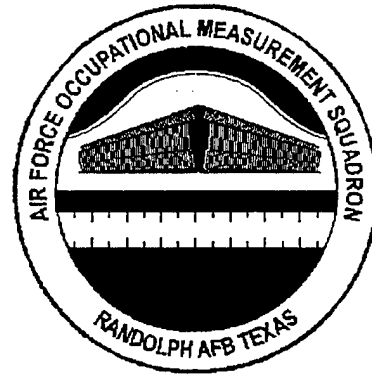




UNITED STATES AIR FORCE

OCCUPATIONAL SURVEY REPORT

**HEATING, VENTILATION,
AIR CONDITIONING, AND
REFRIGERATION (HVAC/R)**

AFSC 3E1X1

OSSN 2368

SEPTEMBER 1999

19991116 112

**OCCUPATIONAL ANALYSIS PROGRAM
AIR FORCE OCCUPATIONAL MEASUREMENT SQUADRON
AIR EDUCATION AND TRAINING COMMAND
1550 5TH STREET EAST
RANDOLPH AFB, TEXAS 78150-4449**

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

DTIC QUALITY INSPECTED 4

DISTRIBUTION FOR AFSC 3E1X1 OSR

	<u>OSR</u>	<u>AD</u> <u>ANL</u> <u>EXT</u>	<u>ANG/</u> <u>AFRC</u> <u>ANL</u> <u>EXT</u>	<u>AD</u> <u>TNG</u> <u>EXT</u>	<u>ANG/</u> <u>AFRC</u> <u>TNG</u> <u>EXT</u>	<u>JOB</u> <u>INV</u>
AFOMS/OMDQ	1					
AFOMS/OMYXI	10			5		10
ARMY OCCUPATIONAL SURVEY BRANCH	1					
CCAF/DFAX	1					
DEFENSE TECHNICAL INFORMATION CENTER	2					
HQ AFPC/DPAAD1	1					
HQ AFCESA/CEOT	1	1				
HQ ACC/XOSE	3			3		
HQ AETC/DPSE	3			3		
HQ AFMC/DPE	3			3		
HQ AFPC/DPPAC	1					
HQ AFSOC/DPPMT	2			2		
HQ AIA/DPT	3			3		
HQ AFSPC/DPDXE	3			3		
HQ AMC/DPPET	1					
86 MSS/DPMAT	3			3		
HQ PACAF/DPPET	3			3		
HQ AFCESA/CEOT, 139 BARNES DRIVE, SUITE 1, TYNDALL AFB FL 32403-5319 (ATTENTION CMSgt GELSLEICHTER)	1			1	1	
HQ USMC TRAINING AND EDUCATION, STANDARDS BRANCH	1					
NAVMAC	1					
HQ ANG/CEXO, 3500 FETCHET AVE, ANDREWS AFB MD 20331-5157 (ATTENTION CMSgt EVANS)	1		1	1	1	
HQ AFRC/CEXT, 155 2 ND ST, ROBINS AFB GA 31098-1635 (ATTENTION CMSgt WYNN)	1		1	1	1	
366 TRS/TTR (727 MISSILE ROAD, SHEPPARD AFB, TX 76311- 2254, ATTENTION: Mr. TOM KEE)	1	1	1	2	1	2
782 TRG/TTS, 826 AVE G, SUITE 4, SHEPPARD AFB TX 76311- 2867	1			1		

TABLE OF CONTENTS

	<u>PAGE NUMBER</u>
PREFACE	vii
SUMMARY OF RESULTS	ix
INTRODUCTION	1
SURVEY METHODOLOGY	2
Inventory Development	2
Survey Administration	2
Survey Sample	3
Task Factor Administration	3
CAREER LADDER STRUCTURE	6
Overview of Specialty Jobs	7
Group Descriptions	7
Comparison of Current Group Descriptions to Previous Study	16
Summary	17
SKILL AND EXPERIENCE ANALYSIS	17
Analysis of DAFSC Groups	17
ACTIVE DUTY	17
Descriptions and Comparisons of Skill-Level Groups	18
AIR NATIONAL GUARD	19
AIR FORCE RESERVE	20
TRAINING ANALYSIS	20
First-Enlistment Personnel	20
Training Emphasis (TE) and Task Difficulty (TD) Data	22
Specialty Training Standard (STS)	24
Plan of Instruction (POI) Analysis	25

TABLE OF CONTENTS (CONTINUED)

	<u>PAGE NUMBER</u>
JOB SATISFACTION ANALYSIS	25
AD Job Satisfaction	25
ANG Job Satisfaction	26
AFRC Job Satisfaction	26
IMPLICATIONS	26

TABLE OF CONTENTS (CONTINUED)
(Tables, Figures, Appendices)

	<u>PAGE</u> <u>NUMBER</u>
TABLE 1 MAJCOM REPRESENTATION OF TOTAL SAMPLE	4
TABLE 2 PAYGRADE DISTRIBUTION OF AD SAMPLE.....	5
TABLE 3 PAYGRADE DISTRIBUTION OF ANG SAMPLE	5
TABLE 4 PAYGRADE DISTRIBUTION OF AFRC SAMPLE	6
FIGURE 1 IDENTIFIED JOB STRUCTURE AND PERCENTAGES OF TOTAL SURVEY SAMPLE	8
FIGURE 2 DISTRIBUTION OF AFSC 3M0X1 FIRST-ENLISTMENT PERSONNEL ACROSS SPECIALTY JOBS	21
APPENDIX A SELECTED REPRESENTATIVE TASKS PERFORMED BY MEMBERS OF CAREER LADDER JOBS.....	27
APPENDIX B TABLES 5-39.....	29
APPENDIX C LISTING OF MODULES AND TASK STATEMENTS	31

THIS PAGE INTENTIONALLY LEFT BLANK

PREFACE

This report presents the results of an Air Force Occupational Survey of AFSC 3E1X1, the Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) career ladder. Authority to conduct occupational surveys is contained in AFI 36-2623. Copies of this report and pertinent computer printouts are distributed to the Air Force Functional Manager, the operations training location, all major using commands, and other interested operations and training officials.

Second Lieutenant Brandon Maroon developed the survey instrument. Dr. Robert M. Yadrick analyzed the data and wrote the final report. Mr. Tyrone Hill provided computer programming support and Ms. Dolores Navarro provided administrative support. Lieutenant Colonel Roger W. Barnes, Chief, Airman Analysis Section, Occupational Analysis Flight, Air Force Occupational Measurement Squadron, reviewed and approved this report for release.

Additional copies of this report can be obtained by writing to AFOMS/OMYXI, 1550 5th Street East, Randolph AFB Texas 78150-4449, or by calling DSN 487-5543. For information on the Air Force occupational survey process or other on-going projects, visit our web site at <http://www.omsq.af.mil>.

