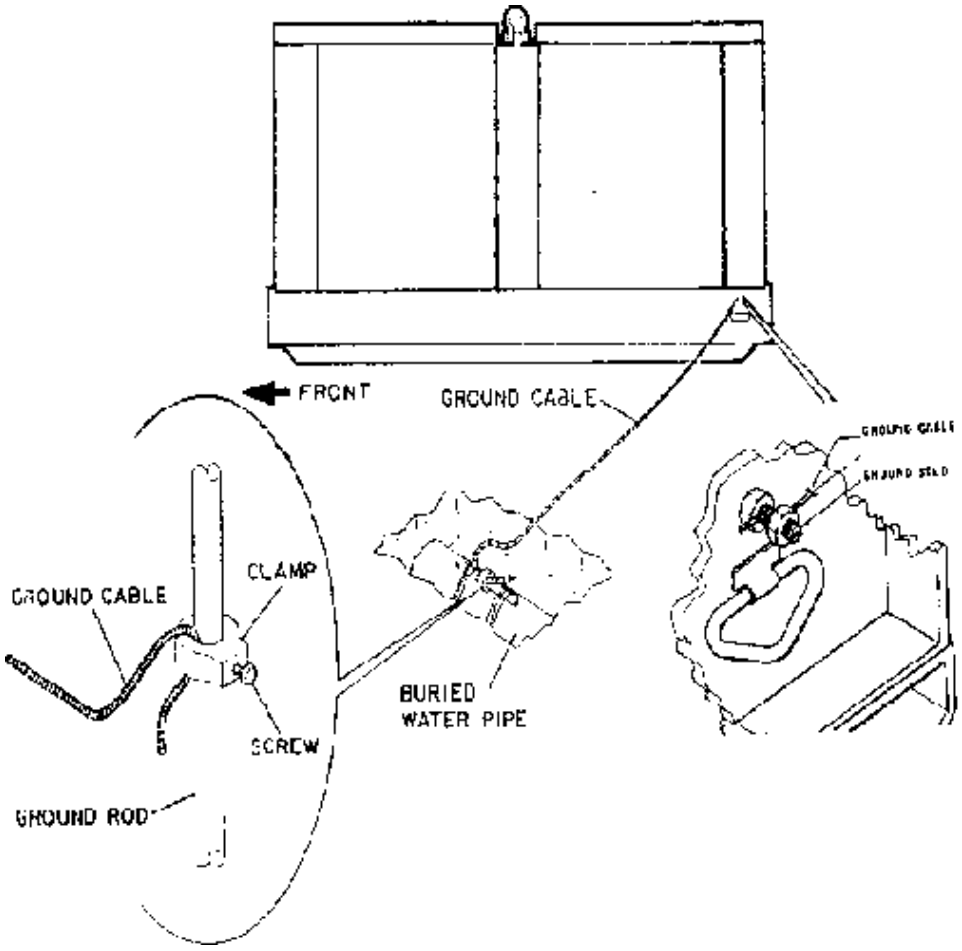


Figure 2-1. Generator Ground Connections

?

1. Why is it necessary to ground the generator set?

2. What could result from failure to properly ground the generator set?

FLUID LEVELS

A generator set has several different fluid levels that must be maintained. These fluid levels are critical to the continued operation of the generator. Letting any of the fluids fall below the required level can damage the generator set. The generator set has three major fluid systems: cooling, lubricating, and fuel.

NOTE

Only generator models MEP-004A thru MEP-007B have an enclosed type cooling system, such as that described at the right. All other models are air-cooled. Air cooled engines are similar to a typical lawn mower engine and require no coolant.

As mentioned in the previous module, generators operate at very high temperatures. Maintaining a safe operating temperature is the primary function of the cooling system. The components that make up this system are the radiator, radiator fan, and water pump. Coolant, a mixture of 60 percent water and 40 percent antifreeze, is stored in the radiator. The coolant is constantly circulated from the radiator, through the engine, and back to the radiator where it is cooled for recirculation. This cycle continues the entire time the generator set is in operation.

The engine oil system also helps to regulate the operating temperature. There are many moving parts within the engine. These parts create friction which in turn produces heat. The engine oil acts as a buffer between the moving parts and reduces the amount of friction. This, in turn, reduces the amount of heat produced. Without proper lubrication, these moving parts would produce a great amount of heat causing the generator set to shut down due to excessive temperature.

Another fluid level you need to check is the fuel. Believe it or not, fuel also plays a part in cooling the generator as it flows through the various fuel system components. Although the flowing fuel contributes in the cooling of the engine, the main reason for maintaining an adequate fuel supply is for the continued operation of the unit. If there isn't an adequate fuel supply, the generator set either isn't going to start or it isn't going to run for very long. One of the golden rules in the power production career field is to never run out of fuel. Not only is this embarrassing, but it also means extra work for you.

Now that you know why it's necessary to properly maintain generator fluid levels, you can find out how to go about checking them. You should already know where the fluid fill points are located, from the previous module. Refer back to Module 1 if you need to refresh your memory. If you own a vehicle, you have probably checked these very same fluids levels. How you check the generator fluid levels isn't really any different. When checking the coolant level, you simply open the radiator cap and look in. On a generator set, the correct coolant level is two inches below the top of the filler tube neck. If the coolant level is below the required level, add the appropriate amount of water and/or antifreeze necessary to bring it to the correct level.

NOTE

On generator models MEP-004A thru MEP-007B, the engine oil level is read both before and during engine operation. One side is marked “run” and the other side is marked “stop”. Make sure you are reading the side marked “stop” when performing a pre-operational inspection.

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.

Engine oil level on all models is checked by reading the engine oil level indicated on the dipstick.

To ensure an accurate dipstick reading, follow these procedures: Remove the dipstick and wipe it clean with a rag. Replace the dipstick back in its opening making sure it's in as far as it can go. Once again remove the dipstick and read the oil level. The correct oil level is indicated when the level on the dipstick is at the "full" mark. In the event oil needs to be added, do so by adding small amounts at a time. This method is recommended to avoid over filling. Over filling can cause internal damage to the engine. The last generator fluid level you need to check is the fuel.

NOTE

Models MEP-016B, MEP-017A, and MEP-026A are not equipped with a fuel level gauge

There are two ways to check the fuel level of the generator. One way is by simply reading the fuel level gauge on the control panel much in the same manner as you do on your automobile. However, this is not necessarily the most reliable method. Too often generator fuel gauges are inaccurate. **Always** visually check the generator fuel level (a flashlight can sometimes help). Simply remove the fuel cap and look in. If you are unable to see the fuel level, you need to add fuel to the tank. Another important item you need to inspect is the battery.

?

3. Which components make up the cooling system?

4. How is the engine oil level checked?

5. Which type of fluid(s) is/are used to replenish the radiator coolant level?

6. What is the recommend method for checking the generator fuel level?

BATTERY

Have you ever stepped into your car to go somewhere only to find that it would not start? Possibly, the battery was old and needed to be replaced or, maybe, the problem was that you never checked it. You must check the condition of the batteries each time you operate the generator set. You must perform both an external and internal inspection. An external inspection begins with checking the overall physical condition. Look for defects, such as cracks in the casing, loose or broken terminals, and loose or defective cables. Battery cables should not have any exposed wires showing. Also notice if the battery terminal connections have any white or greenish residue present. This is corrosion and needs to be removed. Once you have inspected the exterior of the battery, you then need to check the internal condition. You can gain access to check the electrolyte level of each cell by removing the individual battery caps. Electrolyte is a mixture of distilled water and acid.

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.

The correct electrolyte level in each cell is between the metal plates and the bottom of the filler opening. If the electrolyte level is low, use a battery filler to replenish. The battery filler is a specially designed container filled with distilled water. Distilled water is the preferred water for replenishing the electrolyte level. However, in an emergency situation, ordinary tap water can be used. The reason distilled water is normally used is that many of the contaminates found in regular drinking water have been removed. These contaminates, if present, leave deposits in the battery which reduce the life of the battery. When finished with the batteries inspect the generator fan belts.

?

7. Why must caution be used when servicing generator batteries?

8. What makes up the battery electrolyte solution?

FAN BELT INSPECTION

NOTE

Only models MEP-004A through MEP-007B require fan belt inspections.

Generator fan belts are inspected for cracks, wear, frays, and tightness. If the fan belt is cracked, worn, or frayed, it's unserviceable and must be replaced. One way for a fan belt to wear rapidly is if the belt is either too tight or too loose. Proper belt tension must be maintained. Checking the fan belt for proper tension is very easy. Using the back of your hand, press in on the belt. The distance the belt moves in when pressed is referred to as the deflection reading. Fan belt deflection readings will differ between models.

STOP

Select the applicable TO reading assignment listed at the right. After you have finished, return to this module.

- MEP-004A - TO 35C2-3-445-1, para 3-90c(2)
- MEP-005A - TO 35C2-3-446-1, para 3-90c(2)
- MEP-006A - TO 35C2-3-444-1, Table 3-1.1, item 7
- MEP-007B - TO 35C2-3-442-11, para 4-107a

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.

ACCESS DOOR POSITIONING

On generator models MEP-004A through MEP-007B, you must position the access doors in the closed position whenever the generator is operated. The only access doors to remain open are the doors located at the rear of the generator below the control panel. The access doors are positioned this way for cooling purposes. By closing the side access doors, a vacuum is created which draws air through the open end doors, thereby, helping to keep the generator set cool during operation. Another pre-operational check you need to perform is draining sediment/condensation from the fuel system components.

DRAINING SEDIMENT/CONDENSATION

Condensation is caused by an appreciable change in the ambient temperature from hot to cold, much like the temperature changes experienced between night and day. There is probably a long scientific definition of exactly what condensation is, but you only need to know that condensation is the formation of moisture or water. When condensation forms inside generator components, such as fuel tanks and filters, it must be removed, as it's corrosive and can cause damage to internal engine components.

NOTE

Although the requirements listed at the right are listed in each applicable technical order, it's recommend that the sediment/ condensation be drained only at the set tank location for models MEP-003A through MEP-007B.

Sediment is another foreign substance that must be removed from the generator fuel supply. Sediment is dirt or dust that gets trapped in the fuel and settles at the bottom of fuel system components. Every time the fuel is transferred from one storage source to another, there's a chance for foreign particles to enter the fuel. Another way fuel gets contaminated is in the storage area or tank itself. For instance, if the fuel truck that refuels your generator has a rusty, corroded storage tank, chances are that particles from that tank have been put into the generator set fuel tank. If you fail to eliminate the sediment/condensation from the generator fuel tank that same contaminated fuel will flow throughout the entire generator fuel system. Sediment/condensation is normally drained from the following fuel system components: set tank, day tank, fuel filters, and fuel strainer. The location from which you drain the sediment and condensation differs between models. If you are unsure of what the requirements are for the generator you are training on, reread the first reading assignment presented in this module.

NOTE

On generator models that are equipped with a fuel bowl (MEP-017A and MEP-026A), turn off the fuel supply and remove the fuel bowl. Wipe the bowl clean and reinstall. Turn the fuel supply back on.

Located at the bottom of each of the above named components is a drain valve. If you do not know what the drain valve looks like, ask your trainer to show you. Place a suitable container, such as an empty coffee can, beneath the drain valve, open the drain valve, and allow the sediment/condensation to drain. You can determine when all the sediment and condensation has been drained by observing the color of the fuel. When the color of the fuel changes, close the valve. If you do not notice a change in color within approximately 10 to 15 seconds, close the valve anyway. This indicates that there is no sediment/condensation present.

At this point in the pre-operational inspection requirements, you are going to inspect the generator control panel and pre-position the necessary switches and circuit breakers. The generator control panel is where you get the majority of your information concerning the proper operation of the unit. Ensuring all meters are functioning properly and control switches are placed in their correct pre-start position is critical for the safe operation of the generator set. First turn your attention to inspecting the control panel instruments.

?

9. How can you determine when all sediment/condensation has been drained from the fuel system components?

CONTROL PANEL INSPECTION

NOTE

When press-to-test lights are depressed, proper operation is indicated when the light illuminates. When released, the light should go out.

As explained in Module 1, the control panel houses the various meters, switches, breakers, and controls required to operate the generator. It's imperative these items function accurately and are in good working condition. When inspecting meters, switches, and breakers, check for cracks, broken glass (on meters), corroded and/or loose terminals, loose electrical connections, loose mounting, and signs of excessive heat. Inspect all lights for cracked lens covers, loose mounting, and loose or missing bulbs. Depress all press-to-test lights to ensure lights illuminate.

When discussing pre-positioning requirements for generator controls, you once again run into the problem of different model manufacturers. Some of the switches you are required to position during the pre-operational inspection of one unit may not require positioning until performing the start procedures on another unit. The best advice is to have your trainer explain the procedures to you and help clarify any uncertainties. Before you begin flipping switches and operating control panel instruments, you first need to have some idea of what the different switches and controls do.

STOP

Choose the applicable TO reading assignment which pertains to the specific generator you require training on. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, Table 2-1
- MEP-004A - TO 35C2-3-445-1, para 2-8
- MEP-005A - TO 35C2-3-446-1, para 2-8
- MEP-006A - TO 35C2-3-444-1, Figure 2-5
- MEP-007B - TO 35C2-3-442-11, Tables 2-1 and 2-2
- MEP-016B - TO 35C2-3-386-31, Table 2-1
- MEP-017A - TO 35C2-3-424-1, Table 2-1
- MEP-026A - TO 35C2-3-386-1, Figure 2-4

Now that you have an idea of the function of each of the different control panel instruments, place the controls in their proper pre-start position.

STOP

Select the applicable TO which applies to your generator and complete the reading assignment. After you have finished, return to this module.

- MEP-003A - No requirements listed
- MEP-004A - TO 35C2-3-445-1, para 2-10
- MEP-005A - TO 35C2-3-446-1, para 2-10
- MEP-006A - TO 35C2-3-444-1, para 2-12a
- MEP-007B - No requirements listed
- MEP-016B - TO 35C2-3-386-31, para 2-6
- MEP-017A - TO 35C2-3-424-1, para 2-2b(1)
- MEP-026A - No requirements listed

That just about covers it for control panel pre-positioning requirements. There are only two more items you need to check to complete the pre-operational inspection. These are the convenience receptacles and the slave receptacle.

RECEPTACLE INSPECTION

NOTE

The statement "no requirements listed" means that the TO does not list any control panel instrument pre-positioning requirements.

The convenience receptacles are of the same type you would find in your home or office building. They provide a 120 volt AC power source and are used to power drop lights, power tools, exterior lighting, etc. When inspecting the receptacles, check for cracks, loose mounting, and signs of excessive heat, such as scorch marks.

The slave receptacle is provided to jump start a second generator set in the event the second generator sets battery is weak. Using a specially made jumper cable, all the operator needs to do is plug one end of the cable into the receptacle of each generator. You inspect the slave receptacle the same way you do the convenience receptacles.

?

10. What is the purpose of the generator slave receptacle?

SUMMARY

In this module, you reviewed generator pre-operational inspection requirements. You found there were numerous little things that must be checked before attempting to start a generator set. Also, you gained an understanding of why checking these items is

important. Now, you should be better prepared to move on to the next task of learning--how to actually start the generator.

ADDITIONAL INSTRUCTIONS

When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate how to perform generator pre-operational inspections of your assigned generators. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

Generator Pre-operational Inspection:

- Ground the generator set.
- Inspect and service all fluid levels.
- Inspect and service batteries (when applicable).
- Position generator access doors (when applicable).
- Drain sediment/condensation from fuel system components.
- Inspect generator control panel instruments and controls.
- Pre-position all necessary control panel instruments and controls.
- Inspect convenience and slave receptacles.
- Position fuel selector valve.

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS. Your trainer will assign the next task.

REVIEW QUESTIONS CONFIRMATION KEY

1. To provide a path for current flow in the event of an electrical fault
2. Could cause injury or death
3. Radiator, radiator fan, and water pump
4. Reading the level on the dipstick
5. Water and/or antifreeze
6. Visually
7. Acid in the electrolyte solution can cause serious burns
8. Distilled water and acid
9. By a change in color of the fuel
10. Used to jump start a second generator

MODULE 3
GENERATOR START/SHUTDOWN OPERATION

PERFORMANCE GOALS

Given applicable technical references and local directives, perform generator start operation IAW prescribed procedures (AFJQS Task 213.21.2).

Given applicable technical references and local directives perform generator emergency operation procedures (AFJQS Task 213.21.9).

Given applicable technical references and local directives, perform generator shutdown operation IAW prescribed procedures (AFJQS Task 213.21.3).

Given applicable technical references and local directives perform generator emergency shutdown procedures (AFJQS Task 213.21.10).

PREREQUISITE

Must have completed Modules 1 and 2 of this AFQTP.

ABOUT THIS MODULE

This module will cover the startup, emergency operation, and normal and emergency shutdown of the generator set you will be qualifying on.

MODULE OUTLINE

AFJQS Task 213.21.2

- Identify applicable safety precautions.
- List start-up procedures.
- Explain preheating requirements.
- Explain requirement for verifying proper generator operation.

AFJQS Task 213.21.9

- Explain generator emergency operation procedures.

AFJQS Task 213.21.3

- List shutdown procedures.
- Explain cool-down requirements.

AFJQS Task 213.21.10

- Explain generator emergency shutdown procedures.

TRAINING REFERENCE(S)

MEP-003A - TO 35C2-3-455-1, para 2-4, 2-6, and 2-6d
MEP-004A - TO 35C2-3-445-1, para 2-8w, 2-10b, 2-11a(1), 2-11b, and Local Operating Instructions
MEP-005A - TO 35C2-3-446-1, para 2-8w, 2-10b, 2-11a(1), 2-11b, and Local Operating Instructions
MEP-006A - TO 35C2-3-444-1, para 2-12b, 2-13a, 2-13c, and 2-14c
MEP-007B - TO 35C2-3-442-11, Figure 2-5, para 2-6, 2-18, and 2-18c
MEP-016B - TO 35C2-3-386-31, para 2-6.2, 2-7, and 2-8
MEP-017A - TO 35C2-3-424-1, para 2-2a, 2-2b(2), 2-2b(3), 2-2c(1), and 2-10
MEP-026A - TO 35C2-3-386-1, para 2-2b(2), 2-2b(3), 2-2c, and Local Operating Instructions

SAFETY

You have already checked out the generator set during pre-operational inspection, now you are ready to start the unit. Although you positioned a few of the control panel switches during pre-operational inspection, you will operate most of the switches and controls during the start-up procedures. Before you get into that, however, there are a few safety precautions you need to be aware of. First, ensure you have removed all jewelry. Second, make sure you are wearing appropriate hearing protection, this can be either ear plugs or a headset.

?

1. Before you attempt to start the generator set, which two safety precautions must you take?

GENERATOR START-UP PROCEDURES

Starting the generator is not very difficult when you follow the step-by-step procedures listed in the applicable TO. Following the

pattern established in previous modules, you are only required to read the start procedures for the particular generator set you are training on.

The names and functions of the switches and controls involved in starting the generator were discussed in Module 2 and should already be familiar to you. If you need to refresh your memory, do so at this time. After you have finished, return to this module.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, para 2-4
- MEP-004A - TO 35C2-3-445-1, para 2-10b
- MEP-005A - TO 35C2-3-446-1, para 2-10b
- MEP-006A - TO 35C2-3-444-1, para 2-12b
- MEP-007B - TO 35C2-3-442-11, Figure 2-5
- MEP-016B - TO 35C2-3-386-31, para 2-6.2
- MEP-017A - TO 35C2-3-424-1, para 2-2a, 2-2b(2), and 2-2b(3)
- MEP-026A - TO 35C2-3-386-1, para 2-2b(2) and 2-2b(3)

On generator models MEP-004A through MEP-007B, you must hold the START-RUN-STOP switch in the START position long enough for the oil pressure gauge to show a reading. The generator set will **NOT** start if the START switch is released before the engine has adequate oil pressure. On models MEP- 004A through MEP-006A, the oil pressure gauge should read above 20psi. On the MEP-007B, the oil pressure gauge should show a pressure of at least 25psi. In addition, on the MEP- 007B, the Low Oil Pressure light on the Fault Indicator panel will extinguish when proper oil pressure is attained.

NOTE

If the unit does not start within the designated time frame listed in the TO, it's a good indication something is wrong with the unit. In that event, seek assistance from a qualified Power Production technician.

If the generator set will not start due to low cranking power (dead or weak batteries), you may use the Slave Receptacle to jump-start the unit. This is the only authorized method for auxiliary starting of the unit.

On generator models equipped with a Fault Indicator panel, any light that illuminates after the generator set is running is cause for immediate concern. Operate the TEST or RESET switch located on the Fault Indicator panel to reset the fault lights. If any of the fault lights illuminate again, shut the unit down immediately. Operate the TEST or RESET switch located on the Fault Indicator panel and repeat all start procedures. If any of the fault lights again illuminate, shut down the unit and seek assistance from Power Production personnel.

If you require certification on either the MEP-017A or the MEP-026A, you will have noticed from the reading assignment that these two generator models can be started either electrically or manually. Both methods are the same, except one uses a battery and the other requires the use of a pull rope.

PREHEAT REQUIREMENTS

NOTE

Preheat is **NOT** required when the engine is warm.

Generator models MEP-003A and MEP-016B, require you to place the Master switch in the PREHEAT position as part of the start-up procedures. To preheat the engine, you simply depress the DC breaker, move the Master switch to the PREHEAT position, and hold for a specified period of time. On the MEP-003A, the Master switch is held in the PREHEAT position for one minute. On the MEP-016B, it is held in the PREHEAT position for 30 seconds.

These are the only two generator models that require preheating as part of their normal start-up procedure. Methods for preheating other generator models are covered in the next module.

GENERATOR OPERATION

NOTE

This requirement does not pertain to generator models MEP-016B and MEP-026A since these units aren't equipped with oil pressure gauges. Also, remember the oil pressure gauge on generator model MEP-003A is located behind and to the right of the Control Panel.

After the unit is running, you must verify proper operation by checking various Control Panel instruments. One of the first things to check is the engine oil pressure. If the oil pressure gauge is not indicating oil pressure, shut down the generator set immediately.

Another Control Panel instrument you need to check is the voltmeter. Your trainer will tell you what the correct voltmeter reading should be. To adjust the voltmeter reading, use the Voltage Adjusting rheostat, located on the Control Panel. You must also verify that the frequency meter is indicating the correct frequency. Use the Manual Speed Control knob to raise and/or lower the frequency on models MEP-003A through MEP-007B and MEP-016B. Pulling out or pushing in the Manual Speed Control knob provides a coarse frequency adjustment, while turning the knob clockwise or counterclockwise provides a fine adjustment.

If the generator set is on-line (carrying a load), you must ensure that the amount of load does not exceed the capability of the generator set. This can be checked by reading the kW meter. On some generator models, the kW meter is referred to as the load meter. Not all generator models are equipped with a load or kW meter. In this case, you must rely on the percent of current or current meter in determining the load. The current meter indicates amperage and the amperage reading directly corresponds to the amount of load. The maximum reading either of these two meters should ever indicate is 100 percent. Generator models MEP-004A through MEP-007B are equipped with both a kW meter and a percent of current meter.

NOTE

On generator model MEP-026A you will find a tachometer instead of a frequency meter for recording engine speed. The normal reading for this meter is 3600rpms. To make adjustments to either the tachometer or the frequency meter you must seek assistance from your trainer.

Other Control Panel controls you need to operate are the Voltage Selector switch and the Ammeter Selector switch (the latter is also referred to as the Current Selector switch). On generator models MEP-003A through MEP-007B, these two switches are combined into one and referred to as either the Ammeter-Voltmeter Transfer switch or the Volts-Amps Transfer switch. Your trainer will tell you which position these two switches should be in.

In addition to starting and operating the generator set under normal conditions, there are also conditions that require emergency operation.

?

2. How can you determine when the generator set has actually started?

3. Which action is necessary if the generator set fails to start within the specified time frame listed in the applicable technical reference?

4. What should you do if the oil pressure gauge does not indicate oil pressure once the unit is running?

5. How is the output voltage adjusted?

6. What is another name for the Current Selector switch?

7. How are fine tuned adjustments made to the generator frequency?

GENERATOR EMERGENCY OPERATION

Occasionally there may be a situation in which continued operation of the generator set is critical. For instance if the generator set were to shut down during a flight check, the aircraft crew would have no radar signal to guide them and would not be able to communicate with radar personnel on the ground. The aircraft would be in danger.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-004A - TO 35C2-3-445-1, para 2-8w and 2-11b
- MEP-005A - TO 35C2-3-446-1, para 2-8w and 2-11b
- MEP-006A - TO 35C2-3-444-1, para 2-14c
- MEP-007B - TO 35C2-3-442-11, para 2-18

On generator models MEP-004A through MEP-007B, there is a switch called the Battle Short switch located on the generator control panel. When this switch is placed in the "ON" position, it overrides some generator safety circuits, such as low oil pressure, high coolant temperature, etc. The generator will **NOT** shut down if it experiences a generator fault; however, not all of the generator safety circuits can be overridden. The safety circuits for overspeed and electrical short circuits **CANNOT** be overridden at anytime. If the overspeed safety circuit were overridden, the generator set would destroy itself if it experienced an excessive speed malfunction. Overriding a short circuit could cause the unit to burn up. All other safety circuits are overridden when the Battle Short switch is placed in the "ON" position.

The Battle Short switch is only used for a true **EMERGENCY**. For example, assume your generator set is supplying power to the deployed control tower and a flight check is in progress. You notice the indication on the water temperature gauge of your on-line generator is rising. In this situation, you would place the Battle Short switch in the "ON" position and immediately start the standby generator to transfer the load. Return the Battle Short switch to the "OFF" position as soon as the situation permits. Correct the fault that was overridden as soon as possible.

In the event use of the Battle Short switch is required, you should immediately start up your stand-by generator set and notify power production personnel of the situation. If it's possible, change over to the standby unit.

CAUTION

If you are in the middle of a flight check, do NOT attempt to change over to the standby unit unless it is absolutely necessary. There is the possibility that all power could be lost during the transfer operation, and you cannot afford to take this chance. Utilize the Battle Short switch and notify power production personnel as quickly as possible.

Now that you are familiar with both normal and emergency generator operation, you can direct your attention to generator shutdown procedures.

?

8. What is the purpose of the Battle Short switch?

9. When should the Battle Short switch be placed in the "ON" position?

10. Why can't the overspeed safety circuit be overridden?

GENERATOR SHUTDOWN PROCEDURES

Shutting down the generator set is accomplished by basically reversing the start up procedures.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, para 2-6
- MEP-004A - TO 35C2-3-445-1, para 2-11a(1)
- MEP-005A - TO 35C2-3-446-1, para 2-11a(1)
- MEP-006A - TO 35C2-3-444-1, para 2-13a
- MEP-007B - TO 35C2-3-442-11, para 2-6
- MEP-016B - TO 35C2-3-386-31, para 2-7
- MEP-017A - TO 35C2-3-424-1, para 2-2c(1)
- MEP-026A - TO 35C2-3-386-1, para 2-2c

NOTE

If the generator set you're operating is supporting a facility, you must coordinate with appropriate facility personnel before opening the AC circuit breaker. Your trainer will brief you on correct procedures.

Opening the AC circuit breaker disconnects the load from the generator set. Observe the load or kW meter (percent of current meter if that is all you have) to verify that the generator set is no longer carrying the load.

When the generator set has been operated with a load, you must allow a cooling down period before shutting the unit down.

COOL-DOWN REQUIREMENTS

A cooling down period is necessary to permit engine components to cool gradually. If engine components cool too quickly, warping and cracking can occur. Letting the generator operate with no-load for approximately 3 to 5 minutes is a sufficient cool-down period. Even if your particular shutdown procedure does not require you to open the DC breaker, it's best to put this breaker in the OPEN position. Leaving the DC breaker in the CLOSED position can drain the batteries to a point that is insufficient for starting the unit.

?

11. What must you do before opening the AC circuit breaker of an on-line unit?

12. When is it necessary to operate the generator set for a cool-down period?

EMERGENCY SHUTDOWN PROCEDURES

There are times when it is necessary to quickly shut down the generator set because of some emergency such as a major oil leak. In this situation, you would need to perform emergency generator shutdown procedures.

If time permits, to avoid losing power, you can start the standby generator set and attempt to transfer the load from the on-line to the standby unit. This may not be possible because erratic generator operation often results from the malfunction.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, para 2-6d
- MEP-006A - TO 35C2-3-444-1, para 2-13c
- MEP-007B - TO 35C2-3-442-11, para 2-18c
- MEP-016B - TO 35C2-3-386-31, para 2-8
- MEP-017A - TO 35C2-3-424-1, para 2-10

When performing emergency shutdown procedures, your first action will normally be to remove the load from the distressed unit. Opening the AC circuit breaker will disconnect the load from the generator set. Remember, at this time, the power to the equipment is lost. You verify the load is disconnected by observing the applicable control panel meter for your particular model. Once the load has been removed, stop the generator. You accomplished this in a specific way depending upon the generator model. If the generator is equipped with a DC breaker, open the breaker. On the MEP-026A, move the Off-Run switch to the "OFF" position. To stop the MEP-017A in an emergency situation, move the Emergency Run-Stop switch to the "STOP" position after you have opened the AC circuit breaker.

Generator model MEP-007B, has an alternate method of shutting down the unit in an emergency. There is a manual shutdown lever on the governor. When this lever is held in the forward position the generator set shuts down. Have your trainer show you where the governor is located.

When shutting down a generator set under emergency conditions, there is no requirement to observe the normal cool down period. Although shutting down with no cool down period can cause damage to the generator set, continuing to run the engine with a problem may cause even more severe damage to the unit. If an emergency type situation arises and the generator must be shut down immediately, do it. You are not going to be held responsible for equipment damage after making this decision.

This concludes generator start-up/shutdown procedures. You should have a fairly good idea of how to perform these generator operations. Make sure you are comfortable with these procedures before attempting to perform them.

?

*13. Why is it **NOT** always possible to transfer the load from the on-line to the standby generator set during an emergency situation?*

14. How is the load removed from the generator set?

15. Which normal shutdown procedure is omitted when performing emergency shutdown procedures?

SUMMARY

This module covered how to perform normal generator start, emergency start, shutdown, and emergency shutdown operations.

Consult the applicable TO before attempting to start any generator set. The TO should identify all applicable safety precautions, start-up procedures, preheating requirements, and how to verify proper generator operation. The TO also explains emergency operation procedures, shutdown procedures, cool-down requirements, and emergency shutdown procedures. As you can see, proper usage of the TO will make operation of the deployed tactical generator a cinch.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate the start, emergency start, shutdown, and emergency shutdown procedures of your assigned generators. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

Start Operations:

- Use proper hearing protection.
- Properly operate all switches and controls.
- Follow correct start procedures.
- Start the generator set electrically and manually, as applicable.

Emergency Operation:

- Operate the Battle Short switch for emergency generator operation.
- Start the standby generator set after the on-line generator has been placed into emergency operation.
- Notify power production personnel when use of the Battle Short switch was required.

Shutdown Operation:

- Coordinate with using facility when shutting down generator (if applicable).
- Operate generator set for cool-down period.
- Follow correct sequence of events for stopping the generator set.

Emergency Shutdown Operation:

- Follow correct procedures for shutting down the generator set in emergency situations.
- Transfer load from the on-line to the standby unit correctly (if applicable).

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS. Your trainer will assign the next task.

REVIEW QUESTIONS CONFIRMATION KEY

1. Remove all jewelry and put on hearing protection
2. When the Start switch is released and the unit continues to run
3. Seek assistance from a qualified power production technician
4. Immediately shut down the generator set
5. With the Voltage Adjusting rheostat
6. Ammeter Selector switch
7. By turning the Manual Speed Control knob either clockwise or counterclockwise
8. Override generator safety circuits
9. During generator emergency operation
10. Because the generator set would destroy itself due to excessive speed
11. Coordinate with the using facility
12. After the unit has been operated with a load
13. Generator operation may be too erratic
14. By opening the AC circuit breaker
15. Cool-down period

MODULE 4
OPERATION UNDER UNUSUAL CONDITIONS

PERFORMANCE GOALS

Given applicable technical references and local directives, perform generator operation under unusual conditions IAW prescribed procedures (AFJQS Task 213.21.4).