JAMES M. COLLINS, Lt Col, USAF
Commander
Air Force Occupational Measurement Sq

JOSEPH S. TARTELL
Chief, Occupational Analysis Flight
Air Force Occupational Measurement Sq

THIS PAGE INTENTIONALLY LEFT BLANK

SUMMARY OF RESULTS

1. **Survey Coverage:** The Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) career ladder, AFSC 3E1X1, was surveyed to gather data needed to guide the development and evaluation of training. This survey includes all three components – Active Duty (AD), Air National Guard (ANG), and Air Force Reserve Component (AFRC).
2. **Career Ladder Structure:** Structure analysis identified one cluster and three jobs: General HVAC/R Cluster; Mobility/Contingency Job; Air & Water Distribution Systems Job; and Supervisor Job.
3. **Career Ladder Progression:** Personnel entering the career ladder complete the initial technical training course, J3ABR3E131-003 HVAC/R Apprentice. This course is 17 weeks long and is conducted at Sheppard AFB, TX. AFSC 3E1X1 AD personnel follow a typical career progression pattern that includes a decrease in technical task performance and an increase in supervisory performance at the 7-skill level, and performance of almost exclusively supervisory and managerial tasks at the 9-skill level.
4. **Training Analysis:** Matching survey data to the AFSC 3E1X1 Specialty Training Standard (STS) revealed that the document is very well supported by survey respondents – no performance-coded elements were found to be performed by fewer than 20 percent of first-term personnel. Likewise, the Plan of Instruction (POI) is very well supported, with all elements meeting the standard criterion of 30 percent performance by first-term airmen. On the other hand, a number of tasks were identified that are being performed by more than 20 percent of first-term airmen but which are not referenced to the STS.
5. **Job Satisfaction Analysis:** Overall, AFSC 3E1X1 AD members in the 1-48 months Total Active Federal Military Service (TAFMS), 49-96 months TAFMS, and 97+ TAFMS categories were all more satisfied with their jobs, according to such indicators as expressed job interest, perceived use of talents and training, sense of accomplishment, and reenlistment intentions, when compared to members of other Support AFSCs surveyed in 1998. Relatively high satisfaction levels were also found in the previous Occupational Survey study, conducted in 1996, and the primary difference between the present and previous studies is an appreciable decline in reenlistment intentions over the past few years.

THIS PAGE INTENTIONALLY LEFT BLANK

**OCCUPATIONAL SURVEY REPORT (OSR)
HEATING, VENTILATION, AIR CONDITIONING, AND REFRIGERATION (HVAC/R)
CAREER LADDER
(AFSC 3E1X1)**

INTRODUCTION

This is a report of an occupational survey of the Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) career ladder, conducted by the Occupational Analysis Flight, Air Force Occupational Measurement Squadron (AFOMS). This report ensures that current data are available for use in guiding the development and evaluation of training and support planned changes within this career ladder. This survey includes all three components – Active Duty (AD), Air National Guard (ANG), and Air Force Reserve Command (AFRC) – in a single study. This is the second OSR for this single Air Force Specialty Code (AFSC). The previous OSR was completed in July 1996, shortly after the career field was created by the merger of three previous career fields (AFSC 545X0 -- Refrigeration and Air Conditioning; AFSC 545X2 – Heating Systems; and AFSC 545X3 – CE Control Systems).

As described in AFMAN 36-2108, *Airman Classification*, dated 30 April 1999, Specialty Description dated 30 April 1997, members of the 3E1X1 career field are responsible for installing, operating, repairing and maintaining HVAC/R systems and equipment, interpreting drawings and schematics, installing, repairing, fabricating and testing piping and tubing systems. They also install, connect, troubleshoot, and maintain HVAC/R controls, test HVAC/R equipment for proper operation, balance air and water in HVAC/R systems, evaluate water treatment for heating and cooling systems. They ensure compliance with safety and environmental regulations for fuels, refrigerants, and hazardous materials, manage HVAC/R functions and activities, and perform planning activities and facility surveys.

The technical training school for this AFSC is located at Sheppard AFB, TX. The J3ABR3E131-003 HVAC/R Apprentice course is 17 weeks long and provides training in heating, ventilation, air-conditioning, and refrigeration (HVAC/R) systems, including system fundamentals, trouble analysis, and maintenance. The operation of boilers and electrical fundamentals are taught, in addition to the calibration of complex HVAC/R systems. The Community College of the Air Force awards 35 credit hours upon course completion.

Entry into AFSC 3E1X1 requires an Armed Forces Vocational Aptitude Battery (ASVAB) "Mechanical" score of 51, "Electrical" score of 33 (dual – "or") and a Strength requirement of "M" (weight lift of 90 lb.).

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

SURVEY METHODOLOGY

Inventory Development

The data collection instrument for this occupational survey was USAF JI OASN 2368, dated January 1999. A tentative task list was prepared following review of the previous task list supplemented by pertinent career ladder publications and was refined through interviews with 18 Subject-Matter Experts (SMEs) at nine operational bases and one training site. The inventory contains 950 tasks grouped into 16 duty areas, as well as background questions concerning job title; time in career field and present job; job satisfaction; and base and command of assignment. Background information also included primary and duty AFSC; paygrade; equipment maintained in the respondent's present job; tools and equipment used in the respondent's present job, and electronics principles used in the respondent's present job.

<u>BASE</u>	<u>REASON FOR VISIT</u>
Sheppard AFB TX	Technical Training School
Eglin AFB & Tyndall AFB, FL	Hot climate; Silver Flag – unique mobility equipment
Ellsworth AFB, SD	Cold climate
McGuire AFB, NJ	Refrigerants
Cheyenne Mt. AFB & Schriever AFB, CO	Unique heating systems

Others contacted included the Air Force career field manager (CFM), major command (MAJCOM) functional managers, career field CDC writer, ABR course manager and course supervisor, and the AETC Training Manager. The resulting JI contained a comprehensive task listing, as well as biographical and background sections requesting such information as job title, work or functional area, base of assignment, MAJCOM, and organizational level.

Survey Administration

From March 1999 through June 1999, base training offices at operational bases worldwide, and Air National Guard (ANG) and Air Force Reserve Command (AFRC) units, administered the inventory to all eligible DAFSC 3E1X1 personnel. All assigned 3-, 7-, and 9-skill level members were eligible, excluding the following: (1) hospitalized personnel; (2) personnel in transition for a permanent change of station; (3) personnel retiring within the time the inventories were administered to the field; and (4) personnel who had been in their present jobs for less than six weeks. Participants were selected from a computer-generated mailing list obtained from personnel data tapes maintained by Air Force Personnel Center, Randolph AFB TX.

Each respondent first completed the identification and biographical/background information sections, then checked each task performed in his or her present job. After checking the tasks

performed, each individual rated those tasks he or she had checked on a 9-point scale showing relative time spent on that task, compared to other tasks performed. The ratings ranged from 1 (very small amount time spent) to 9 (very large amount time spent).

To determine relative time spent for each task, all of the incumbent's ratings are assumed to account for 100 percent of time spent on the job and are summed. Each task rating is then divided by the total task ratings and multiplied by 100 to provide a relative percentage of time spent on each task.

Survey Sample

All eligible members were surveyed in an effort to ensure that the sample reflected an accurate representation across MAJCOMs and paygrades. Table 1 shows the distribution of the survey sample by MAJCOM, while Tables 2, 3, and 4 reflect the survey distribution by paygrade groups for AD, ANG, and AFRC personnel, respectively. All additional tables referenced in the text of this OSR (Tables 5 through 49) can be found in Appendix B.

Task Factor Administration

Job descriptions alone do not provide sufficient data for making decisions about career ladder documents or training programs. Task factor information is needed for a complete analysis of the career ladder. To obtain the needed task factor data, selected senior AFSC 3E1X1 personnel (generally E-6 or E-7 craftsmen) also completed a second booklet for either training emphasis (TE) or task difficulty (TD). The TE and TD disks were processed separately from the JIs. This information is used in a number of analyses discussed in more detail within this report.

Training Emphasis (TE). Training emphasis is defined as the degree of emphasis that should be placed on each task for structured training of first career field job personnel. Structured training is defined as resident technical schools, field training detachments, mobile training teams, formal on-the-job training (OJT), or any other organized training method. Twenty experienced AFSC 3E1X1 Active Duty (AD) noncommissioned officers (NCOs) rated the tasks in the inventory on a 9-point scale ranging from 1 (extremely low) to 9 (extremely high training emphasis). Overall agreement among these raters was very good. The average TE rating for this study is 2.54, with a standard deviation of 2.43. Tasks with a TE rating of 4.97 or greater are considered important to train new AFSC 3E1X1 personnel to perform.