PREREQUISITE

Must have completed Modules 1 thru 3 of this AFQTP.

ABOUT THIS MODULE

This AFQTP discusses generator models that are used primarily in a mobile environment, as such they are subject to worldwide deployment and must be capable of operating in varying climatic conditions. This module will explain these unusual conditions.

MODULE OUTLINE

AFJQS Task 213.21.4

- Explain requirements for operating in extreme cold weather conditions.
- Explain fuel burning heater operation.
- Explain electric heater operation.
- Explain requirements for operating in extreme heat.
- Explain additional requirements for generator operation under other unusual conditions.

TRAINING REFERENCES

MEP-003A - TO 35C2-3-455-1, para 2-7 through 2-10
MEP-004A - TO 35C2-3-445-1, para 2-15 through 2-20, 2-22, and 2-23
MEP-005A - TO 35C2-3-446-1, para 2-15 through 2-20, 2-22, and 2-23
MEP-006A - TO 35C2-3-444-1, para 2-16 through 2-22, and Figures 2-11 and 2-12
MEP-007B - TO 35C2-3-442-11, para 2-8, 2-9, and 2-11 through 2-17
MEP-016B - TO 35C2-3-386-31, para 2-9 through 2-14
MEP-017A - TO 35C2-3-424-1, para 2-5 through 2-10
MEP-026A - TO 35C2-3-386-1, para 2-5 through 2-10

COLD CLIMATE OPERATION

In Module 2, several different fluid systems found on a typical generator set were covered. These generators are normally utilized in the mobile environment and, as such, are subject to worldwide deployment in cold climates. It is critical to the operation of the generator set that these fluids continue to flow freely under cold weather conditions.

STOP

Select the applicable TO reading assignment listed at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, para 2-8
- MEP-004A - TO 35C2-3-445-1, para 2-15
- MEP-005A - TO 35C2-3-446-1, para 2-15
- MEP-006A - TO 35C2-3-444-1, para 2-16b through 2-16f
- MEP-007B - TO 35C2-3-442-11, para 2-11
- MEP-016B - TO 35C2-3-386-31, para 2-9
- MEP-017A - TO 35C2-3-424-1, para 2-5
- MEP-026A - TO 35C2-3-386-1, para 2-5

Operation in a cold weather environment requires special precautions such as increasing the amount of antifreeze protection and selecting an appropriate grade of fuel.

Always keep the fuel tank as full as possible when operating in cold weather. This helps prevent build up of condensation. Water present in the fuel can freeze and block fuel lines. Fuel filters and strainers may require more frequent servicing. Local operating procedures will normally determine the interval for servicing. The generator set battery also requires extra precautions. A battery is less efficient when cold. As the temperature drops, so does the batteries cranking ability. All efforts to keep the battery warm should be made. This may even require removing the battery from the generator and storing it in a warm location, such as inside a building. If the electrolyte needs replenishing in freezing temperatures, charge the battery for approximately one hour, after servicing, to thoroughly mix the water and battery acid. When operating in very cold climates allow the generator set to reach operating temperature before applying load. This warm-up period ensures that all engine components are moving freely and can handle the additional stress of carrying the load.

NOTE

On generator models equipped with both fuel burning and electric heaters, only one may be operated at a time.

External heating may be required for generator models MEP-004A through MEP-007B if the ambient temperature falls below -25^{o}F. Heat is supplied by fuel burning or electric heaters. Normally only one type of heater is on a given generator set, although some do have both.

FUEL BURNING HEATER OPERATION

STOP

Select the applicable TO reading assignment listed at the right. After you have finished, return to this module.

The fuel burning heater is used to preheat the engine coolant and lubricating oil in extremely cold weather. It takes approximately 50 to 60 minutes for the fuel burning heater to preheat the engine for starting. This is a relatively short amount of time when compared to the electric heater which may take several hours to preheat. Now take a closer look at how the fuel burning heater operates.

- MEP-004A - TO 35C2-3-445-1, para 2-22
- MEP-005A - TO 35C2-3-446-1, para 2-22
- MEP-006A - TO 35C2-3-444-1, Figure 2-11
- MEP-007B - TO 35C2-3-442-11, para 2-8

From the reading assignment, you will have noticed the requirement to position several valves in order to operate this heater. It's important that these valves are properly positioned; they allow the coolant to be heated and circulated. Your trainer will show you where these different valves are located and in what position they are to be placed. Now, it's time to see how the electric heater operates.

ELECTRIC HEATER OPERATION

NOTE

Some generator sets may be equipped with a generic type heater, such as a Kim Start. The Kim Start heater requires a 120VAC power source for operation.

The electric heater uses an external power source for heating the oil and coolant. The external power may be obtained from any 208 to 240 volt, single phase power source. This type of power is **NOT** always readily available. Normally, whenever you deploy, you are required to have 100 percent backup power. You should operate the electric heater on your backup generator using the on-line unit as a source of power whenever possible. Keep the electric heater operating until the backup unit must be placed on-line. Then do the same thing with the unit that has just come off-line. In this way, you will always have the generator sufficiently preheated for immediate usage. These procedures sound simple and easy to accomplish; however, there is always at least one problem--how to get the first generator started! For this very reason, generator sets are frequently equipped with fuel burning heaters. Most of these heaters utilize the generator set batteries as their source of power.

STOP

Select the applicable TO reading assignment listed at the right. After you have finished, return to this module.

- MEP-004A - TO 35C2-3-445-1, para 2-23
- MEP-005A - TO 35C2-3-446-1, para 2-23
- MEP-006A - TO 35C2-3-444-1, Figure 2-12
- MEP-007B - TO 35C2-3-442-11, para 2-9

?

1. Which generator models utilize fuel burning and/or electric heaters?

2. Why must the generator set be capable of operating in various climatic conditions?

3. Why should the fuel tank be kept as full as possible during operation in extremely cold weather?

4. How can water in the fuel affect the operation of the generator set in cold climates?

5. Why must a battery be charged after replenishing the electrolyte level in cold climate conditions?

6. How does a drop in the ambient temperature affect the operation of the generator batteries?

EXTREME HEAT OPERATION

As with extreme cold weather conditions, there are also special procedures to follow when operating generators in hot weather conditions. These procedures apply to generators operated in ambient temperatures up to 125^{o} F. Your trainer will tell you at which ambient temperature these procedures will be implemented for your particular operating location.

STOP

Select the applicable TO reading assignment listed at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, para 2-7
- MEP-004A - TO 35C2-3-445-1, para 2-16
- MEP-005A - TO 35C2-3-446-1, para 2-16
- MEP-006A - TO 35C2-3-444-1, para 2-17
- MEP-007B - TO 35C2-3-442-11, para 2-12
- MEP-016B - TO 35C2-3-386-31, para 2-10
- MEP-017A - TO 35C2-3-424-1, para 2-6
- MEP-026A - TO 35C2-3-386-1, para 2-6
-

Your biggest concern when operating in extremely hot climates is keeping the generator set from overheating. Keep an eye on both the coolant gauge and the load meter. (Remember the load meter is also referred to as the kW meter on some generator models.) If your generator set has neither a load meter nor a kW meter, rely on the current meter for determining the amount of load as explained in an earlier module. Whenever the generator shows signs of overheating or overload, take measures quickly to correct the situation. This may require some load shedding or the addition of another generator set. Your trainer will instruct you as to what actions are required.

Since the generator set relies on air for cooling, make sure that nothing obstructs the air flow to or from the unit. It may seem a good idea to open the access doors on generator models MEP-004A through MEP-007B to help keep the unit cooler; however, this is not the case. By opening the doors, the vacuum created with the side doors closed and the end doors open will be lost. The air flow is in fact greatly reduced. Keep the side doors closed. On models with an enclosed type cooling system, ensure the radiator louvers are in the open position. Make more frequent inspections of the battery electrolyte levels. This is necessary because the rate of evaporation increases as the temperature rises.

?

7. Why is it necessary to increase battery inspection intervals in extremely hot weather?

ADDITIONAL OPERATING CONDITIONS

In addition to operation in extreme cold and heat, there are other unusual operating conditions you should be familiar with. These include operation in dusty or sandy climates, in humid climates, at high altitudes, and in salt water areas.

STOP

Select the applicable TO reading assignment listed at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, para 2-9 through 2-10
- MEP-004A - TO 35C2-3-445-1, para 2-17 through 2-20
- MEP-005A - TO 35C2-3-446-1, para 2-17 through 2-20
- MEP-006A - TO 35C2-3-444-1, para 2-18 through 2-22
- MEP-007B - TO 35C2-3-442-11, para 2-13 through 2-17
- MEP-016B - TO 35C2-3-386-31, para 2-11 through 2-14
- MEP-017A - TO 35C2-3-424-1, para 2-7 through 2-10
- MEP-026A - TO 35C2-3-386-1, para 2-7 through 2-10

Make an extra effort to keep the dust and sand out of the generator set when operating in dusty and sandy areas. Make use of natural barriers, such as buildings, as much as possible to prevent dirt and dust from being blown inside the unit. Take special precautions to prevent dust and sand from getting into the fuel tank whenever you are required to refuel or when checking the fuel level. Always try to remove as much of the dust and sand from around the fuel tank opening before servicing to prevent it from entering the fuel system. Also make more frequent checks of the air cleaner to ensure it hasn't become clogged. If an adequate water supply is available, wash the generator set frequently.

When operating at high altitudes, the output rating of the generator set is reduced. Each generator is designed to operate at its rated capacity up to a designated altitude. When that designated altitude is exceeded, the output rating of the generator is affected. Air is thinner at higher altitudes because there is less oxygen. As a result, there is less oxygen available for burning with the fuel in each cylinder. This, in turn, results in less output power.

?

8. What can be used to help prevent dust and sand from entering the generator set in dusty and sandy environments?

9. Which generator component should be checked more frequently in dusty and sandy climates?

10. How does operation at higher altitudes affect generator operation?

SUMMARY

This completes our discussion on generator operation under unusual conditions. Knowing what to do and when to do it is the key to successful operation of the generator under these different operating environments.

During cold climate operation you will have to operate the fuel burning or electric heater supplied with the generator to keep it warm and ready for use. Along with keeping the generator warm you also have to keep the batteries warm for maximum cranking power for cold weather starts.

Your biggest concern when operating in extremely hot climates is keeping the generator set from overheating. Since the generator set relies on air for cooling, make sure that nothing obstructs the air flow to or from the unit and you must make more frequent inspections of the coolant and battery electrolyte levels.

In addition to operation in extreme cold and heat, there are other unusual operating conditions you should be familiar with. These include operation in dusty or sandy climates, in humid climates, at high altitudes, and in salt water areas.

As you can see, there is a lot involved with keeping the generator operating properly in all these different operating conditions and ensuring that your customer has uninterrupted power for equipment operation.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate how to perform generator operation under unusual conditions. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

- Operate fuel burning heater (if applicable).
- Operate electric heater (if applicable).
- Operate generator in extreme hot climate (**simulated** if necessary).
- Operate generator in extreme cold climate (**simulated** if necessary).
- Operate generator in rainy and humid climate (**simulated** if necessary).

- Operate generator in salt water area (**simulated** if necessary).
- Operate generator in dusty and sandy climate (**simulated** if necessary).
- Operate generator at high altitude (**simulated** if necessary).

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS. Your trainer will assign the next task.

REVIEW QUESTIONS CONFIRMATION KEY

1. MEP-004A through MEP-007B
2. Because these generators are normally utilized in the mobile environment and, as such, are subject to worldwide deployment
3. To prevent condensation of moisture
4. The water can freeze and block the fuel passages
5. In order to properly mix the distilled water with the electrolyte solution
6. Reduces the cranking ability of the battery
7. When the temperature rises, so does the rate of evaporation
8. Natural barriers such as buildings
9. Air cleaner
10. At higher altitudes, the output rating of the generator set is reduced

MODULE 5
GENERATOR PARALLEL (LOAD TRANSFER) OPERATION

PERFORMANCE GOAL

Given applicable technical references and local directives, perform generator parallel (load transfer) operation IAW prescribed procedures (AFJQS Task 213.21.5).

PREREQUISITE

Must have completed Modules 1 thru 4 of this AFQTP.

ABOUT THIS MODULE

In a mobile unit, it is imperative that power production equipment remain on-line or operational at all times. By operating generator sets in parallel, the load can be shifted from the on-line generator to the stand-by (on-coming) generator with no power interruption. This module covers procedures for generator parallel (load transfer) operation. Though not really difficult this task is critical, therefore, it must be performed correctly each time. Performing the task incorrectly could result in damage to vital equipment and in some cases personal injury as well. Pay close attention as you read these generator load transfer procedures.

MODULE OUTLINE

AFJQS Task 213.21.5

- Explain on-coming generator preparation.
- Explain procedures for transferring the load from the on-line unit to the on-coming unit.
- Explain on-line unit adjustments.

TRAINING REFERENCES

MEP-004A - TO 35C2-3-445-1, para 2-12d
MEP-005A - TO 35C2-3-446-1, para 2-12e
MEP-006A - TO 35C2-3-444-1, para B, pages 2-26.1 and 2-26.2
MEP-007B - Local operating instructions

LOAD TRANSFER

NOTE

Generator models MEP-004A through MEP-007B are the **ONLY** generator models that can be paralleled. None of the other models are equipped for this operation.

Before beginning load transfer procedures notify the using facility of your intended action. Certain items of electrical and electronic equipment are very sensitive to power fluctuations; they cannot handle sudden voltage increases or spikes. Advance notice allows the using facility to power down equipment that may be damaged if the transfer operation is not accomplished smoothly. After you notify the using facility prepare the on-coming generator set.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-004A - TO 35C2-3-445-1, para 2-12d
- MEP-005A - TO 35C2-3-446-1, para 2-12e
- MEP-006A - TO 35C2-2-444-1, para B, pages 2-26.1 and 2-26.2
- MEP-007B - Local operating instructions

NOTE

If you require certification on generator model MEP-007B, you may have noticed there is no TO reference listed. For this reason, load transfer procedures for the MEP-007B will be covered in the following paragraphs. However, local operating procedures outline the exact load transfer procedures for this particular generator model.

?

1. Why should you check with the using facility prior to transferring the load from the on-line unit to the on-coming unit?

ON-COMING GENERATOR PREPARATION

NOTE

Both pre-operational and start-up procedures were covered in previous modules. If you need to refresh your memory on these procedures, do so at this time. After you have finished, return to this module.

The first step in preparing the on-coming generator is a pre-operational inspection. After this inspection is completed, perform the generator start-up procedures. Verify that all generator instruments are indicating correctly. The frequency and voltage of the on-coming unit must match that of the on-line unit. These two instruments should read 60Hz and 120VAC, respectively.

After the generator set has started, place the Operations switch, located on the generator control panel, in the PARALLEL position on **BOTH** the on-line and the on-coming generator sets.

NOTE

The direction the Manual Speed Control Knob is rotated to raise or lower the frequency is **NOT** the same between all models. Your trainer will instruct you on proper operation of this control for your particular generator model.

When the Operations switch is placed in the PARALLEL position, the synchronizing lights, located in the center of the control panel of the on-coming unit, will begin to flash on and off. The speed at which the lights flash is in direct relation to the frequency the set is producing. To make the lights flash more quickly (raise the frequency) rotate the Manual Speed Control knob in a clockwise direction. To slow the lights down, you rotate the knob in a counterclockwise direction. The synchronizing lights indicate when the on-line and on-coming unit are in "sync" with each other. When the lights are at their darkest point, the two generator sets are in "sync."

?

2. Which generator operations must be performed on the on-coming unit prior to performing load transfer procedures?

3. How can you slow down the speed at which the synchronizing lights are flashing?

4. What is the purpose of the synchronizing lights?

TRANSFERRING THE LOAD

After the on-coming generator is operating and the frequency and voltage are adjusted, you are ready to begin the load transfer operation. To do this, check the synchronizing lights of the on-coming unit. They should be flashing on and off in unison.

NOTE

If the synchronizing lights are not flashing on and off in unison or otherwise not functioning, do **NOT** attempt to close the main AC circuit breaker. Seek assistance from a qualified Power Production individual.