Task Difficulty (TD). Task difficulty is defined as the amount of time needed to learn to perform each task satisfactorily. Twenty-six experienced AFSC 3E1X1 NCOs rated the difficulty of the tasks in the inventory using a 9-point scale ranging from 1 (extremely low difficulty) to 9 (extremely high difficulty). Interrater agreement among these respondents was likewise very good. TD ratings are normally adjusted so that tasks of average difficulty have a value of 5.00 and a standard deviation of 1.00. Any task with a difficulty of 6.00 or greater is therefore considered difficult to learn.

When used in conjunction with the primary criterion of percent members performing, TE and TD ratings can provide insight into the appropriate training requirements for personnel in their first career field job. Such insights may suggest a need for lengthening or shortening portions of instruction supporting AFSC entry-level jobs.

TABLE 1
MAJCOM REPRESENTATION OF TOTAL SAMPLE

<u>COMMAND</u>	<u>PERCENT OF ASSIGNED*</u>	<u>PERCENT OF SAMPLE</u>
AMC	8	9
ACC	17	20
USAFE	4	5
PACAF	8	10
AETC	6	10
AFSPC	4	6
AFMC	9	11
AFSOC	1	1
USAFA	**	1
AIA	1	1
ANG	30	17
AFRC	12	9
TOTAL ASSIGNED		3,504
TOTAL ELIGIBLE		3,155
TOTAL IN SAMPLE		1,398
PERCENT OF ASSIGNED IN SAMPLE		40%
PERCENT OF ELIGIBLE IN SAMPLE		44%

* As of March 1999

** Denotes less than 1percent

TABLE 2
PAYGRADE DISTRIBUTION OF
AD SAMPLE

<u>PAYGRADE</u>	<u>PERCENT OF ASSIGNED*</u>	<u>PERCENT OF SAMPLE</u>
E-1 -- E-4	52	56
E-5	25	25
E-6	11	11
E-7	10	7
E-8	2	1
E-9	0	0

* As of March 1999

TABLE 3
PAYGRADE DISTRIBUTION OF
ANG SAMPLE

<u>PAYGRADE</u>	<u>PERCENT OF ASSIGNED*</u>	<u>PERCENT OF SAMPLE</u>
E1 -- E-4	30	26
E-5	30	34
E-6	24	23
E-7	12	13
E-8	4	3
E-9	0	0

* As of March 1999

TABLE 4
PAYGRADE DISTRIBUTION OF
AFRC SAMPLE

<u>PAYGRADE</u>	<u>PERCENT OF ASSIGNED*</u>	<u>PERCENT OF SAMPLE</u>
E1 -- E-4	17	15
E-5	30	28
E-6	28	24
E-7	16	23
E-8	8	10
E-9	1	0

* As of March 1999

CAREER LADDER STRUCTURE

The first step in the analysis process is to identify the structure of the career ladder in terms of the jobs performed by the respondents. The Comprehensive Occupational Data Analysis Program (CODAP) assists by creating an individual job description for each respondent based on the tasks performed and relative amount of time spent on these tasks. The CODAP automated job clustering program then compares all the individual job descriptions, locates the two descriptions with the most similar tasks and time spent ratings, and combines them to form a composite job description. In successive stages, CODAP either adds new members to this initial group or forms new groups based on the similarity of tasks and time spent ratings.

The basic group used in the hierarchical clustering process is the Job. When two or more jobs have a substantial degree of similarity in tasks performed and time spent on tasks, they are grouped together and identified as a Cluster. The job structure resulting from this grouping process (the various jobs within the career ladder) can be used to evaluate the changes that have occurred in the AFSCs since the previous OSR. The above terminology will be used in the discussion of the AFSC 3E1X1 career ladder.

Overview of Specialty Jobs

Based on the analysis of tasks performed and the amount of time spent performing each task, one cluster and three jobs were identified within the HVAC/R career ladder. Figure 1 shows the jobs performed by AFSC 3E1X1 personnel, and a description of the career ladder structure follows.

A listing of the clusters and jobs is provided below. The stage (STG) number shown beside each title references computer-printed information; the letter "N" represents the number of personnel in each group.

- I. GENERAL HVAC/R CLUSTER (STG061, N = 1,127)
 - A. HVAC/R Generalist Job
 - B. HVAC/R Junior Generalist Job
 - C. Electrical Components and Circuits Job
 - D. Steam and Hot Water Distribution Systems Job
- II. MOBILITY/CONTINGENCY JOB (STG165, N = 17)
- III. AIR AND WATER DISTRIBUTION SYSTEMS JOB (STG163, N = 13)
- IV. SUPERVISOR JOB (STG179, N = 83)

The respondents forming these groups account for 89 percent (1,240 out of 1,398) of the survey sample. The remaining 11 percent were performing tasks that did not group clearly with any of the other defined jobs.

Group Descriptions

The following paragraphs contain brief descriptions of the cluster and three jobs identified through the career ladder structure analysis. Tables in Appendix A list representative tasks performed by members of the cluster and jobs. Table 5 (Appendix B) displays time spent on duties by all the members of these career ladder jobs, while Tables 6, 7, and 8 give the same information for AD, ANG, and AFRC personnel, respectively. Table 9 provides demographic information for each cluster and job discussed within this report, while Tables 10, 11, and 12 provide demographic information for AD, ANG, and AFRC groups, respectively. When Total Active Federal Military Service (TAFMS), Time in Present Job (TIPJ), and Time in Career Field (TICF) data are given in the group descriptions below, information concerning ANG and AFRC is not included because these personnel measure accrued time differently from AD personnel.

Another way to illustrate these jobs is to summarize tasks performed into groups of Task Modules (TMs). This allows for a very concise display of where job incumbents spend most of their time and develops a comprehensive overview of each job. Each cluster/job description