Adjust the speed of the synchronizing lights of the on-coming unit until they are flashing on and off at a two to three second interval. When the lights are at their **DARKEST** point, close the main AC circuit breaker. Once the AC circuit breaker is closed, the on-coming generator is now on-line. The synchronizing lights will also stop flashing and turn off at this time.

CAUTION

It is extremely important that you, the operator, feel comfortable with the speed at which the synchronizing lights are flashing. The main AC load contactor must be closed at the exact instant the sync lights are at their DARKEST point. Closing the breaker at any other instant could result in damage and/or injury to equipment and personnel.

.

NOTE

Since the on-coming unit is now on-line, the original on-line unit will be referred to as the out-going generator.

As the on-coming unit comes on-line, it should begin picking up some of the load. By observing the kW, and the Current meters, you can determine if the generator is, in fact, picking up some of the load. In order to fully transfer the load you must adjust the frequency on both the on-line and the out-going units. Slightly raise the frequency of the on-line unit and lower the frequency on the out-going unit, observing the kW meter as you do so. Make these adjustments gradually. By making the adjustments gradually, you will be in better control of the transfer operation and provide a smoother generator changeover. As you simultaneously raise and lower the frequency of the generator sets, try to maintain frequency on both units as close to 60Hz as possible.

NOTE

Although correct task performance is important, do not take an excessively long time to transfer the load. Load transfer procedures should only take a minute or two to complete.

When the kW meter of the out-going generator indicates approximately 10 percent, or less, open the AC circuit breaker on this unit.

CAUTION

Ideally, the AC circuit breaker on the out-going unit should be opened when the kW meter is indicating as close to zero as possible. Personal experience is your best guide.

NOTE

The reading assignment tells you that once the generator sets are sharing the load equally, you can then open the AC circuit breaker on the out-going unit. This is not recommended because it can cause a power surge that adversely affects the using facility.

This removes all load from the set and should be indicated by a zero percent reading on the kW meter. Once the AC circuit breaker has been opened the synchronizing lights on the out-going unit will begin flashing. Move the Operations switch to the SINGLE operation position, and this will extinguish the synchronizing lights. Continue to operate the now off-line (out-going) generator set for approximately 5 to 10 minutes to allow it to cool down. While the off-line unit is cooling down, there are a few things you need to attend to on the on-line unit.

5. Which action should be taken if the synchronizing lights do not flash on and off in unison?

6. What could result from closing the AC circuit breaker at the wrong instant?

7. How can you determine whether or not the on-coming generator is assuming load?

8. Why is it necessary to gradually transfer the load from the on-line to the on-coming unit?

9. How are the synchronizing lights extinguished on the out-going generator set once the AC circuit breaker has been opened?

ON-LINE ADJUSTMENTS

NOTE

Normally, when you perform a generator changeover (load transfer), you must notify Job Control. Local operating procedures will outline the requirements for your particular location.

After successful transfer of the load from one unit to another, you must make some fine adjustments to the now on-line unit. Make any necessary adjustments to the generator frequency and voltage so they are reading correctly. Move the Operations switch to the SINGLE operation position. Check with the using facility to make sure there are no problems with their power. Sometimes, after checking with the using facility, you will again need to make small adjustments to the generator voltage and frequency.

After the prescribed cool down period for the out-going generator perform normal shutdown procedures. These procedures were discussed in Module 3 of this AFQTP.

?

10. Once the generator set is on-line, which final adjustments, if any, are required?

SUMMARY

As stated, it is imperative that your equipment remain on-line or operational at all times. By operating the generator sets in parallel, you can shift the load from one generator set to another without any power interruption. This module covered the procedures for completing generator parallel (load transfer) operation. Completing this task is not really difficult; however, it is critical that the task be performed correctly. Incorrect task performance could result in both injury to personnel and damage to equipment.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate how to perform Generator Parallel (load transfer) Operation. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

- Perform pre-operational inspection on on-coming generator set.
- Perform start procedures on on-coming generator set.
- Notify using facility prior to transferring load.
- Verify proper operation of on-coming generator.
- Place the Operations switch in the correct position for both units.
- Accurately perform load transfer procedures.
- Operate the out-going unit for cool-down.
- Complete on-line adjustments for the on-line generator.
- Check with the using facility after placing the unit on-line.
- Perform shutdown procedures on the out-going generator set.

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS. Your trainer will assign the next task.

REVIEW QUESTIONS CONFIRMATION KEY

1. To allow time for powering down sensitive equipment
2. Pre-operational inspection and start procedures
3. By operating the Manual Speed Control in a counterclockwise direction
4. Used in determining when the on-line and on-coming units are in “sync” with each other
5. Contact power production personnel
6. Injury to personnel as well as damage to equipment
7. By observing the kW and current meters
8. To allow for better control of the transfer operation as well as providing for a smoother transfer
9. Placing the Operations switch in the SINGLE operation position
10. Voltage and frequency adjustments

MODULE 6
GENERATOR INSPECTION DURING OPERATION

PERFORMANCE GOALS

Given applicable technical references and local directives, perform generator inspection during operation IAW prescribed procedures (AFJQS Task 213.21.6).

Given AFI 32-1062, para 7; generator operating forms; a log book; and local operating instructions; document generator forms and records IAW prescribed procedures (AFJQS Task 213.21.7).

PREREQUISITE

Must have completed Modules 1 thru 5 of this AFQTP.

ABOUT THIS MODULE

This module covers all the items that should be inspected during operation of the generator. It also explains how the generator operation log is completed for every inspection of the generator. This form is used to record a variety of information and applicable entries are made every 3 hours of generator operation. It is also important to make proper entries to the generator log book. The log book is maintained by power production personnel for recording such things as personnel on shift, which generators are on-line, maintenance actions on deployed generators, etc. The generator log book is a permanent record and once the book is completely filled, it will remain in the power production work center.

MODULE OUTLINE

AFJQS Task 213.21.6

- Explain Control Panel inspection requirements.
- Explain fluid level inspection requirements.
- Explain procedures for conducting an overall visual inspection of the generator set.

AFJQS Task 213.21.7

- Identify which forms must be completed.
- Explain the purpose of generator operating forms and generator log book.
- Explain how to complete generator operating forms and generator log book.

- Explain requirements for properly maintaining generator operating forms and generator log book.

TRAINING REFERENCES

AFI 32-1062, para 7
MEP-003A - TO 35C2-3-455-1, Table 3-2
MEP-004A - TO 35C2-3-445-1, para 3-3b and 3-4c, and Table 3-1, items 3 and 4
MEP-005A - TO 35C2-3-446-1, para 3-3b and 3-4c
MEP-006A - TO 35C2-3-444-1, Table 3-1, items 2 and 4, para 3-4c and 3-4c(1)
MEP-007B - TO 35C2-3-442-11, para 3-3d(1), 3-3e, 3-3e(1), 3-3e(2), and 3-3e(3), and Table 3-2, items 10 through 13
MEP-016B - TO 35C2-3-386-31, Table 3-2, items 9 through 14
MEP-017A - TO 35C2-3-424-1, Table 3-2, items 2 and 4;
TO 38G2-89-21, Table 3-1, items 1 and 4
MEP-026A - TO 35C2-3-386-1, Table 3-2, item 2; Local operating instructions

GENERATOR DURING OPERATION INSPECTION

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 3 hours during periods of extended operation. There are several areas to be checked during this inspection.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, Table 3-2
- MEP-004A - TO 35C2-3-445-1, Table 3-1, items 3 and 4, para 3-3b and 3-4c
- MEP-005A - TO 35C2-3-446-1, para 3-3b and 3-4c
- MEP-006A - TO 35C2-3-444-1, Table 3-1, items 2 and 4, para 3-4c and 3-4c(1)
- MEP-007B - TO 35C2-3-442-11, Table 3-2, items 10 through 13, para 3-3d(1), 3-3e, 3-3e(1), 3-3e(2), and 3- 3e(3)
- MEP-016B - TO 35C2-3-386-31, Table 3-2, items 9 through 14
- MEP-017A - TO 35C2-3-424-1, Table 3-2, items 2 and 4, TO 38G2-89-21, Table 3-1, items 1 and 4
- MEP-026A - TO 35C2-3-386-1, Table 3-2, item 2

Let's begin the During Operation Inspection at the generator Control Panel.

CONTROL PANEL INSPECTION

The generator Control Panel houses all necessary controls and instruments to operate the generator set. These same 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.

NOTE

Your particular generator model may not have all of the instruments listed. You need only be concerned with the information that applies to your generator set.

- Voltmeter - 120/208
- Frequency meter - 50Hz or 60Hz (dependent upon your particular operating conditions)
- Load meter (kW meter) - can read anywhere between 1 to 100%. However, it should never exceed 100%
- Ammeter (Percent of Current meter) - can read anywhere between 1 and 100%. However, it should never exceed 100%
- Battery Charging Ammeter - green portion of scale
- Oil Pressure gauge

  MEP-003A - 25psi
  MEP-004A - 20 to 60psi
  MEP-005A - 20 to 55psi
  MEP-006A - 35 to 55psi
  MEP-007B - 40 to 60psi

- Coolant Temperature gauge

  MEP-004A - 170 to 200 degrees Fahrenheit
  MEP-005A - 170 to 200 degrees Fahrenheit
  MEP-006A - 180 to 200 degrees Fahrenheit
  MEP-007B - 180 to 200 degrees Fahrenheit

- Fuel Level gauge - recommended the fuel level be maintained at no less than one half of tank.

Also, check the Fault Indicator Panel on generator models equipped with one, to ensure no fault lights are illuminated. Verify the Air Cleaner Indicator light is not illuminated. Next, check the generator fluid levels.

GENERATOR FLUID LEVELS

NOTE

When using an auxiliary fuel source, the generator set tank is bypassed. Therefore, make sure you visually check the fuel level at the auxiliary fuel source. Don't be misled by the reading indicated on the Control Panel Fuel gauge. This gauge only indicates the level of the fuel in the generator set tank.

The importance of monitoring generator fluids and maintaining their proper levels was discussed in a previous module. One of the most important fluids to monitor is fuel. Remember, NEVER rely solely on the generator Fuel Level gauge to provide you with an accurate indication. Go to the fuel tank and visually look inside it. If you are using an auxiliary fuel supply, make sure you check the level at the auxiliary source.

On some generator models (MEP-004A through MEP-007B), you must check the engine oil level when the generator set is operating. To do this, simply remove the engine oil level dipstick and read the side of the dipstick marked "RUN." The engine oil level should be at the "FULL" mark on the dipstick. Check the engine oil level at least every 8 hours of generator operation.

NOTE

To ensure the correct engine oil level, make sure that the side of the dipstick marked "RUN" is in the up position. The underside of the dipstick is wiped clean as it is removed from the oil filler tube.

CAUTION

Only the generator models mentioned above require checking of the oil when the unit is operating. Attempting to check the oil level on any other generator model when it is operating will result in oil "spurting" out from the oil filler tube.

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.

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 log book must also be maintained to document certain information.

?

1. What are control panel gauges checked for when accomplishing a During Operation Inspection?

2. How is the fuel level of an auxiliary fuel source determined?

3. Which type of discrepancies are considered major and are best corrected by a power production individual?

4. What is the rule of thumb when encountering a small or minor leak?

GENERATOR OPERATING FORMS

Different log forms are used depending on local procedures and the status of each organization. Figure 6-1 is an example of a locally produced generator operation/maintenance log. This form is used to record a variety of information; applicable entries are made every 3 hours of generator operation. Refer to Figure 6-1 as you read the instructions for completing a typical generator operating log.

At the top of the form, enter information about the generator. Under model, list the type of generator, such as MEP-004A. In the adjacent block, record the generator serial number. This number is stenciled somewhere on the generator set, usually on one of the side access doors and on either the front or rear top corner of the unit. The serial number is normally a three or four digit number. Next, fill in the information about the alternator. In the block marked "kW RATING," place the kW rating of the generator. Under the heading "VOLTS," place the voltage rating at which the set operating, i.e., 120/208VAC. In the next block to the right

enter the generator frequency. The last entry on the top line is for COMMAND/MILITARY UNIT. Enter the owning command and unit of the generator set.

Below the generator information blocks are columns for other information you are required to document. At the far left side of the form, in the column entitled "DATE," enter the current date. Next, enter the local time when the inspection took place. To complete the next four entries, HOUR METER, OIL PRESSURE, WATER TEMPERATURE, AND FUEL LEVEL, you must observe the appropriate meters on the generator Control Panel and record the information indicated. For the next entry "EXHAUST CONDITION/TEMPERATURE," observe the color of the exhaust coming from the muffler. Indicate the condition on the form by entering either CLEAR, WHITE, or BLACK. Normally, the color of the exhaust should be clear to slightly white. To complete the next block, observe the kW meter and record the amount of load. Use the "AMPS-VOLTS" selector switch to gain information to complete the next two entries.

STOP

Your trainer will explain how this switch operates and how to obtain the necessary information for recording on your operating log.

MOBILE GENERATOR/EQUIPMENT OPERATION/MAINTENANCE LOG			UNIT TYPE				ALTERNATOR							COMMAND/MILITARY UNIT	
			MODEL	AF REGISTRATION NO.			KW RATING	VOLTS		FREQUENCY					
DATE	TIME	HOUR METER	OIL PRESS.	WATER TEMP	FUEL LEVEL	EXHAUST CON/TEM	KW LOAD	VOLTS PH - 1	VOLTS PH - 2	VOLTS PH - 3	AMPERES % PH - 1	AMPERES % PH - 2	AMPERES % PH - 3	BATTERY CHARGER	PRINTED NAME AND SIGNATURE

MAINTENANCE LOG							
DATE	JOB CON NO.	SUP DOC NO.	STATUS	DISCREPANCY	CORRECTIVE ACTION	DATE CORRECTED	CORRECTED BY

Figure 6-1. Typical Generator Operating Log

The column entitled "BATTERY CHARGING AMPS" records the condition of the battery. Normal indication of this meter is dependent upon the state of charge of the battery. A low charge will result in a high ammeter reading. When the battery is fully charged, this meter should indicate slightly above zero. If the Battery Charging Ammeter is indicating 0 or below, the battery is discharging. The last entry on the front of the form is for your name and signature. Now that you have reviewed the front of the form, it is time to take a look at the back.

NOTE

The Job Control Section was briefly touched on in Module 5 of this AFQTP. Your trainer will explain how to obtain a job control number and what its purpose is.

The back of the operating log form is used to record maintenance actions for a particular generator set. The first thing you are required to fill in is the date the maintenance discrepancy was noted. Next, enter the job control number received from Job Control when you call in a job.

The next column, "SUP DOC NO," is for the supply control number provided by the Supply Section when a part is ordered. A supply document number is normally obtained by power production personnel, however there may be occasions when you have to do it yourself.

NOTE

To order a part from Supply, an AF Form 2005 must be completed. If you are unfamiliar with this form, have your trainer explain its use and how to complete the form.

In the column marked "STATUS," enter the code that relates to the operational capability of the unit. The entry in this block will be either RED, AMBER, or GREEN. Determine the appropriate status and place the first letter of the applicable status code in the block marked "STATUS."

NOTE

The generator status codes were explained in Module 2 of this AFQTP. If you need to review them, do so now. After you have finished, return to this module.

The next entry is the particular discrepancy, and what, if any, corrective action was taken. If corrective action was taken, enter the date in the column marked "DATE CORRECTED." If you were the one who made the correction, enter your name in the last column.

NOTE

You may or may not be required to complete all of the information on the back of the operating log; local operating procedures will determine what actions are required. At a minimum, you must enter the date and any discrepancies noted when operating the generator set.

Don't ever make the mistake of assuming a discrepancy is too minor to annotate. Minor problems tend to become major problems. Along the documentation just covered, each generator set has its individual log book which you are required to complete.

GENERATOR LOG BOOK

When power production personnel deploy they are required to document all actions concerning the operation and maintenance of their generator sets. This information is recorded in a log book. The log book is a bound book maintained by the power production personnel and is used to record information such as personnel on shift, which generators are on-line, maintenance actions, generator outages, etc. In other words, a history of events concerning the generator set is recorded in this book. Your trainer will explain further what information you are required to annotate in the generator log book. In the absence of a power production individual, the responsibility for documenting and maintaining the log book rests with you as the generator operator.

MAINTAINING FORMS AND RECORDS

Proper documentation and maintenance of generator operating forms and the generator log book 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 operating forms; they will be included in the unit historical records upon arrival back at home station. If the historical records were sent out with the generator set, go ahead and place the completed forms inside the historical record as necessary.

The generator log book is a permanent record. Care must be taken to ensure no damage occurs to this book. Normally, the same log book 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 log book 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.

?

5. Where should information concerning a generator outage be recorded?

6. Where can the generator serial number be found?

7. What are the minimum entries required on the back of a typical generator operating form?

8. Which type of information is recorded in the log book?

9. Under normal operating conditions, which color should the generator exhaust be?

SUMMARY

This module covered all the items that should be inspected during operation of the generator. This module also explained how the generator operation log should be completed for every inspection of the generator. This form is used to record a variety of information and applicable entries are made every three hours of generator operation. It is also important to make proper entries to the generator log book. The log book is maintained by power production personnel for recording such things as personnel on shift, which generators are on-line, maintenance actions on

deployed generators, etc. The generator log book is a permanent record and once the book is completely filled, it will remain in the power production work center. Proper documentation and maintenance of generator operating forms and the generator log book is your responsibility.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate how to make generator inspections during operation and how to properly fill out generator forms. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

- Generator Inspections during Operation:

  Use hearing protection.
  Verify correct Control Panel instrument operation.
  Make adjustments to Control Panel instruments (if required).
  Check engine oil level (if required).
  Replenish oil supply (if needed).
  Verify fuel level (aux. and/or set tank, as required).
  Conduct a thorough overall visual inspection.

- Document Generator Forms and Records:

  Document local generator operating/maintenance form.
  Document generator log book.
  Properly maintain forms and records.

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you

may be certified on the AFJQS. Your trainer will assign the next task.

REVIEW QUESTIONS CONFIRMATION KEY

1. Correct indication
2. Visual inspection
3. Broken parts and severe leaks
4. Leave it until the unit is shut off and has cooled down
5. Log book
6. Stenciled on the generator set
7. Date and discrepancy
8. Any significant information
9. Clear to slightly white

MODULE 7
GENERATOR POST-OPERATIONAL INSPECTION

PERFORMANCE GOALS

Given applicable technical references and local directives, perform generator post-operational inspection IAW prescribed procedures (AFJQS Task 213.21.8).

PREREQUISITE

Must have completed Modules 1 thru 6 of this AFQTP.

ABOUT THIS MODULE

The majority of items to be checked during a post-operational inspection, fuel system, fluid levels, battery condition, and overall generator condition, were also checked during the pre-operational inspection. As a result, you should be familiar with them and should not have any trouble performing the post-operational inspection. This module will cover these procedures for you.

MODULE OUTLINE

AFJQS Task 213.21.8

- Explain the purpose of performing a post-operational inspection.
- Explain requirement for draining condensation/sediment from fuel system components.
- Explain requirement for servicing generator fluid systems.
- Explain requirement for servicing generator set batteries.
- Explain requirement for making an overall inspection of the generator.

TRAINING REFERENCES

MEP-003A - TO 35C2-3-455-1, Table 3-2, items 5 and 6
MEP-004A - TO 35C2-3-445-1, para 3-25b, and Table 3-1 item 5
MEP-005A - TO 35C2-3-446-1, para 3-25b, and Table 3-1, items 5, 8, 9, and 10
MEP-006A - TO 35C2-3-444-1, Table 3-1, items 3 and 5
MEP-007B - TO 35C2-3-442-11, Table 3-2, items 14 thru 19, 21, 22, 26, 27, and 28
MEP-016B - TO 35C2-3-386-31, Table 3-2, items 15 thru 18
MEP-017A - TO 35C2-3-424-1, Table 3-2, items 1 and 3
MEP-026A - TO 35C2-3-386-1, Table 3-2, item 3

POST-OPERATIONAL INSPECTION

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. Suppose that you have just come on shift and need to change over the generator sets. That is an easy task, right? Well, if the person before you forgot to perform a post-operational inspection it may not be so easy. Instead of performing a relatively quick and simple pre-operational check, you may have to spend time adding oil, coolant, or fuel. A post-operational inspection would have prevented this. 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. At this time, review the requirements for a post-operational inspection in the applicable TO.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, Table 3-2, items 5 and 6
- MEP-004A - TO 35C2-3-445-1, para 3-25b, and Table 3-1, item 5
- MEP-005A - TO 35C2-3-446-1, para 3-25b, and Table 3-1, items 5, 8, 9, and 10
- MEP-006A - TO 35C2-3-444-1, Table 3-1, items 3 and 5
- MEP-007B - TO 35C2-3-442-11, Table 3-2, items 14 thru 19, 21, 22, 26, 27, and 28
- MEP-016B - TO 35C2-3-386-31, Table 3-2, items 15 thru 18
- MEP-017A - TO 35C2-3-424-1, Table 3-2, items 1 and 3
- MEP-026A - TO 35C2-3-386-1, Table 3-2, item 3

In addition to the inspection items shown in the applicable TOs, there are other items you may be required to inspect. The TO lists only minimum requirements but, often, local operating instructions will include additional requirements. A good way to begin a post-operational inspection is by draining sediment/condensation from fuel system.

?

1. Why is it necessary to perform a generator post-operation inspection?

DRAIN SEDIMENT/CONDENSATION

NOTE

How to drain sediment/conden-sation from fuel system components was explained in Module 2. If you need to review the procedures, do so at this time. After you have finished, return to this module.

As with a pre-operational inspection, you are required to drain all sediment and condensation from the fuel system. The locations from which sediment/condensation are drained varies between generator models.

Chances are you will **NOT** notice an appreciable amount of sediment/condensation during a post-operational inspection. This is because condensation normally does not form when the generator set is operating. If you recall, condensation forms when the ambient temperature changes from hot to cold. Additionally, sediment that does form has not had sufficient time to settle at the bottom of the fuel system.

Next, we are going to take a look at inspecting the generator fluid levels. We will begin with the engine oil level.

?

*2. Why will there normally **not** be sediment/condensation present in fuel system components during a post-operational inspection?*

GENERATOR FLUID LEVELS

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. On generator models equipped

with both a "run" and "stop" sided dipstick, make sure you are reading the side marked "stop." 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.

Another fluid level to check is the fuel. Most of the technical orders require you to ensure the fuel tank is full after each operation. However, this is not always the procedure when deployed. When deployed, generators usually draw fuel from an auxiliary fuel source, such as a 55-gallon fuel drum or an A1B (fuel trailer). A refueling schedule is usually set up with the motor pool for refueling these auxiliary fuel sources. 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 from a previous module “NEVER RUN OUT OF FUEL.”

STOP

Remember the radiator is pressurized when hot. Never open the radiator cap until the generator set has completely cooled down. Make sure you are equipped with the appropriate safety gear before attempting to check the coolant level.

Next, take a look at the 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 mixture of water and antifreeze.

CAUTION

When under field conditions (deployed), you may not have access to both water and antifreeze. In this instance, use the one that is available as long as you are not having to replenish large amounts.

After all fluid levels have been checked and serviced, turn your attention to the generator set batteries.

?

3. Why must you wait for the generator to cool down before checking the engine oil level?

BATTERY INSPECTION

NOTE

Battery inspection requirements were discussed in both Modules 1 and 2 of this AFQTP. Refer to these modules if you need to refresh your memory on these requirements. Return to this module after you have finished.

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.

The final step in completing your post-operational inspection a good overall inspection of the generator set.

OVERALL INSPECTION

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.

Document discrepancies noted during the post-operational inspection, that you cannot quickly correct, on the appropriate generator operating form. If you are able to quickly correct the discrepancy there is no need to document it. If you must obtain a part in order to repair the discrepancy, a job must be opened with job control and the discrepancy annotated on the back of the generator operating form.

?

4. Why should the oil level be replenished by adding small amounts of oil at a time?

5. Under which circumstances would the requirement for filling the fuel tank after generator operation be waived?

6. How is the electrolyte level of the generator batteries depleted during generator operation?

7. What is the final step of performing a post-operational inspection?

8. How can a low electrolyte level affect the batteries?

SUMMARY

This module covered the majority of items to be checked during a post-operational inspection, fuel system, fluid levels, battery condition, and overall generator condition, which were also checked during the pre-operational inspection. As a result, you should have been familiar with them and should not have any trouble performing the post-operational inspection.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate how to perform a generator post-operational inspection. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

- Drain sediment/condensation from fuel system components.
- Check and service all fluid levels as needed.
- Utilize appropriate safety equipment.
- Check and service generator batteries as needed.

- Make an overall visual inspection of the generator set.

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS. Your trainer will assign the next task.

REVIEW QUESTIONS CONFIRMATION KEY

1. To service the generator set and prepare it for its next operation
2. Because condensation does not normally form during generator operation and sediment has **not** had time to settle to the bottom of fuel system components
3. To allow sufficient time for all of the oil to drain back down into the oil sump
4. To avoid overfilling the oil sump
5. When in the deployed environment
6. By evaporation due to the electrolyte heating up inside the battery
7. Make an overall visual inspection of the generator set
8. By reducing both the state of charge and life of the battery

MODULE 8
GENERATOR MINOR MAINTENANCE

PERFORMANCE GOALS

Given applicable technical references (listed below) and local directives, perform generator minor maintenance IAW prescribed procedures (AFJQS Task 213.21.11).

PREREQUISITE

Must have completed Modules 1 thru 7 of this AFQTP.

ABOUT THIS MODULE

This module covers minor maintenance actions which are common to most generator sets. These include changing the oil, servicing the fuel filters, bleeding the fuel system, servicing the air filter, and replacement of defective radiator hoses.

MODULE OUTLINE

AFJQS Task 213.21.11

- Explain how to change engine oil.
- Explain how to change fuel filters.
- Explain how to bleed fuel system.
- Explain how to service the air filters.
- Explain how to remove and replace defective radiator hoses.

TRAINING REFERENCES

MEP-003A - TO 35C2-3-455-1, para 3-18b(1), 3-18b(2), 3-18c(1), 4-20b(1), 4-20b(2), 4-21b, and Figure 3-1
MEP-004A - TO 35C2-3-445-1, para 3-4c(3) through 3-4c(10), 3-24b, 3-26b, 3-31b(3), 3-43b, and 3-78c
MEP-005A - TO 35C2-3-446-1, para 3-4c(3) through 3-4c(10), 3-24b, 3-26b, 3-31b(3), 3-43b, and 3-78c
MEP-006A - TO 35C2-3-444-1, para 3-4c(3) through 3-4c(9), 3-4d, 3-32b, 3-34b, 3-56b, and 3-165a
MEP-007B - TO 35C2-3-442-11, para 4-11, 4-12, 4-84b, 4-85a, 4-86a, 4-87, 4-102a, and 4-115
MEP-016B - TO 35C2-3-386-31, para 3-29b, 4-7, 4-34b, 4-35b, 4-35c, and 4-36a
MEP-017A - TO 38G2-89-21, para 3-4d, 3-7, and 3-8
MEP-026A - TO 38G2-90-1, para 3-2e, 4-14a, 4-14b, and 4-16a

GENERATOR MINOR MAINTENANCE

This module covers minor maintenance actions which are common to most generator sets. These include changing the oil, servicing the fuel filters, bleeding the fuel system, servicing the air filter, and replacement of defective radiator hoses. Depending upon local requirements, additional tasks may be assigned. The first maintenance task discussed is changing the engine oil.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, Figure 3-1
- MEP-004A - TO 35C2-3-445-1, para 3-4c(3) through 3-4c(10)
- MEP-005A - TO 35C2-3-446-1, para 3-4c(3) through 3-4c(10)
- MEP-006A - TO 35C2-3-444-1, para 3-4c(3) through 3-4c(9) and 3-4d
- MEP-007B - TO 35C2-3-442-11, para 4-11 and 4-12
- MEP-016B - TO 35C2-3-386-31, para 4-7
- MEP-017A - TO 38G2-89-21, para 3-4d
- MEP-026A - TO 38G2-90-1, para 3-2e

CHANGING ENGINE OIL

NOTE

If there are no instructions for changing the engine oil in your particular TO, local operating instructions will outline how to perform this particular task.

Before you can begin changing the engine oil, there are a couple of preliminary requirements which you must first accomplish. One of these requirements involves checking the operational status of the generator set. This is done by reviewing the backside of the generator operating log. If there are any open "RED" jobs, do not proceed any further and notify power production personnel. If the operational status of the generator set is acceptable, you can then perform a routine pre-operational inspection. With these preliminary requirements completed, you are now ready to perform the first step in changing the engine oil. The first step requires you to operate the generator set in order to warm up the engine oil. Operate the unit until it reaches normal operating temperature. Once the unit has reached normal operating temperature, perform generator shutdown procedures. By operating the generator set prior to changing the engine oil, the oil is warmed up which allows it to drain more thoroughly.

CAUTION

In the MEP-006A TO, the instructions tell you to start the generator set after having refilled the oil pan with new oil. This is NOT correct. Since you have not yet changed the oil filters, the new oil will be allowed to circulate and become contaminated by the dirty oil still in the oil filter. Drain and

replace the oil filter before operating the unit to circulate the new oil. This applies to all generator models.

Once the unit is shut down, place an appropriate size bucket beneath the oil drain valve. Next, open the drain valve and allow the oil to drain into the bucket. On some generator models, instead of a drain valve there is a drain plug, such as that found on the MEP-026A.

CAUTION

Use extreme caution when draining the hot engine oil. The oil and engine components are very hot and may cause serious burns. Make sure you are wearing some type of gloves to prevent the oil from coming in contact with your hands.

NOTE

Some oil filters are not equipped with a drain valve. In this situation, your trainer will explain the correct procedures for draining the oil.

While the oil is draining from the oil pan, you can begin draining the oil from the oil filter housing. To drain the oil from the filter, open the drain valve located at the bottom of the filter housing. Drain the oil into a bucket or other suitable container.

With the oil drained from the oil filter, you are now ready to replace the filter element. A bolt, located at either the top or the bottom of the filter housing, secures the filter housing to the cover or base plate. Locate this bolt and remove it by turning it in a counterclockwise direction. Because there is still a small amount of hot oil contained within the filter element, make sure you are holding onto the housing when removing this bolt. This procedure helps to prevent the residue oil from spilling.

NOTE

On generator model MEP-006A, you are required to disconnect the negative battery lead prior to servicing the oil filter. This is due to the location of the filter and is a safety requirement for this particular model..

The oil filter will be resting inside of the filter housing. To remove the filter, simply lift it out. Once the old filter has been removed from the filter housing, it may be thrown away. Using a lint free cloth, wipe out the inside of the housing to remove any remaining oil and dirt.

The next step is to remove the old filter gasket and replace it with a new one. The filter gasket is located on the underside of the filter housing cover. If the filter housing is attached to a base plate, the gasket is located in a recessed groove in the base plate. This type of gasket can sometimes be difficult to remove. Your trainer will instruct you on the procedures necessary to remove this type of gasket if you should experience difficulty. Again, take a clean lint-free cloth and wipe clean the inside of the filter cover or base plate.

You are now ready to put the oil filter assembly back together. The first step is to install a new gasket. Using your finger, place a light coat of clean oil on the gasket. This helps to make a better seal and prevents oil from leaking from the filter when the generator set is operated.

NOTE

You should always replace the old gasket with a new one any time you change the oil filter.

After you have installed the new gasket, close the drain valve (if applicable) at the bottom of the filter housing. Install a new filter and secure the filter housing to the cover or base plate by tightening down the bolt. Be careful not to overtighten the bolt as it is possible to strip its threads. You will know if this has happened if the bolt continues to turn and does not tighten down.