**IDENTIFIED JOB STRUCTURE AND PERCENTAGES OF
TOTAL SURVEY SAMPLE**

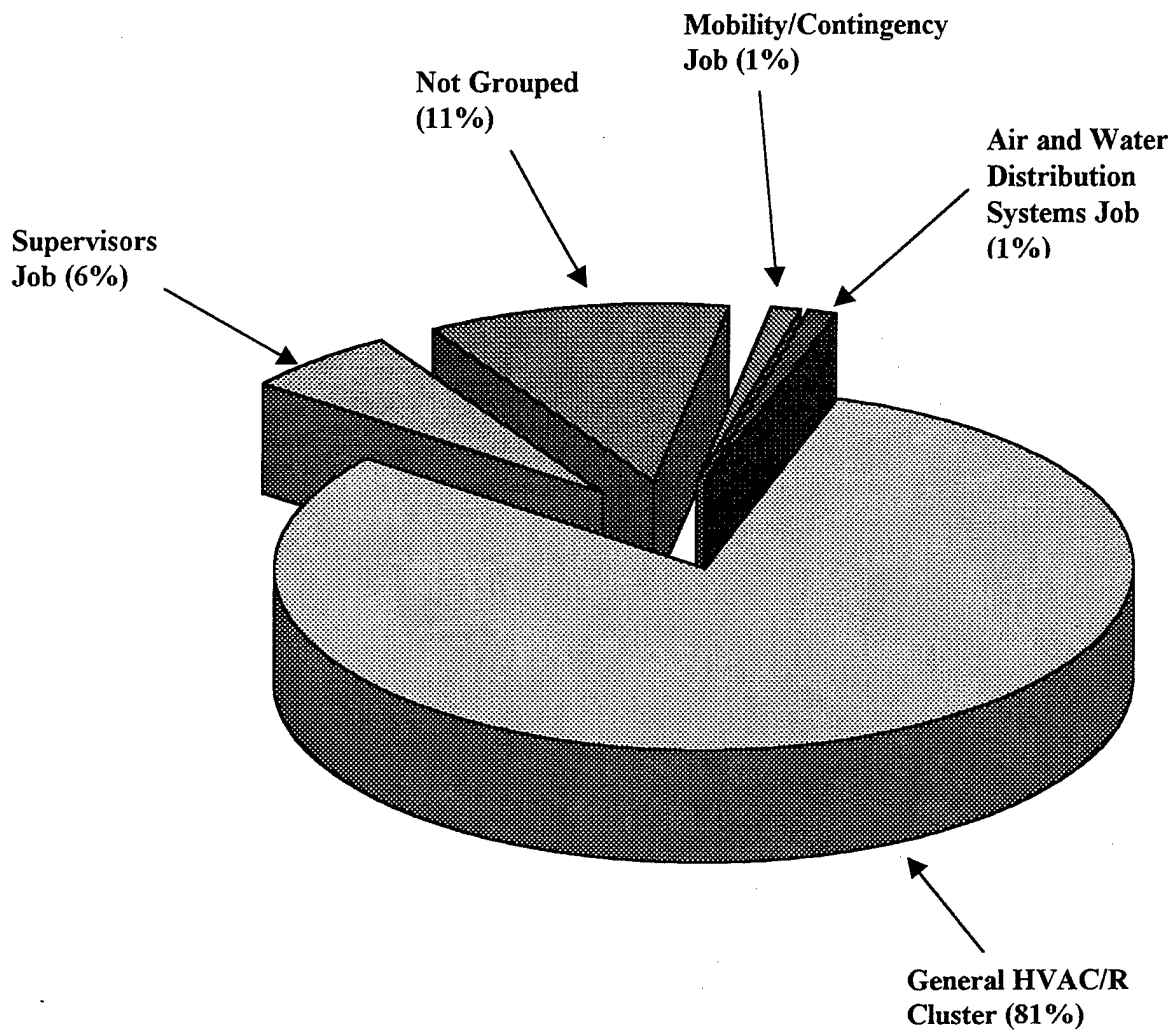


FIGURE 1

includes a display of related TMs. This display shows the number of tasks included in a module, the average percent time spent on that module, and an average percent of members performing the particular TM. These modules were identified through CODAP coperformance clustering, which calculates the probability that members who perform one task will also perform a second task or group of related tasks. Representative TMs are listed as part of the job description. A complete list of TMs is presented in Appendix C.

I. GENERAL HVAC/R CLUSTER

(STG061). The 1,127 members of this cluster comprise 81 percent of the career field. The cluster is extremely homogeneous, although four distinct jobs are still identifiable within the cluster. These jobs will be discussed below. Considerable overlap exists between the duties in which these members spend the bulk of their work time, although they are distinguished among themselves by particular emphasis on a particular duty area. This duty area also provides the job with its name. Apart from this, further differences are more a matter of examining the mixture of time spent within duties and particular tasks performed within duties than of finding sharp distinctions between the types of work they perform. Members perform an average of 379 tasks, spending (see Table 5) 23 percent of their work time Maintaining Air and Water Distribution Systems (Duty Area B), 12 percent of their time Maintaining HVAC/R Electrical Systems and Circuitry (Duty Area C), 12 percent of their time on Duty Area G tasks (Maintaining Air Conditioning and Refrigeration Systems), and another 9 percent of their time Performing General Heating, Ventilating, Air Conditioning, and Refrigeration Activities (Duty Area A). Seventeen percent (189 members) are ANG and another 7 percent (83 members) are AFRC. Nearly one-third (32 percent) are 3-skill level and half (50 percent) are 5-skill level. Eighteen percent hold paygrade E-3, twenty-six percent hold E-5, 14 percent hold E-6, 6 percent hold E-7, and 1 percent hold E-8.

GENERAL HVAC/R CLUSTER			
	AD	ANG	AFRC
Number of members	855	189	83
Average number of tasks performed	396	303	374
Average time in present job	3.3 yrs	N/A	N/A
Average time in career field	6.8 yrs	N/A	N/A
TAFMS	7.4 yrs	N/A	N/A
Predominant paygrade	E3/ E4/ E5	E4/ E5/ E6	E5/ E6/ E7

Representative tasks (those tasks which the highest percentages of members report performing) for this cluster include the following:

- Clean air filters
- Adjust or align belt tensions
- Perform electrical troubleshooting on air-conditioning systems
- Remove or replace belts or belt guards

- Inspect fuses or circuit breakers
- Remove or replace fuses
- Inspect electrical wiring or connections
- Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping
- Inspect drive belts
- Reset circuit breakers
- Inspect electrical motors
- Locate refrigerant leaks using soap solutions

Representative TMs for this cluster include the following:

TM	Module Title	No. of Tasks	Percent Time Spent	Percent Members Performing
0002	Service HVAC	85	24	80
0001	Contingencies	125	9	24
0007	HVAC Electrical/Mechanical Controls	58	8	55
0003	Install/Remove Mechanical Components	39	8	69
0008	Troubleshoot AC Controls	43	6	57

Cluster members therefore spend nearly half of their work time performing tasks in a few core task modules for this specialty, and nearly a quarter spend part of their time on mobility/contingency tasks.

Seventy-nine percent of the members of this cluster (890) are grouped together in the HVAC/R Generalist job. These members perform an average of 442 tasks spread across the core duty areas of the specialty, but also devote some amount of time to each of the other duty areas as well. Overall, they closely resemble the entire cluster in terms of grade structure, TAFMs, task performance, etc., because they represent such a large proportion of the total cluster membership. Representative tasks for this job include the following:

- Clean air filters
- Perform electrical troubleshooting on air-conditioning systems
- Adjust or align belt tensions
- Remove or replace fuses
- Remove or replace belts or belt guards
- Inspect fuses or circuit breakers
- Inspect electrical wiring or connections
- Inspect drive belts
- Perform electrical troubleshooting on refrigeration systems, other than controls
- Clean air handlers
- Inspect air handler fans

- Inspect motor or fan bearings

The 85 members of the next-largest job in the cluster, the HVAC/R Junior Generalist job, also perform much of the core work of the specialty, essentially a subset of the tasks performed by the members of the HVAC/R Generalist job. They are distinguished from the larger job by their relative lack of seniority and the relatively restricted scope of their work activities. That is, they report performing many fewer tasks, an average of only 146 tasks compared to 442 for the larger job; in addition, AD members average 32.0 month TICF and 53.3 months TAFMS, as opposed to 51.5 and 85.2 months TICF and TAFMS, respectively, for AD members of the more senior job. Those tasks that they do perform overlap completely with those performed by members of the HVAC/R Generalist job. Their most widely performed tasks are as follows:

- Clean air filters
- Adjust or align belt tensions
- Clean air handlers
- Inspect air handler fans
- Remove or replace belts or belt guards
- Service fans or blowers
- Inspect drive belts
- Perform electrical troubleshooting on air-conditioning systems
- Inspect fuses or circuit breakers
- Inspect motor or fan bearings
- Perform RWP inspections on fan-coil units
- Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping
- Inspect water pumps
- Remove or replace fuses

Next is the Electrical Components and Circuitry Job. Slightly over half (51 percent) of these 45 members are ANG, although none are AFRC. The name for this job is derived from the fact that they specialize somewhat in Maintaining HVAC/R Electrical Components and Circuitry (Duty Area C), spending nearly a quarter of their work time (23 percent) on these activities. They also spend considerable worktime (17 percent) Performing Mobility and Contingency Activities (Duty Area L). Nevertheless, they do much of the same general work across duty areas as all the other members of this cluster. They perform an average of 123 tasks. Nine percent hold paygrade E-3, 29 percent hold E-4, 42 percent hold E-5, and 20 percent hold E-6. Seventy-one percent are 5-skill level, and another 22 percent are 7-skill level. The most widely performed tasks for these members include the following:

- Perform electrical troubleshooting on air-conditioning systems
- Practice personal hygiene techniques
- Clean air filters
- Inspect electrical wiring or connections
- Inspect fuses or circuit-breakers

- Perform start-up or shut-down procedures for mobile refrigeration or air-conditioning equipment
- Inspect electrical motors
- Locate refrigerant leaks using soap solutions
- Remove or replace electrical wiring
- Reset circuit breakers
- Remove or replace fuses
- Inspect gauges or lines

The final job in this cluster, the Steam and Hot Water Distribution System Job, has 15 members who perform an average of 208 tasks. Slightly more than a quarter (26 percent) of their worktime is devoted to tasks in Duty Area F, Maintaining Steam and Hot Water Generating Equipment, and another 21 percent is spent on tasks in Duty Area B, Maintaining Air and Water Distribution Systems. They also spend lesser amounts of time on the general HVAC/R activities that characterize the other jobs in this cluster. Their most widely performed tasks include the following:

- Inspect steam boilers
- Prepare boilers for inspections
- Inspect or read meters
- Fill steam heating system boilers
- Blow down steam heating system boiler or water columns
- Inspect or wash down steam heating system boiler water sides
- Inspect gas burners
- Check steam boiler water levels
- Light-off steam heating system boilers
- Inspect fuel systems for leaks
- Drain steam heating system boilers
- Check steam heating system boiler tricocks

II. MOBILITY/CONTINGENCY JOB (ST165).

These incumbents indicate (see Table 5) spending 41 percent of their worktime Performing Mobility and Contingency Activities (Duty Area L). They also report spending 11 percent of their time on Management and Supervisory tasks (Duty Area M), 10 percent on PRIME BEEF tasks (Duty Area K), and 10 percent on tasks in Duty Area A (Performing General Heating, Ventilating, Air-Conditioning, and Refrigeration (HVAC/R) Activities. They perform an average of 69 tasks. Forty-one percent of these members (7) are AFRC, and another 29 percent (5) are ANG. Sixty-five percent (11 members) hold paygrade E-5, 24 percent hold E-7, and the other two members hold E-4.

MOBILITY/CONTINGENCY JOB			
	AD	ANG	AFRC
Number of members	5	5	7
Average number of tasks performed	67	64	75
Average time in present job	5.5 yrs	N/A	N/A
Average time in career field	10.5 yrs	N/A	N/A
TAFMS	14.0	N/A	N/A
Predominant paygrade	E-5/ E-7	E-5	E-5

These are the most-performed tasks for members of this job:

- Fire weapons for qualification, such as M-16 rifles or 9mm pistols
- Practice personal hygiene techniques
- Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols
- Perform or practice first-aid lifesaving techniques
- Inspect mobility bags or kits
- Perform chemical warfare agent decontamination procedures
- Perform cover and concealment techniques for work party security
- Perform camp security
- Practice self-protection from extreme weather
- Identify and report chemical warfare agents
- Perform military field sanitation techniques
- Perform camouflage procedures

Representative TMs of this cluster include the following:

TM	Module Title	No. of Tasks	Percent Time Spent	Percent Members Performing
0001	Contingencies	125	53	24
0038	Service HVAC	85	17	18
0033	Management & Supervision	39	13	19
0040	WIMS	65	5	4

Thus, these members as a whole spend more than half their worktime on Mobility/Contingency tasks. Although they also perform tasks in a number of additional TMs, no other TM accounts for more than 2 percent of their time.

III. AIR AND WATER DISTRIBUTION SYSTEM JOB (STG163).

The members of this job report performing an average of only 65 tasks, spending half (50 percent) of their worktime on tasks (see Table 5) in Duty Area B (Maintaining Air and Water Distribution Systems). Almost all of the rest of their time (an additional 39 percent) is spent in Duty Area A (Performing General Heating, Ventilating, Air-Conditioning, and Refrigeration (HVAC/R) Activities). They are, therefore, distinguished from true generalists by performing primarily this circumscribed set of tasks. As a group, they are relatively junior: 31 percent (4 members) hold paygrade E-2, 15 percent (2 members) hold each of paygrades E-3 and E-4, 23 percent (3 members) hold E-5, while only one member holds each of paygrades E-5 and E-6. For the most part, then, this is an entry-level job, although a few more senior members are also performing the same limited set of tasks.

AIR AND WATER DISTRIBUTION SYSTEM JOB			
	AD	ANG	AFRC
Number of members	10	2	1
Average number of tasks performed	66	55	72
Average time in present job	2.5 yrs	N/A	N/A
Average time in career field	6.2 yrs	N/A	N/A
TAFMS	6.5	N/A	N/A
Predominant paygrade	E-2	E-4/ E-5	E-5

The most-performed tasks include these:

- Adjust or align belt tensions
- Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment
- Fabricate or bend copper tubing
- Clean strainers
- Measure and cut pipe by hand
- Measure and cut pipe by machine
- Thread pipe by machine
- Thread pipe by hand
- Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping
- Adjust dampers
- Install check valves
- Adjust safety relief valves

Representative TMs of this cluster include the following:

TM	Module Title	No. of Tasks	Percent Time Spent	Percent Members Performing
0002	Service HVAC	85	39	26
0003	Install/Remove Mechanical Components	39	22	36
0011	Adjust Steam Heating Valve	5	5	51
0007	HVAC Electrical/Mechanical Controls	58	5	6

These TMs reflect these members' basic similarity to the General HVAC Cluster, but also show the differences in emphasis that set them apart from the majority of the specialty.

IV. SUPERVISOR JOB (STG179). The 83 members of this job report spending 40 percent of their worktime (see Table 5) on tasks in Duty Area M, Performing Management and Supervisory Activities. Their job titles indicate that they span a range from lower- to high-level management positions. They also spend 14 percent of their time on Mobility and Contingency Activities (Duty Area L) and 12 percent of their time on Training Activities (Duty Area N). More than half (52 percent) hold paygrade E-7. From among the others, four percent (three members) hold paygrade E-4, 12 percent (10 members) hold E-5, 19 percent (16 members) hold E-6, and 13 percent (11 members) hold E-8. AD members average 17.0 years TAFMS, by far the highest in the career field. There are also 14 ANG members (17 percent of the job) and 11 AFRC members (13 percent).

SUPERVISOR JOB			
	AD	ANG	AFRC
Number of members	58	14	11
Average number of tasks performed	151	162	151
Average time in present job	2.6 yrs	N/A	N/A
Average time in career field	15.5 yrs	N/A	N/A
TAFMS	17.0	N/A	N/A
Predominant paygrade	E-7	E-7	E-6/ E-8

The most-performed tasks for this job include the following:

- Interpret policies, directives, or procedures for subordinates
- Conduct supervisory performance feedback sessions
- Write recommendations for awards and decorations
- Determine training requirements
- Review budget requirements
- Write or endorse military performance reports
- Initiate actions required due to substandard performance of personnel
- Allocate funds
- Counsel subordinates concerning personal matters
- Review drafts of supplements or changes to directives, such as policy directives, instructions, or manuals
- Review outgoing correspondence or messages

- Review work priorities
- Write or endorse civilian performance appraisals
- Conduct general meetings, such as staff meetings, briefings, conferences, or workshops

Representative TMs of this job include the following:

TM	Module Title	No. of Tasks	Percent Time Spent	Percent Members Performing
0033	Management & Supervision	39	33	80
0040	WIMS	65	25	43
0001	Contingencies	125	22	27

These TMs account for 80 percent of these members' work time, reflecting the specific focus of their work.

Comparison of Current Group Descriptions to Previous Study

It is apparent that this career field has become more homogenous since the last OSR appeared. Although the remnants of the cluster and all the jobs identified in the previous OSR are still apparent in the present analysis, most are not as sharply defined or distinguished from others as the previous analysis revealed.

Table 13 summarizes the differences between the results of the previous and present OSRs. The primary observation is that the career field appears to have grown more homogeneous, with many members' work becoming more similar. Even those who tend to specialize mix their specialization area with more general technical work. For example, the previous OSR identified a General HVAC/R Technician Cluster, similar to the present General HVAC/R Cluster, but only 52 percent of career field members were included in that cluster, as opposed to 81 percent in the present analysis. This is likely because the work of some members of previously independent jobs has become more similar to that performed by members of the cluster, and they have been "absorbed" into the cluster. In other cases, the entire previous independent job now appears as a job inside the General HVAC/R Cluster because the members no longer meet the criteria for identification as an independent job, but still are identifiable as specialized within the large cluster. That is, some of the identity and unique nature of the job has been retained, while at least some of the work these incumbents do overlaps more with that performed by the bulk of career field members than it did before. The previously-independent Steam/Hot Water Job provides one example, appearing now within the large cluster, while the previous Entry-Level Job appears now to be divided between the present independent Air and Water Distribution System Job and the HVAC/R Junior Generalist Job embedded within the General HVAC/R Cluster. This suggests that some entry-level members continue to do a set of rather unique tasks, while others perform a

subset of the overall tasks of the cluster. The present Supervisor Job is considerably smaller than the previous corresponding job, suggesting either that some supervisory personnel have since taken on additional technical responsibilities and thus been absorbed into the cluster, or that there has simply been a reduction in the number of supervisory positions authorized. In addition, a separate Functional Manager Job in the previous OSR is no longer identifiable apart from the present Supervisor Job.

The present independent Mobility/Contingency Job closely corresponds to the previous Mobility Job, but the present analysis identified nothing corresponding to either the Steam Plant Job or the Quality Assurance (QA) Job from the previous analysis. Career-ladder member SMEs explain the absence of the Steam Plant Job by saying that this work is now contracted out, but it is unclear why no QA Job is present. Close inspection revealed only one member in the sample with a QA job title, and this member fell within the Mobility/Contingency Job. It is possible that very few members are doing exclusively or primarily QA work at present, and that they did not respond to the survey, but it is also possible that members now perform primarily technical work with additional QA responsibilities.

Summary

In summary, analysis reveals that the HVAC/R career ladder is extremely homogeneous. Structure analysis identified one cluster that includes 81 percent of the AFSC members, and three jobs. If anything, indications are that this AFSC has become more homogeneous since the last OSR, with more members performing a more diverse set of tasks than previously. This conclusion results from the fact that many formerly independent jobs, while maintaining their identity to some extent, now resemble each other closely enough to be identifiable only as jobs embedded within a large cluster.

SKILL AND EXPERIENCE ANALYSIS

Analysis of DAFSC Groups

An analysis of DAFSC groups in conjunction with the analysis of the career ladder structure is an important part of each occupational survey. DAFSC analysis examines differences in tasks performed between skill levels. This information may then be used to evaluate how well career ladder documents, such as AFMAN 36-2108 *Airman Classifications*, reflect what career ladder personnel are actually doing in the field.

ACTIVE DUTY

AFSC 3E1X1. The distribution of AFSC 3E1X1 AD skill-level groups across career ladder clusters and jobs is displayed in Table 14. As can be seen, all 3-skill level who were grouped

within a cluster or job fell within either the General HVAC/R Cluster or the Air and Water Distribution Systems Job, which is comprised mostly of entry-level personnel. By the 5-skill level, some members are present in each job, and a number have assumed sufficient supervisory responsibilities to fall within the Supervisor Job. Still, more than 80 percent of these members are in the General HVAC/R Cluster, performing the core technical work of the specialty. The same may be said of 7-skill level members, although the proportion of Supervisor Job members has grown substantially, and by the 9-skill level, all but one member is identified with the Supervisor Job.

Table 15 offers a different perspective by displaying the relative percent time spent on each duty across skill-level groups. As expected, 3-skill level personnel have little to do with management and supervisory activities (Duty Area M), training activities (Duty Area N), or administrative, supply, or Prime BEEF tasks (Duty Areas O, P, and K, respectively), and this pattern changes very little at the 5-skill level. On the other hand, 7-skill level members as a group devote nearly a quarter (24 percent) of their worktime to management and supervision, and although they continue to perform technical duties as well, the amount of time they devote to tasks in each of the technical duty areas has dwindled appreciably. DAFSC 3E191 personnel report spending more than half (55 percent) of their time performing tasks related to Duty Area M and another 14 percent of their time performing Duty Area L (Performing Mobility and Contingency Activities) tasks, with 7 percent of their time devoted to Prime BEEF tasks. Overall, this pattern indicates that career progression in this specialty is typical, with a continuous increase in supervisory, management, and administrative activities and a corresponding decrease in technical work as skill level increases. Specific skill-level group discussions are presented below.

Descriptions and Comparisons of Skill-Level Groups

DAFSC 3E131. Table 16 shows the top tasks that AD DAFSC 3E131 personnel are performing. Not surprisingly, these tasks reflect the basic nature of their work – soldering fittings and working with copper tubing, air filters, belts, fuses, strainers, and the like.

DAFSC 3E151. Table 17 shows the top tasks that AD DAFSC 3E151 personnel are performing. These most-performed tasks show essentially no difference between 3- and 5-skill level work. Table 18 tells a somewhat different story, however. This table shows the tasks that best distinguish between 3- and 5-skill level members, that is, those tasks from the entire inventory that show the greatest differences between groups in the percent of members performing them. These differences reflect the typical increase in supervisory/management activities and the decrease in technical activities at the 5-skill level, although close inspection shows that these shifts are not major. Clearly, 5-skill level personnel are doing much the same jobs as are 3-skill level personnel – only one technical task performed widely at the 3-skill level is no longer widely-performed at the 5-skill level -- with supervisory duties supplementing, rather than replacing, their technical work. The supervisory tasks do not yet constitute a major part of their work.

DAFSC 3E171. Table 19, which shows the top tasks performed by AD 7-skill level personnel, shows clearly that management and supervision tasks are beginning to comprise a considerable amount of these member's duties. On the other hand, they continue to do considerable technical

work. This is reflected in the information in Table 20, which shows the tasks that best distinguish between 5- and 7-skill level members. A number of technical tasks are now performed more widely by 5-skill level members, but a considerable proportion of 7-skill level members still perform these tasks.

DAFSC 3E191. Tables 21 and 22 show that AD 9-skill level personnel are distinguished from others by their appreciable decrease in technical tasks and their primary involvement in management, contingency, and PRIME BEEF tasks. Table 21, in particular, shows that these members are assuming more responsibility for higher-level management tasks, as opposed to direct supervisory activities.

ANG

Table 23 shows the distribution of AFSC 3E1X1 skill-level groups across career ladder clusters and jobs for ANG personnel, while Table 24 shows the time spent on the various Duties by skill-level groups. As with AD members, ANG personnel tend to concentrate in the General HVAC/R Cluster at lower skill levels, progressing into management and supervisory jobs by the 9-skill level. It is mildly surprising that ANG members are nearly absent from the Mobility/Contingency Job, since for many career fields it is typical for ANG personnel to concentrate on Mobility/Contingency tasks.