Reinstall the oil pan drain plug or close the drain valve, whichever is applicable. Locate the oil fill point and fill the engine with new oil. Your trainer will instruct you as to the approximate amount of oil necessary to fill your particular generator model. As you add the new oil, make frequent checks of the oil level by reading the level indicated on the dipstick. Remember, you do **NOT** want to overfill the unit with oil, as this can cause internal damage to the engine. Add enough oil to bring the level to the "Full" mark as indicated on the dipstick. Secure the oil fill point and start the generator set. Operate the unit until normal operating temperature is obtained. This is necessary to adequately circulate the new oil. Thoroughly check the generator for any oil leaks, especially the drain plug and oil filter housing. Stop the generator set and again check the level indicated on the dipstick. Don't be surprised if the level is now below the "Full" mark. Some of the oil was used to fill up the oil filter. Add additional oil as required to bring the oil level to the correct level. That's all there is to changing the engine oil. The next discussion explains how to change the generator fuel filters.

?

1. What is the purpose of operating the generator set prior to changing the engine oil?

2. What can result if the oil filter(s) is/are not changed when the engine oil is changed?

CHANGING/CLEANING FUEL FILTERS/STRAINER

In a previous module, different ways in which the generator fuel supply can become contaminated was covered. It also mentioned that contaminated fuel can affect the operation of the generator set. If you discover that your fuel is contaminated, you will more than likely have to change/clean the generator fuel filter(s)/strainer in order to clean out the fuel system.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, para 4-20b(1)
- MEP-004A - TO 35C2-3-445-1, para 3-26b and 3-43b
- MEP-005A - TO 35C2-3-446-1, para 3-26b and 3-43b
- MEP-006A - TO 35C2-3-444-1, para 3-34b and 3-56b
- MEP-007B - TO 35C2-3-442-11, para 4-85a and 4-86a
- MEP-016B - TO 35C2-3-386-31, para 4-36a

To change the fuel filter(s)/strainer, the first thing you must do is turn off the fuel supply. This is necessary to prevent the fuel system from

draining while changing the fuel filter(s)/strainer. On some generator models, all that is required is to position the **set tank** fuel valve to the "OFF" position. On generator models MEP-004A through MEP-007B, the fuel supply must be cut off at the **day tank** instead of at the **set tank**. Since there is not an ON/OFF valve at the **day tank**, the fuel must be drained from the **day tank** into a suitable container. This is accomplished by opening the drain valve located at the bottom of the **day tank**.

Once you have turned off the fuel supply, drain the fuel from the filter/strainer housings. There is usually a drain valve or plug located at the bottom of the filter/strainer housings for this purpose. The fuel should be drained into a clean container as this fuel can be reused. With the fuel drained, hold onto the housing and loosen the bolt at the top of the filter/strainer housing. This will release the housing from its cover. The fuel filter element can then be lifted out and thrown away.

To remove the strainer, you normally have to remove a retaining screw before being able to lift it out of the strainer housing. Do **not** throw the strainer element out. It must be cleaned and reinstalled. To clean the strainer element, use an appropriate dry cleaning solvent. If this is not readily available, the strainer can also be cleaned by rinsing it in clean fuel. After the strainer element has been cleaned, direct low-pressure compressed air onto

the strainer element in order to dry it thoroughly. The inside of the filter/strainer housings can be cleaned by using clean lint-free rags.

NOTE

By filling the filter/strainer housings approximately half way with fuel, less air is present in the fuel system and priming of the fuel system is accomplished much quicker.

The next step is to remove the old gasket from the cover and replace it with a new one. This is accomplished in the same manner as for the oil filter gasket discussed earlier in this module. However, there is one exception. Instead of coating the gasket with oil, apply a light coat of fuel. With the new gasket in place, reinstall the drain plug or close the drain valve, whichever is applicable. Reinstall the strainer element and retaining nut. Fill both the filter and strainer housings approximately half way with clean fuel. Install the new fuel filter and secure both the filter and strainer housings to their covers. Again, be careful not to overtighten the bolt to prevent stripping of the threads.

?

3. When installing a new oil filter gasket, why are you required to apply a thin coat of oil to it?

On generator models MEP-017A and MEP-026A a different type of fuel filter called a fuel bowl is used. The fuel bowl must be cleaned when fuel contamination is suspected.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-017A - TO 38G2-89-21, para 3-8
- MEP-026A - TO 38G2-90-1, para 4-14a and 4-14b

Place the fuel tank selector valve in the "OFF" position. Hold onto the fuel bowl as you loosen the nut at the bottom of the bowl. Once the nut has been loosened, slide the fuel bowl out of the metal brace holder. Pour the fuel into a suitable container and wipe the inside of the bowl clean. Reposition the fuel bowl, holding it up against the base plate. Tighten the nut at the bottom of the fuel bowl to secure the bowl to the base plate. Reposition the fuel tank selector valve to the "ON" position. The bowl will automatically refill with clean fuel when attempting to start the unit.

After servicing the generator fuel filter(s) and strainer, you must then service the fuel transfer pump filters. Depending upon your particular generator model, the exact name of the pump may differ. Your trainer will identify these pumps and show you where they are located.

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, para 4-21b
- MEP-004A - TO 35C2-3-445-1, para 3-78c
- MEP-005A - TO 35C2-3-446-1, para 3-78c
- MEP-006A - TO 35C2-3-444-1, para 3-165a
- MEP-007B - TO 35C2-3-442-11, para 4-84b
- MEP-016B - TO 35C2-3-386-31, para 4-34b and 4-35b

Before attempting to remove the filter from the Fuel Transfer Pump, place rags or a suitable container beneath the pump to catch any fuel that spills. To gain access to the filter element, position an appropriate sized box-end wrench on the nut located at the bottom of the pump and turn in a clockwise direction. This will release the bottom cover of the fuel pump. Usually, the filter is sitting in the cover. If not, you must use your finger to reach up inside the pump and gently work the filter loose. Once the filter has been removed, you must determine whether or not the filter is serviceable.

NOTE

There are two different types of filters which are used. One is made of a hard cork type material while the other is made of nylon screen. Either type is suitable for use in the pump. If the nylon filter is torn, it is unserviceable and should be replaced. The cork type filter can normally be cleaned and reused provided it is not cracked or deteriorated in any manner. A dry cleaning solvent is used to clean the filter element.

After the filter has been removed, you can then remove the gasket which is located inside the cover. Also in the bottom of the cover, there should be a round black disc. This is a magnet which collects any metallic particles present in the fuel. Remove the magnet and clean it to remove any metal particles which may be attached. Clean the inside of the cover by wiping it clean with a lint free rag. Once you have cleaned and/or replaced all necessary components, you must put the pump back together. This is done by reversing the order of removal. Position a new gasket in the cover. Place the clean magnet in the middle of the cover and center the filter element. Secure the pump cover to the base of the fuel pump.

After you have serviced all of the necessary fuel system components for your particular model, you must turn the fuel supply back on by returning the fuel tank selector valve to the "ON" position. On generator models MEP-004A through MEP-007B, the day tank must be refilled. This is accomplished by depressing the DC circuit breaker, placing the Start-Run-Stop switch in the RUN position, and placing the Battle Short switch in the ON position. This allows fuel to be pumped into the day tank. While you are refilling the day tank, you should also be bleeding the fuel system of trapped air.

?

4. Why must the fuel supply be turned off when changing the generator fuel filter(s)/strainer?

5. How is the fuel strainer element cleaned?

6. What is the purpose of the magnet located in the fuel transfer pump cover?

BLEEDING THE FUEL SYSTEM

STOP

If you require certification on generator model MEP-007B, read the following TO reading assignment. After you have finished, return to this module.

- MEP-007B - TO 35C2-3-442-11, para 4-87

In order to bleed trapped air from the fuel system, an opening in the fuel system must be made. Generator models MEP-004A through MEP-007B each have a bleeder screw located at the top of the secondary fuel filter for this very purpose. While the day tank is refilling, unscrew this bleeder screw. When there is a steady flow of fuel, without any bubbles, tighten the bleeder screw back down. After the day tank has finished refilling, position the Battle Short switch to the OFF position, place the Start-Run-Stop switch to the STOP position, and open the DC breaker. The generator set is now ready for operation. Start the unit to verify proper operation.

NOTE

NOTE

The following bleeding procedures apply to generator models MEP-004A through MEP-007B.

On generator models that are not equipped with a bleeder screw, bleeding the fuel system can be accomplished by loosening the fuel line shortly after the secondary filter and observing the fuel flow from this location. Again, once a steady stream of fuel is noticeable, without air bubbles, re-tighten the fuel line. Local operating procedures should outline exact guidelines for performing this task.

?

7. What is an alternative method for bleeding the generator fuel system if it is not equipped with a bleeder screw?

The next minor maintenance task you are going to learn concerns servicing the generator air filter.

AIR FILTER SERVICING

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-003A - TO 35C2-3-455-1, para 3-18B(1), 3-18B(2), and 3-18C(1)
- MEP-004A - TO 35C2-3-445-1, para 3-24b
- MEP-005A - TO 35C2-3-446-1, para 3-24b
- MEP-006A - TO 35C2-3-444-1, para 3-32b
- MEP-007A - TO 35C2-3-442-11, para 4-115
- MEP-016B - TO 35C2-3-386-31, para 3-29b
- MEP-017A - TO 38G2-89-21, para 3-7
- MEP-026A - TO 38G2-90-1, para 4-16a

Before removing the air filter from its holder, make sure all external surfaces and the surrounding area are clean. Next, remove the filter element from its holder and examine it for serviceability. If there are any obvious defects, such as large tears or holes, the filter element must be replaced. To check for less obvious defects, such as small holes, hold a light behind the filter. If there are only a few holes, the filter may be reused. However, if numerous holes are noticeable, the element needs to be replaced.

NOTE

Never reuse an air filter element more than twice.

If the air filter is dirty, low-pressure compressed air directed in the opposite direction of air flow can be used to clean the element. The direction of air flow is indicated by an arrow printed on the side of the filter. If this method fails to clean the filter adequately, you should replace it with a new one. Although the filter element can be cleaned with a mild detergent and water solution, this is not always possible in the deployed environment. If a situation arises where you have no choice but to clean the filter, do this by soaking the filter element in the detergent solution for approximately 15 minutes. Rinse thoroughly by soaking the element in clean water. Let the filter element dry a minimum of 24 hours before using.

CAUTION

NEVER attempt to dry a wet filter with compressed air as the filter can be easily torn when it's wet.

Prior to placing a new or cleaned filter in the air filter housing, wipe it clean. Place the filter in the air filter housing, and replace all necessary hardware.

You will also have to learn how to replace the radiator hose if it has a hole in it or is leaking. This information only applies to generator models MEP-004A through MEP-007B as they are the only units equipped with a radiator.

RADIATOR HOSE REPLACEMENT

STOP

Select the applicable TO reading assignment from the list at the right. After you have finished, return to this module.

- MEP-004A - TO 35C2-3-445-1, para 3-31b(3)
- MEP-005A - TO 35C2-3-446-1, para 3-31b(3)
- MEP-006A - TO 35C2-3-442-11, para 4-102a

When replacing a defective radiator hose, the first thing you must do is drain the radiator. The radiator must be drained completely if the bottom radiator hose is to be replaced. If the top hose is being replaced, you only have to drain the radiator enough so that the level of coolant is below the hose.

NOTE

Procedures for changing radiator hoses are basically the same for all models. Local operating procedures should also cover radiator hose replacement.

To gain access to the hoses, it is necessary to remove the fan guard assembly. The radiator hoses are secured to the connection points with clamps. Use a flat-tip screwdriver to turn the hose clamp screw in a counterclockwise direction. This will loosen the clamp. Loosen the hose clamps at both connection points and slide them toward the middle of the hose. Remove the hose ends from their respective connection points. If the hose has been in place for a long period of time, it may be difficult to remove. You may have to try turning the hose from left to right in a effort to work it loose.

After the defective hose has been removed, the connection points need to be cleaned. A wet rag can be used to help remove residue at the connection points. However, sometimes there may be a build-up of corrosion which has hardened and cannot be easily removed. In this instance, a fine grade of sand paper or wire brush may be used. With the connection points cleaned, you are ready to place the new hose into position. Slide both of the clamps onto the new hose. If the old hose clamps are serviceable, you can reuse them. Push the radiator hose onto the connection points and

tighten the clamps. Be careful not to push the hose too far onto the connection point. As a guide, there is usually a visible line on the connection point showing the position of the old hose. When tightening the clamp nearest the radiator, make sure that the tab protruding from the clamp does not come in contact with the radiator fan.

Next, replace the fan guard assembly. With fan guard assembly installed, you are now ready to refill the radiator. Remember, a mixture of 60 percent water and 40 percent antifreeze is required for the radiator. Operate the generator set to make sure that the new hose does not leak.

?

8. How do you inspect the air filter cartridge for hard to see defects, such as small holes?

9. When cleaning the air filter using low-pressure compressed air, in which direction should the air be directed?

10. What is removed in order to gain access to the radiator hoses?

SUMMARY

This concludes our discussion on generator minor maintenance. Again, the tasks discussed in this module were only a small sampling of the numerous minor maintenance tasks you may be required to perform. This should give you a basic idea of the type of maintenance procedures you will be responsible for performing.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you.

When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate how to perform generator minor maintenance. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

- Change engine oil, including filters.
- Service fuel filter(s)/strainer.
- Bleed fuel system of trapped air.
- Change the air filter.
- Clean the air filter (if applicable).
- Change radiator hose(s).

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS. Your trainer will assign the next task.

REVIEW QUESTIONS CONFIRMATION KEY

1. To warm the oil so that it will drain thoroughly
2. New oil can become contaminated
3. To make a better seal for preventing leaks
4. To prevent the fuel supply from draining
5. With dry cleaning solvent or by rinsing in clean fuel
6. To collect metal particles present in the fuel
7. Loosen the fuel line located after the secondary fuel filter
8. By holding a light behind the filter
9. Opposite direction of air flow
10. The fan guard assembly

MODULE 9
GENERATOR MINOR TROUBLESHOOTING

PERFORMANCE GOALS

Given specific generator malfunctions, applicable technical references (listed below), and local operating instructions, perform generator minor troubleshooting IAW prescribed procedures (AFJQS Task 213.21.12).

PREREQUISITE

Must have completed Modules 1 thru 8 of this AFQTP.

ABOUT THIS MODULE

You are not expected to fix every malfunction that occurs. However, you should be capable of correcting minor problems. Any major repairs or extensive troubleshooting procedures are the responsibility of trained power production personnel. You are not required to utilize any type of test equipment when performing minor troubleshooting of the generator set. The type of malfunctions you are responsible for isolating and correcting are those that can be easily identified. In this module, you are going to learn about some minor malfunctions and the steps to take to isolate and correct them.

MODULE OUTLINE

AFJQS Task 213.21.12

- Explain procedures for isolating generator malfunctions.
- Explain steps for correcting generator malfunctions.
- Explain requirement for notifying appropriate personnel/agency when a generator malfunction occurs.
- Explain procedures for recording/documenting generator malfunctions.

TRAINING REFERENCES

MEP-003A - TO 35C2-3-455-1, Table 3-3
MEP-004A - TO 35C2-3-445-1, Table 3-2
MEP-005A - TO 35C2-3-446-1, Table 3-2
MEP-006A - TO 35C2-3-444-1, Table 3-3
MEP-007B - TO 35C2-3-442-11, Table 3-3
MEP-016B - TO 35C2-3-386-31, Table 3-3
MEP-017A - TO 35C2-3-424-1, Table 3-4

MEP-017A - TO 38G2-89-21, Table 4-4
MEP-026A - TO 38G2-90-1, Table 4-2

GENERATOR MINOR TROUBLESHOOTING

You can expect that at some time or another something is bound to break or go wrong with your generator set. A generator that operates perfectly in garrison (home station) may not operate so well once it reaches its deployed location. The reason for this is that the generator set, being a mobile unit, must sometimes be transported several miles across varying terrain until it reaches its final destination. While the unit is being transported, vibrations can cause components to work loose and/or break. Other malfunctions/problems can occur after the generator set is in operation. What happens when the generator suddenly trips off-line? What are you going to do? In either of these situations, you must isolate (find) the source of the malfunction and attempt to correct the problem as soon as possible.