DAFSC 3E131. There are two 3-skill level members in the ANG sample, although it is unusual for the ANG to have 3-skill level members of non-lateral career fields at all. Because of the small number of such members, however, no further analysis or comparisons regarding these personnel are presented.

DAFSC 3E151. Table 25 lists representative tasks for 3E151 ANG personnel. Although their work clearly resembles that of 5-skill level AD members, the data also reflect a clear shift toward mobility/contingency work, as well as greater emphasis on working with electrical components and circuits. Again, it is surprising that more of these members aren't found within the Mobility/Contingency Job, but their residual concentration on the core technical work of the career field dominates their mobility/contingency activities.

DAFSC 3E171. Table 26 shows representative tasks for the ANG 7-skill level group, while Table 27 shows the tasks that best distinguish between the 5- and 7-skill level groups. Once again, the two groups appear to be similar in their primary work – the tasks listed in Tables 25 and 26 are very similar. Table 27, however, shows the increased supervisory and training responsibilities of 7-skill level members relative to 5-skill level members.

DAFSCs 3E191. Table 28 lists representative tasks for 9-skill level ANG members and Table 29 shows the tasks that best distinguish them from 7-skill level members. The main distinction lies, not surprisingly, in the decreased emphasis on technical work and the increased emphasis on supervisory and management tasks among 9-skill level personnel, particularly upper-level

management activities. Additional increases in training and mobility/contingency tasks are also apparent.

AFRC

Table 30 shows the distribution of AFSC 3E1X1 skill-level groups across career ladder clusters and jobs for AFRC personnel, while Table 31 shows the time spent on the various Duties by skill-level groups. The picture that emerges is straightforward, in that the work performed by AFRC personnel resembles that of ANG members, mixing technical and mobility/contingency tasks, with increased involvement in PRIME BEEF and supervisory and managerial activities as they progress from the 5-skill level to the 9-skill level.

DAFSC 3E151. These members' similarity to their ANG 5-skill level counterparts is apparent in Table 32, which shows that the most widely-performed tasks for this DAFSC group involve a mixture of basic HVAC/R work and mobility/contingency tasks.

DAFSC 3E171. These members' continued involvement in both basic HVAC/R and mobility/contingency activities is reflected in Table 33, while Table 34 shows once again the increased supervisory/managerial responsibilities that distinguish between 5- and 7-skill level personnel.

DAFSCs 3E191. The picture that emerges for 3E191 AFRC members is similar to that for ANG 9-skill level members, in that they are mainly characterized by increased involvement in management/supervisory tasks, particularly the higher-level managerial tasks typically performed by 9-skill level personnel. This is clear from both Table 35, which lists representative tasks, and Table 36, which shows the tasks that differentiate between 7- and 9-skill level members.

TRAINING ANALYSIS

Occupational survey data are a source of information that can assist in the development or evaluation of relevant training programs for entry-level personnel. Factors used to evaluate entry-level HVAC/R training include the jobs that are being performed by first-term personnel (i.e., those with 1-48 months TAFMS), the overall distribution of first-enlistment personnel across career ladder jobs, and the percent of first-term members who perform specific tasks, as well as ratings of relative TE and TD.

First-Enlistment Personnel

In this study, there were 417 AD AFSC 3E1X1 members in their first enlistment (1-48 months TAFMS). This represents 27 percent of the total survey sample and 37 percent of the AD survey sample. Figure 2 illustrates the distribution of these members across specialty jobs. All

**DISTRIBUTION OF AFSC 3E1X1 FIRST CAREER FIELD JOB
PERSONNEL ACROSS SPECIALTY JOBS**

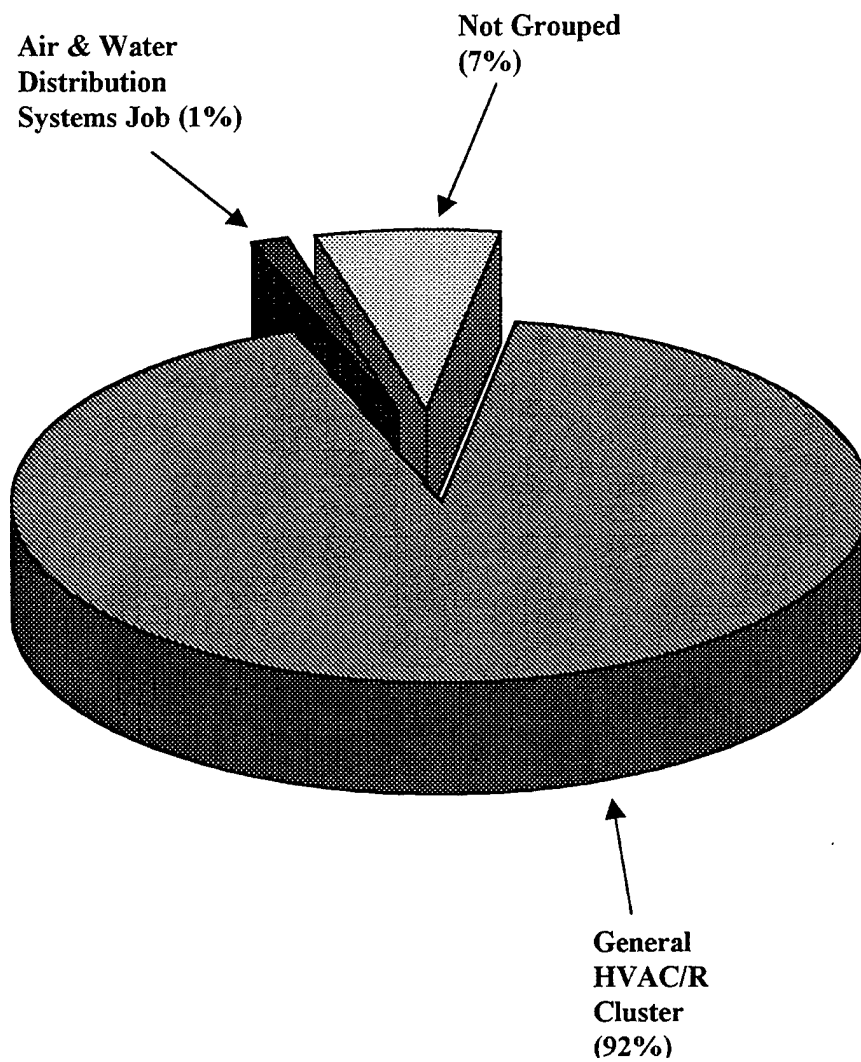


FIGURE 2

first-enlistment personnel who are grouped fall in either the General HVAC/R Cluster or the Air & Water Distribution Systems Job. Table 37 shows the relative percent of time spent across duties by first career field job 3E1X1 members. Not surprisingly, they closely resemble the 3-skill level group in this regard. The largest portion of their time (26 percent) is spent performing tasks related to Duty Area B (Maintaining Air and Water Distribution Systems), 13 percent is spent in Duty Area C (Maintaining HVAC/R Electrical Components and Circuitry), and another 12 percent is devoted to tasks in Duty Area G (Maintaining Air Conditioning and Refrigeration Systems). Representative tasks for these personnel are shown in Table 38.

Table 39 lists the HVAC/R control systems operated or maintained by first-enlistment AD personnel, while Tables 40 and 41 list, also for first-enlistment AD personnel, the equipment that these members maintain and the tools/equipment they use in their work, respectively. All three tables give the percent of respondents who indicated that they operate/maintain/use the particular item of equipment.

As a final point in this section, technical school personnel who aided in constructing the job inventory were particularly interested in information on tasks involving relatively new Direct Digital Control (DDC) systems, such as the percent of first-enlistment personnel performing such tasks. Anecdotal evidence is that ABR course graduates are now starting to work on DDC systems in substantial numbers, although the ABR course presently teaches students little about DDC systems, and the data are needed to examine whether the level of performance justifies including more about DDC systems in the initial skills course.