ISOLATING MALFUNCTIONS

Before you can determine whether or not a generator malfunction exists, you must first know **normal** generator operation. This information was presented in earlier modules. One of the most difficult steps in troubleshooting a generator malfunction is determining the exact cause of the malfunction. You know the generator set tripped off-line, but what caused this particular malfunction to occur? There could be several different causes of which you must eliminate one-by-one until you find the exact source of the malfunction. The majority of generator malfunctions are discovered when performing your during operation inspection. Using your sense of smell, hearing, and sight can often help in locating generator malfunctions. Your sense of smell can alert you to components that are burning or overheating. If the generator set is making an abnormal sound, this can usually be detected by listening or hearing. The most beneficial sense used in determining generator malfunctions is your sense of sight. By observing the equipment, you can readily see if a fault light is illuminated, a hose is leaking, or a control panel gauge is reading incorrectly.

Another method for determining generator malfunctions is by monitoring the Fault Indicator Panel. Only generator models MEP-004A through MEP-007B are equipped with this panel. When certain generator malfunctions occur, a corresponding light illuminates on the Fault Indicator Panel. Depending upon the particular malfunction, either the main AC circuit breaker opens or

the generator set shuts down. For example, an over load or over voltage fault will cause the main AC circuit breaker to open while an overspeed fault causes the generator set to shut down completely. It is important to identify which fault light illuminated prior to resetting any safety circuits.

The Troubleshooting Charts on the following pages, list a few **samples** of possible generator malfunctions, probable causes, and corrective actions. It is impossible to identify every problem that could occur. Some of the most common malfunctions which do occur are simply the result of "operator error," such as failing to follow correct generator start procedures. This particular malfunction most often occurs during a stressful or emergency situation like that experienced when a power failure occurs. Although speed is sometimes an important factor, make sure that proper procedures are always followed. The most important thing to remember when isolating a malfunction is to do it as quickly and safely as possible.

You can also see from the troubleshooting chart that the cause of the malfunction is not limited to one particular item but rather several possible causes. As part of generator troubleshooting, it is your job to determine which of the probable causes actually caused the malfunction to occur. The list of probable causes shown on this chart is not all inclusive. These are things that you, the non-power production individual, are capable of

easily checking. For example, it is within your capability to check and see if the unit is out of fuel. This is simply a matter of opening the fuel cap and looking inside.

?

1. When are the majority of generator malfunctions found?

2. What is the most important thing to remember when isolating a malfunction?

3. When is the generator operator most likely to perform generator procedures incorrectly?

4. Who is responsible for performing minor troubleshooting on the generator set?

On generator models that utilize batteries, a quick way to check to see if dead batteries are the cause of the unit not starting is to check the control panel lights. Depress the DC breaker and place the control panel light switch in the ON position. If the lights don't come on, this is a good indication that the batteries are dead. If the lights do come on, start the unit with the Start switch. If the control panel lights flicker, this is an indication that the batteries may be weak and are not strong enough to actually start the unit.

TROUBLESHOOTING CHART (MEP-003A, 004A, 005A, 006A, 007B, 016B)

Malfunction	Probable Cause	Corrective Action
Engine fails to crank	Improper starting procedures	Reaccomplish start procedures
	Loose or corroded battery cable terminals and battery post	Clean battery post and clean and tighten battery cable terminals
	Dead batteries	Using slave receptacle, jump start unit
Engine cranks but fails to start	Improper starting procedures	Reaccomplish start procedures
	No fuel	Service set tank or auxiliary source
	Fuel selector valve in wrong position	Ensure auxiliary fuel valve is in correct position
	Air in fuel lines	Bleed fuel system
	Speed switch needs to be reset. (MEP-004 thru MEP-007B only)	Depress reset button on back of overspeed switch
Engine starts but stops when the START-RUN-STOP switch is released (MEP-004 thru MEP-007B)	Switch released too soon from START position	Hold switch in the START position until the oil pressure gauge indicates 20 psi
	Fuel level in day tank too low	Refill day tank
Engine stops suddenly	Fuel supply exhausted	Service fuel tank or aux. source as required
	Vent on fuel cap in closed position	Open vent
	Low oil pressure	Check oil level
Low oil pressure	Low oil level	Add oil to proper level
Engine overheating (MEP-004A thru MEP-007B only)	Low coolant level	Add coolant as necessary
	V-belt broken or out of adjustment	Put standby unit on-line and notify higher level maintenance
	Radiator shutter assembly defective or out of adjustment	Manually open shutter assembly and notify higher level maintenance
	Low oil	Add oil as necessary

TROUBLESHOOTING CHART (MEP-017A and MEP-026A)

Malfunction	Probable Cause	Corrective Action
Engine fails to crank	Dead battery (MEP-017) Battery cables loose and/or corroded or posts corroded (MEP-017) Improper starting procedures	Jump start unit Clean posts and clean and tighten battery cable terminals Perform generator start procedures
Engine cranks but fails to start	Improper starting procedures No fuel Insufficient engine speed (manual start)	Perform generator start procedures Check fuel supply Pull harder on start rope or jump start unit
Engine stops suddenly	No fuel	Check fuel supply
Unit won't accept load	Circuit breaker open	Close circuit breaker

Now that you have identified the malfunction and its cause, you must take appropriate action to correct the problem.

CORRECTIVE ACTIONS

NOTE

The troubleshooting chart shown in the applicable TO is much more in-depth than the examples shown in this AFQTP. You do not possess the necessary skills to repair all of the malfunctions listed in the TO. Your trainer will provide guidance on which troubleshooting tasks you are capable of performing.

Here again, the type of malfunction you are responsible for repairing should be very minor in nature. This could possibly include, tightening a loose hose connection, cleaning a battery terminal, resetting a switch, etc. Whenever a problem is identified, use the troubleshooting chart in the applicable TO to determine the necessary corrective actions.

If an engine fault such as high coolant temperature exists, your best move is to start the standby generator set and transfer the load. After the unit has cooled down, you can then go back and try to find out what caused the generator to overheat. When an electrical fault occurs, again, you should put the standby unit on-line. Do not attempt to repair a generator electrical fault if it involves more than resetting a switch. In this situation, notify power production personnel as soon as possible. Generator malfunctions which are **minor** and can be repaired without risk of injury to yourself or the equipment can be accomplished by non-power production personnel. If you are in doubt as to how to correct the malfunction, it is usually best to transfer the load to the stand-by generator.

PERSONNEL/AGENCY NOTIFICATION

If a generator malfunction occurs which causes the generator to trip off-line, you must notify both power production and Job Control personnel immediately. Other generator malfunctions require you to notify Job Control within 1 hour of incident occurrence. Power production personnel must be notified so that they can come and make any necessary repairs. **Always** keep Job Control abreast of the generator operational status both in garrison and in the deployed environment. If the malfunction is serious enough in nature and can't be repaired in the field, a replacement generator set may need to be requested from the home station. Each facility must have 100 percent back-up power. By keeping Job Control accurately informed of generator status, they are better able to coordinate with the appropriate agencies if such a situation arises.

DOCUMENTING MALFUNCTIONS

Finally, when a malfunction occurs, you must record this information in the appropriate locations. This information was discussed in Module 1 of this AFQTP and you should be familiar with the procedures for opening a job with Job Control. You also need to know that whenever a job is opened with Job Control, it must be documented on the generator operating log. If a generator malfunction occurs which requires a job to be opened, you must annotate all pertinent information on the operating maintenance log. Additionally, whenever any maintenance action is performed on the generator set, regardless of its severity, you must record this information in the generator log book. You should record the time the malfunction was discovered, what the malfunction was, and what actions were taken to correct the problem. If you had to open a job with Job Control, this should be stated in the log book.

5. What action is required if the generator set shows obvious signs of overheating?

6. What should you do if you are in doubt on how to correct a particular generator malfunction?

7. Which type of information is recorded in the generator log book concerning generator malfunctions?

8. What prior knowledge must you possess before you can determine whether or not a generator malfunction actually exists?

9. Which type of generator malfunctions require Job Control notification?

SUMMARY

This last module covered how to perform generator minor troubleshooting to include isolating and correcting generator malfunctions, notifying the appropriate personnel/agency when a generator malfunction occurs, and recording/documenting the generator malfunctions.

You are not expected to fix every malfunction that occurs. However, you should be capable of correcting minor problems. Any major repairs or extensive troubleshooting procedures are the responsibility of trained power production personnel. The type of malfunctions you are responsible for isolating and correcting are those that can be easily identified.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate how to perform generator minor troubleshooting. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel

comfortable with the procedure, you will be evaluated on the following:

- Identify generator malfunction(s).
- Take appropriate action to correct generator malfunction(s).
- Document generator malfunction(s) in the appropriate location.

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS.

REVIEW QUESTIONS CONFIRMATION KEY

1. When performing a during operation inspection
2. Do so as quickly and as safely as possible
3. Under stressful or emergency situations
4. Non-power production personnel
5. Switch over to the stand-by generator
6. Contact power production personnel
7. Time, malfunction, and corrective action
8. Normal generator operation
9. All generator malfunctions must be reported to Job Control

GLOSSARY OF TERMS

Alternating Current (AC)	Current which is periodically reversing in direction and constantly changing in magnitude.
Cycle	One complete positive and one complete negative alternation of alternating current or voltage.
Direct Current (DC)	An electric current that flows in only one direction.
Electrolyte	The chemical solution in electrical batteries.
Frequency	The number of complete cycles per second existing in any form of wave motion, such as the number of cycles per second in alternating current.

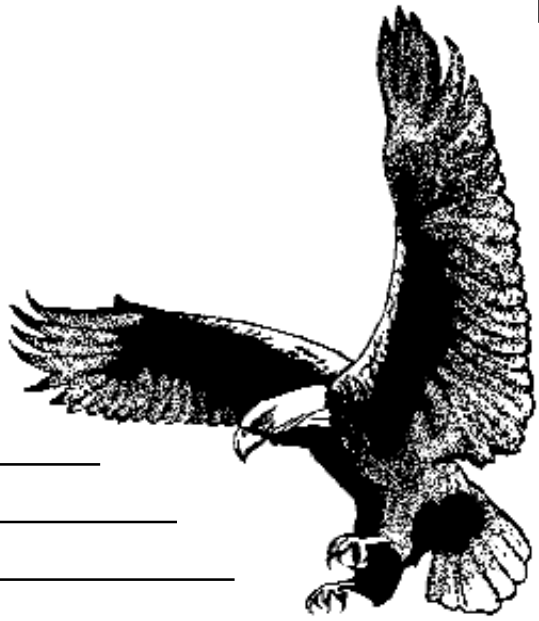
AIR FORCE QUALIFICATION TRAINING PACKAGE

000X0-213U

PART OF AFJQS 000X0-213U

TACTICAL GENERATOR OPERATION FOR NON-POWER PRODUCTION PERSONNEL

KNOWLEDGE EVALUATION PAMPHLET



1 OCTOBER 1999

SUPERSEDES AFJQS 000X0-213U
DATED 12 Dec 96

FOR OJT USE ONLY

KNOWLEDGE EVALUATION PAMPHLET (KEP)

- This pamphlet should be separated from the package immediately and stored to prevent compromise of the questions. The answer sheet for the KEP is located at the back of this pamphlet. This answer sheet may be detached to make it easier to enter the answers. The KEP confirmation key, also located at the back of this pamphlet, should be detached and stored until ready for grading.

- After the trainee completes each module, the supervisor/trainer administers the corresponding KEP test. Using the KEP confirmation key, the supervisor/trainer checks the trainee's answers and reviews the incorrect responses. If the score is less than what is required, have the trainee restudy the module and retake the test.

- The trainee's responses to the KEP questions will aid us in evaluating the effectiveness of this training package. After the questions have been answered for all the module tests, please attach the completed and graded answer sheets to the training certification document and send the package to us at the address specified.

KEP QUESTIONS - MODULE 1

1. How often must non-power production personnel receive refresher generator qualification training?

   a. Monthly
   b. Quarterly
   c. Annually
   d. Only require initial certification training

2. Which of the generator models discussed produces a DC output voltage?

   a. MEP-003A
   b. MEP-016B
   c. MEP-017A
   d. MEP-026A

3. The tasks identified in this AFQTP are the ONLY tasks non-power production personnel are required to perform.

   a. True
   b. False

4. Which of the following safety items are required when servicing generator batteries?

   a. Rubber apron, face mask, and leather gloves
   b. Goggles, leather gloves, and rubber apron
   c. Rubber apron, rubber gloves, and goggles
   d. Goggles, face mask, and rubber apron

5. Which of the following terms is used to describe generator speed?

   a. Voltage
   b. Amperage
   c. Kilowatts
   d. Frequency

6. The generator set consists of ___ major component(s).

   a. 1
   b. 2
   c. 3
   d. 4

7. The load carrying capability of the generator set is identified by

    a. horse power.
    b. physical size.
    c. output voltage.
    d. kilowatt rating.

KEP QUESTIONS - MODULE 2

1. What is the minimum depth, in feet, a ground rod must be driven?

   a. 5
   b. 6
   c. 8
   d. Between 6 and 8

2. Which of the following dipstick readings indicates sufficient engine oil level?

   a. At the “add” mark
   b. At the “full” mark
   c. Just above the “full” mark
   d. Between the “add” and “full” mark

3. Which action should be taken if you accidentally spill battery electrolyte solution on your skin?

   a. No special action is required
   b. Seek medical assistance immediately
   c. Clean the affected area with a wet rag
   d. Immediately rinse the affected area with clean water

4. Which of the following control panel instruments indicates the generator set output voltage?

   a. Ammeter
   b. Voltmeter
   c. Kilowatt meter
   d. Battle Short indicator

5. Condensation forms within generator fuel system components because of a change in

   a. ambient temperature from cold to hot.
   b. ambient temperature from hot to cold.
   c. the internal temperature of the fuel from cold to hot.
   d. the internal temperature of the fuel from hot to cold.

6. How long should the drain valve be left open for draining sediment/condensation?

    a. Approximately 1 minute
    b. A maximum of 10 to 15 seconds
    c. Until a change in fuel color is observed
    d. Until a change in fuel color is observed or within 10 to 15 seconds, whichever comes first

7. What is the purpose of a generator slave receptacle?

    a. Supplies a 24VDC power source
    b. Supplies a 120VAC power source
    c. External outlet used for jump starting another generator
    d. External outlet used for charging the generator battery

KEP QUESTIONS - MODULE 3

1. What is the primary reason for the time lapse requirement between generator starting attempts?

   a. Allows the starter to cool down
   b. Allows the batteries to cool down
   c. To avoid overheating of the Start switch
   d. To prevent the batteries from discharging

2. In which position is the DC breaker placed when shutting down the generator?

   a. ON
   b. OFF
   c. OPEN
   d. CLOSED

3. How long in minutes should you allow the generator to operate at no-load for cool-down?

   a. 1 to 2
   b. 2 to 3
   c. 3 to 5
   d. 10 to 15

4. The load and/or kW meter should never exceed what percent?

   a. 50
   b. 75
   c. 100
   d. 110

5. If the on-line generator set develops a major oil leak, which action should be taken?

   a. Perform normal shutdown
   b. Attempt to repair the leak
   c. Contact power production personnel
   d. Perform emergency shutdown procedures

6. What is the first step when performing generator **EMERGENCY** shutdown procedures?

a. Open the DC breaker
b. Start the standby generator
c. Notify power production personnel
d. Remove the load from the unit by opening the AC circuit breaker

If you require certification on generator model MEP-003A, answer questions 7 through 9.

7. How much time must elapse between start attempts?

a. 15 seconds
b. 30 seconds
c. 1 minute
d. 2 minutes

8. What is the minimum amount that should be indicated on the engine oil pressure gauge?

a. 10 psi
b. 15 psi
c. 20 psi
d. 30 psi

9. How long in seconds is the Master switch held in the preheat position when used?

a. 10
b. 25
c. 30
d. 60

If you require certification on generator models MEP-004A through MEP-007B, answer questions 10 through 14.

10. A single starting attempt should not exceed how many seconds?

a. 3
b. 10
c. 15
d. 30

11. What are the two types of adjustments which are made by the Manual Speed Control knob?

a. Rough/fine
b. Coarse/fine
c. Rough/precise
d. Coarse/precise

12. Which action, if any, is necessary if a fault light illuminates on the fault control panel once the unit has started?

a. This is normal, all lights will go out within 30 seconds
b. Operate the TEST or RESET switch and continue operation
c. Stop the unit immediately and refer the problem to a qualified power production individual
d. Stop the unit immediately; operate the TEST or RESET switch and reaccomplish the start procedures

13. Which generator fault(s) is/are **NOT** overridden when the Battle Short switch is placed in the "ON" position?

a. Low oil pressure
b. Under voltage and overspeed
c. Overspeed and short circuit
d. Short circuit and over voltage

14. In the event use of the Battle Short switch is required, which action(s) is/are required?

a. Notify the using facility
b. Start the standby generator
c. Notify power production personnel
d. Start up the standby generator and notify power production personnel

If you require certification on generator model MEP-016B, answer questions 15 through 17.

15. How long in seconds must the Master switch be held in the PREHEAT position?

a. 15
b. 20
c. 30
d. 35

16. What is the maximum number of times you can repeat the start sequence before a starter cooling period must be observed?

a. 3
b. 4
c. 5
d. 6

17. Which adjustment(s), if any, is/are made to the Manual Speed Control knob when shutting down the unit?

a. Turn knob fully counterclockwise and push all the way in
b. Turn knob fully clockwise and push all the way in
c. Turn knob fully counterclockwise only
d. No adjustment is required

If you require certification on generator model MEP-017A, answer questions 18 through 20.

18. Which generator controls are positioned based on the ambient temperature?

a. Oil pan baffle rod, choke control, governor
b. Choke control, air cleaner intake shutter, governor
c. Oil pan baffle rod, remote-local switch, choke control
d. Air cleaner intake shutter, governor, oil pan baffle rod

19. In which position is the Run-Stop switch placed during electrical starting of the generator set?

a. RUN
b. NORMAL
c. EMERGENCY RUN
d. EMERGENCY STOP

20. In which position is the choke control initially placed when starting the generator manually?

a. 1/2 closed
b. 1/2 open
c. 3/4 closed
d. 3/4 open

If you require certification on generator model MEP-026A, answer questions 21 through 23.

21. In which position is the Variable Resistor knob placed when starting the generator?

a. Mid-range
b. 3/4 range
c. Full clockwise
d. Full counterclockwise

22. How does unnecessary or excessive use of the choke affect the generator set?

a. No affect
b. Governor operates erratically
c. Damages the voltage regulator
d. Lubricating oil becomes diluted with fuel

23. Which control panel instrument indicates the operating speed of the generator and what is the correct speed?

a. Tachometer/400Hz
b. Frequency meter/60Hz
c. Tachometer/3600rpms
d. Frequency meter/3600rpms

KEP QUESTIONS - MODULE 4

1. How long should the generator battery be charged after servicing it in 32^{o}F weather conditions?

   a. 30 minutes
   b. 1 hour
   c. 2 hours
   d. 6 hours

2. During which unusual operating condition are more frequent battery electrolyte level inspections required?

   a. Extreme cold
   b. Extreme heat
   c. High altitude
   d. Dusty and sandy climate

3. What effect, if any, does operating at high altitudes have on the generator set?

   a. Increases the engine oil operating pressure
   b. Reduces the output power capability
   c. Reduces fuel consumption
   d. No effect whatsoever

4. Which operating environment can affect the batteries' ability to crank the engine?

   a. In rainy or humid areas
   b. In salt water areas
   c. At high altitudes
   d. In extreme cold

If you require certification on generator model MEP-003A, answer questions 5 through 7.

5. In which position is the air cleaner intake shutter placed for generator operation in extreme cold conditions?

   a. Hot
   b. Cold
   c. Winter
   d. Summer

6. When starting the unit in extreme cold weather, how long must the Master switch be held in the START position after the unit has started?

a. 10 seconds
b. 1 minute
c. 2 minutes
d. 3 minutes

7. Which color is visible on the air cleaner indicator when the air cleaner requires servicing?

a. Red
b. Green
c. Yellow
d. Orange

If you require certification on generator models MEP-004A or MEP-007B, answer questions 8 through 11.

8. The generator sets are designed to operate within which ambient temperature ranges?

a. 0^{o} F to 100^{o}F
b. 25^{o} F to 125^{o}
c. 32^{o} F to 125^{o}
d. -25^{o} F to 125^{o}

9. Which Control Panel instrument(s) aid(s) the operator in determining an overheat condition?

a. kW meter only
b. Coolant gauge only
c. Oil pressure gauge only
d. Coolant gauge and kW meter

10. Below which ambient temperature would it become necessary to utilize an external heating source for preheating the generator set?

a. 0^{o} F
b. 32^{o} F
c. -25^{o} F
d. -32^{o} F

11. Approximately how many minutes does it take for the fuel burning heater to sufficiently heat the engine for starting?

a. 3 1/2 to 4
b. 30 to 40
c. 50 to 60
d. 61 to 90

If you require certification on generator model MEP-016B, answer questions 12 through 14.

12. Which grade of diesel fuel should be used when operating the generator set in extremely cold climates?

a. Regular
b. Winter
c. Arctic
d. Light

13. How often is the oil and oil filter changed on the MEP-016B when operating in dusty and sandy areas?

a. Once a week
b. Every 60 hours
c. As needed basis
d. Every 60 hours or as needed

14. How frequently should the battery electrolyte level be checked when operating in extreme heat?

a. Hourly
b. Daily
c. Semiweekly
d. Weekly

If you require certification on generator model MEP-017A, answer questions 15 through 17.

15. In which position is the Oil Pan Baffle Rod placed for operating in extreme cold?

a. Winter
b. Midway
c. Towards the rear of the engine
d. Towards the front of the engine

16. How often is the fuel filter inspected when the generator set is operating in dusty and sandy areas?

a. Daily
b. After operation
c. Before operation
d. Before and after operation

17. Which control panel instrument is checked frequently during operation in extreme heat?

a. Voltmeter
b. Oil pressure gauge
c. Current indicator meter
d. Battery charging ammeter

If you require certification on generator model MEP-026A, answer questions 18 through 20.

18. At what ambient temperature should the Air Intake Shutter be place in the SUMMER position?

a. 33^{o} F
b. 65^{o} F
c. 85^{o} F
d. 125^{o} F

19. How frequently should the air cleaner be serviced when the generator is operating in dusty and sandy areas?

a. Every 8 hours
b. Every 12 hours
c. Once a day
d. Once a week

20. How often is the fuel tank strainer serviced during operation in dusty and sandy climates?

a. Daily
b. Weekly
c. Before and after each operation
d. Prior to adding fuel to the fuel tank

KEP QUESTIONS - MODULE 5

1. In which position is the Operations switch placed when performing load transfer procedures?

   a. LOCAL
   b. SINGLE
   c. REMOTE
   d. PARALLEL

2. How should the voltage of the on-coming unit compare with that of the on-line unit?

   a. Slightly lower
   b. Slightly higher
   c. Exactly the same
   d. Within 20 percent of each other

3. When must the AC circuit breaker be closed on the on-coming unit?

   a. Slightly before the synchronizing lights go dark
   b. When the synchronizing lights are at their darkest point
   c. When the synchronizing lights are at their brightest point
   d. Any time as long as the synchronizing lights are flashing in unison

4. How often should the synchronizing lights be flashing on and off prior to closing the AC circuit breaker of the on-coming unit?

   a. 1 to 2 seconds
   b. 2 to 3 seconds
   c. 20 to 30 seconds
   d. 2 to 3 minutes

5. Which two Control Panel meters must be monitored throughout the load transfer procedure to make sure the load is actually transferring from one unit to the other?

   a. Voltage and kW
   b. Current and kW
   c. Voltage and Frequency
   d. Current and Frequency

6. At which point should the AC circuit breaker on the out-going generator be opened?

   a. When the kW meter indicates zero percent load
   b. When the kW meter indicates approximately 10 percent
   c. As soon as the AC breaker of the on-coming unit has been closed
   d. After the generator set has been operated for the required cool-down period

7. Which on-line adjustment(s) is/are necessary after the on-coming unit has been placed on-line?

   a. Voltage only
   b. Voltage and frequency only
   c. Frequency and Operations switch
   d. Voltage, Frequency, and Operations switch

KEP QUESTIONS - MODULE 6

1. What is the minimum generator inspection interval when the generator is in operation?

    a. Hourly
    b. Every 2 hours
    c. Every 3 hours
    d. Every 12 hours

2. Which form is used to order parts from supply?

    a. AF Form 9
    b. AF Form 28
    c. AF Form 2005
    d. AETC Form 2005

3. What is indicated when the Battery Charging Ammeter reads slightly above zero?

    a. Charging
    b. Discharging
    c. Fully charged
    d. Completely discharged

4. Which generator status code indicates the generator set should NOT be operated?

    a. Red
    b. Green
    c. Amber
    d. Yellow

5. Which action is necessary when the generator operating/maintenance log has been completely filled?

    a. Throw it away and start a new form
    b. Close all open jobs on the back side before starting a new form
    c. Transfer all open jobs listed on the back side of the completed form and start a new form
    d. Attach the completed form to the back of a new generator operating log and start using the new form

6. The generator Fuel Gauge indicates the fuel level of the auxiliary fuel supply.

    a. True
    b. False

KEP QUESTIONS - MODULE 7

1. When is a post-operational inspection performed?

    a. After 12 continuous hours of operation
    b. Before each generator operation
    c. After each generator operation
    d. Every 8 hours of operation

2. What causes condensation to form in fuel system components?

    a. Ambient temperature changes from cold to hot
    b. Ambient temperature changes from hot to cold
    c. Internal engine temperature changes from hot to cold
    d. Internal engine temperature changes from cold to hot

3. When performing a post-operational inspection, how is the correct engine oil level indicated on the dipstick?

    a. At the “add” mark
    b. At the “full” mark
    c. Just above the “full” mark
    d. Between the “add” and “full” mark

4. What is the recommended level of fuel in the generator set tank for a post-operational inspection?

    a. 1/4
    b. 1/2
    c. 3/4
    d. Full

5. A post-operational inspection is NOT required as long as a thorough pre-operational inspection was performed.

    a. True
    b. False

6. Which protective safety equipment is required when inspecting the generator batteries?

a. Rubber apron, face mask, and leather gloves
b. Goggles, leather gloves, and rubber apron
c. Rubber apron, rubber gloves, and goggles
d. Goggles, face mask, and rubber apron

7. Which types of discrepancies noted during a post-operational inspection are recorded on the generator operating/maintenance log?

a. All
b. Only those which CANNOT be immediately corrected
c. Only those which affect the operational capability of the unit
d. Only those which require a bench stock part or a part to be ordered from supply for repair

KEP QUESTIONS - MODULE 8

1. How often can the oil filter gasket be reused before it is unserviceable?

    a. 1 time
    b. 2 times
    c. 3 times
    d. Cannot be reused

2. What is the last step in changing the engine oil?

    a. Check the oil level indicated on the dipstick
    b. Operate the engine to circulate the new oil
    c. Perform a post-operational inspection
    d. Close the oil drain valve

3. What must be applied to the new fuel filter gasket prior to installation?

    a. Light coating of oil
    b. Heavy coating of fuel
    c. Light coating of fuel
    d. Light coating of gasket sealer

4. The fuel strainer element must be replaced every time the fuel strainer is serviced.

    a. True
    b. False

5. How long should the air filter element be allowed to dry after washing?

    a. 15 minutes
    b. 1 hour
    c. 2 to 4 hours
    d. 24 hours

6. Approximately how long should the air filter cartridge be allowed to soak in a cleaning solution?

a. 15 minutes
b. 25 minutes
c. 1 hour
d. 2 to 4 hours

7. How is the filter in the fuel transfer pump removed if it becomes lodged inside of the pump body?

a. Tap the side of the pump with a hammer
b. Complete disassembly of the pump is required
c. Remove the pump from its mounting and shake the filter out
d. Using your finger, reach up inside the pump and gently work it free

Answer questions 8 and 9 if you require certification on generator models MEP-004A through MEP-007B.

8. Where and how is trapped air bled from the generator fuel system?

a. At the primary fuel filter by opening the bleed screw
b. Before the primary fuel filter by loosening the fuel line
c. After the secondary fuel filter by loosening the fuel line
d. At the secondary fuel filter by opening the bleeder screw

9. After the generator set has cooled down, what is the first step in replacing a radiator hose?

a. Remove the hose clamps
b. Remove the fan guard
c. Drain the radiator
d. Start the unit

KEP QUESTIONS - MODULE 9

1. What are the best senses to use when identifying generator malfunctions?

    a. Seeing, hearing, and tasting
    b. Seeing, hearing, and smelling
    c. Smelling, seeing, and touching
    d. Hearing, touching, and smelling

2. Where must all generator malfunctions be recorded?

    a. AF Form 2005
    b. Historical records
    c. Generator log book
    d. Generator operating log

3. Within what time frame must a generator malfunction which causes the unit to trip off-line be reported to Job Control?

    a. Immediately
    b. As soon as possible
    c. Within 1 hour of occurrence
    d. Before the end of the duty day

Answer questions 4 through 7 if you require certification on generator models MEP-003A through MEP-007B and MEP-016B. For questions 4 through 7, match the probable cause in Column B to the malfunction in Column A. Each probable cause may be used only once.

	Column A		Column B
4.	Engine fails to crank	a.	Improper starting procedures
5.	Engine stops suddenly	b.	Low oil level
6.	Engine cranks but fails to start	c.	Fuel supply exhausted
7.	Low oil pressure	d.	Dead batteries

Answer questions 8 through 11 if you require certification on generator model MEP-017A or MEP-026A. For questions 8 through 11, match the probable cause in Column B to the malfunction in Column A. Each probable cause may be used only once.

	Column A		Column B
8.	Engine fail to crank	a.	Circuit breaker open
9.	Engine stops suddenly	b.	Dead batteries
10.	Engine cranks but fails to start	c.	Improper start procedures
11.	Unit will not hold load	d.	No fuel

KEP CONFIRMATION KEY

MODULE 1

1. c
2. d
3. b
4. c
5. d
6. b
7. d

MODULE 2

1. c
2. b
3. d
4. b
5. b
6. d
7. c

MODULE 3

1. a
2. c
3. c
4. c
5. d
6. d
7. b
8. c
9. d
10. c
11. b
12. d
13. c
14. d
15. c
16. c
17. a
18. d
19. b
20. c
21. d
22. d
23. c

MODULE 4

1. b
2. b
3. b
4. d
5. c
6. b
7. a
8. d
9. d
10. c

11. c
12. c
13. d
14. b
15. d
16. b
17. c
18. a
19. c
20. d

MODULE 5

1. d
2. c
3. b
4. b
5. b
6. b
7. d

MODULE 6

1. c
2. c
3. c
4. a
5. c
6. b

MODULE 7

1. c
2. b
3. b
4. d
5. b
6. c
7. d

MODULE 8

1. d
2. a
3. c
4. b
5. d
6. a
7. d
8. d
9. c

MODULE 9

1. b
2. c
3. a
4. d
5. c
6. a
7. b
8. b
9. d
10. c
11. a

KEP QUESTIONS ANSWER SHEET

NAME_____ RANK_____ DAFSC_____

ORGANIZATION_____ MAJCOM_____ DSN_____

AFJQS/AFQTP PUBLICATION DATE_____ DATE COMPLETED_____

MODULE 1

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____

MODULE 2

1. ____
2. ____
3. ____
4. ____
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6. ____
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MODULE 3

1. ____
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23. ____

MODULE 4

1. ____
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16. ____
17. ____
18. ____
19. ____
20. ____

MODULE 5	MODULE 6	MODULE 7	MODULE 8	MODULE 9
1. ____	1. ____	1. ____	1. ____	1. ____
2. ____	2. ____	2. ____	2. ____	2. ____
3. ____	3. ____	3. ____	3. ____	3. ____
4. ____	4. ____	4. ____	4. ____	4. ____
5. ____	5. ____	5. ____	5. ____	5. ____
6. ____	6. ____	6. ____	6. ____	6. ____
7. ____		**7. ____**	7. ____	7. ____
			8. ____	8. ____
			9. ____	9. ____
				10. ____
				11. ____

NOTE: After completing and grading all tests, attach this answer sheet to the Training Certification document and send the package to the following address:

81 TRSS/TSQS
601 D STREET
KEESLER AFB MS 39534-2229