The inventory contained three tasks concerning DDCs. The following table lists each of those tasks, along with the corresponding average TE and TD ratings (for information on TE and TD ratings, see Task Factor Administration in the **SURVEY METHODOLOGY** section of this report), and the percent of first-job, first-enlistment, and 3-skill level personnel reporting that they perform the task.

Task #	Task Title	TE	TD	First Job	First Enl.	3-lvl
308	Install Direct Digital Control Systems	2.26	8.25	28	33	31
333	Operate DDC Systems	3.65	7.86	29	34	32
356	Remove or replace DDC sensors	3.35	5.76	27	32	30

Training Emphasis (TE) and Task Difficulty (TD) Data

TE and TD data are secondary task factors that can help training development personnel decide which tasks to emphasize for entry-level training. These ratings, based on the judgments of senior career ladder NCOs at operational units, provide training personnel with a rank-ordering of those tasks considered important for airmen with 1-48 months TAFMS training (TE) and a

measure of the relative difficulty of those tasks (TD). When combined with data on the percentages of first career field job personnel performing tasks, comparisons can be made to determine whether adjustments to training are necessary. For example, tasks receiving high ratings on both task factors (TE and TD) generally warrant resident training if they are also performed by a moderate-to-high percentage of members performing. Those tasks receiving high task factor ratings but that are performed by relatively low percentages of members may be more appropriately planned for OJT programs within the career ladder. Low task factor ratings may highlight tasks best omitted from training for new personnel. These task factors are, of course, not the only ones to weigh in making training decisions; the percentages of personnel performing the tasks, command concerns, and criticality of the tasks must also be considered carefully.

To assist training development personnel, AFOMS developed a computer program that uses these task factors and the percentage of first job personnel performing tasks to produce Automated Training Indicators (ATI). ATIs correspond to training decisions listed and defined in the Training Decision Logic Table found in Attachment 1, AETCI 36-2601. ATIs allow training developers to quickly focus attention on those tasks, which are most likely to qualify for resident course consideration.

A total of 100 TE booklets were mailed, all to senior-level AD personnel, and 86 were returned. Of these, 43 were acceptable according to a number of standard criteria (such as a minimum number of tasks rated). A total of 100 TD booklets were mailed, also all to senior AD personnel (some but not all of whom also provided TE ratings), and 79 were returned. The final sample included 59 raters. Analysis showed excellent overall agreement between raters with regard to both TE and TD ratings.

Table 42 lists examples of tasks that were assigned the highest average TE ratings along with the percent members performing those tasks by groups of 1-24 months and 1-48 months TAFMS, as well as 3-, 5- and 7-skill level groups.

Table 43 shows tasks that were assigned the highest average TD ratings, and also includes the percent members performing these tasks by groups of 1-24 months and 1-48 months TAFMS, and 3-, 5-, and 7-skill level groups. It is apparent that a number of the tasks with high TD ratings are also being performed by a substantial percentage (i.e., 25-35 percent) of target group members (first job, first assignment, and 3-skill level). This is somewhat unusual; in many career fields, the most difficult tasks are typically not performed until members reach the 7- and 9-skill levels. On the other hand, none of these tasks received particularly high TE ratings (note, for example, the lack of overlap between the tasks listed in Table 42 and those listed in Table 43). This is true not only for the tasks shown in Table 43, but for most of the tasks given high TD ratings which would not fit into Table 43 – the general pattern is high TD, relatively high percent performing among junior personnel, and relatively low TE).

This pattern suggests a possible problem. The general principle is that high TD tasks that are performed by substantial numbers of first-term members should receive structured training, unless other rational considerations override this rule of thumb. However, the TE ratings that many of these tasks received are not even above average. Anyone reviewing only the TE ratings would

see no reason to stress structured training for these tasks. The reasons for this are unclear. Respondents who provided TE ratings may not have realized the generally sizeable percentages of junior members performing these difficult tasks and therefore underestimated the need for early structured training. There may, of course, be perfectly good reasons for the relatively low TE ratings that are not apparent. Whatever the reasons, it may be that these tasks require structured training, although the TE ratings do not reflect it.

Full information concerning TE and TD ratings and ATIs for the entire task list can be found in the Training Extract that accompanies this OSR. For a more detailed explanation of TE and TD ratings, see Task Factor Administration in the **SURVEY METHODOLOGY** section of this report.

Specialty Training Standard (STS) Analysis

STS 3E1X1 was reviewed by comparing survey data to STS elements. Technical school personnel from the 366 TRS, Sheppard AFB TX matched JI tasks to appropriate STS sections and subsections. A complete computer listing displaying the percent members performing tasks and the TE and TD ratings for each task, where applicable, along with the STS matching, was forwarded to the technical school for their further review of training documents. STS elements with performance objectives were reviewed for TE, TD and percent members performing information, as stipulated in AETCI 36-2601, dated 5 July 1996. STS paragraphs containing general knowledge information, subject-matter knowledge requirements, or supervisory responsibilities were not reviewed.

Typically, STS elements that match tasks having sufficiently high TE and/or TD ratings and that are performed by at least 20 percent of personnel in appropriate skill-level groups should be included in the STS, unless other rational considerations argue against inclusion. Likewise, elements matched to tasks with less than 20 percent performing in all of these groups generally should not be included in the STS, unless other considerations argue for inclusion.

Survey data showed no clear evidence of any performance-coded STS elements performed by fewer than 20 percent of first-enlistment personnel. A handful of elements involving application of safety practices were matched to the task "Evaluate job hazards or compliance with Air Force Occupational Safety and Health (AFOSH) program". Few first-enlistment personnel (16 percent) responded that they perform this task, giving the appearance that several elements are not supported by OA data. Since common sense argues that first-enlistment personnel probably evaluate job safety hazards several times each workday, it appears more likely that respondents interpreted the task as indicating a formal sort of evaluation, such as a supervisor might perform. There are a few other, similar examples, but it appears that no performance-coded STS elements are truly unsupported by OA data.

On the other hand, a number of tasks which were not referenced to the STS were found to have sufficiently high TE, TD, and PMP to possibly justify inclusion in the STS. Examples of these tasks are given in Table 44. Table 44 also includes the DDC tasks that are of special interest to technical school personnel, even though none of them has a particularly high TE value.

A full listing will appear in the Training Extract produced from survey data and provided to Technical School personnel.

Plan of Instruction (POI) Analysis

In addition to the STS, the POI for a course may also have unsupported tasks (included in the course but performed by few first-term airmen). Personnel from the 366 TRS also matched JI tasks to related training objectives in the POI for the entry-level course. POI blocks, units of instruction, and learning objectives were then compared to the standard set forth in AETCI 36-2601, dated 5 July 1996. This document indicates that tasks trained in the course but not performed by at least 30 percent of first-enlistment members should be considered for elimination from the course, unless other rational considerations argue for inclusion. This is particularly so if TE ratings for the task are not high and TD ratings for the task are sufficiently high.

The ABR3E1X1 POI, however, is extremely well supported. As with the STS analysis, POI elements regarding safety hazard evaluation and maintenance of TO libraries were linked to tasks that relatively few first-job or first-term airmen report performing, but it is likely that these links depended on interpretations of the task statements which not all airmen would share.

JOB SATISFACTION ANALYSIS

An examination of job satisfaction indicators can give career ladder managers a better understanding of factors that may affect the job performance of career ladder airmen. Therefore, the survey booklet included attitude questions covering job interest, perceived utilization of talents and training, sense of accomplishment from work, and reenlistment intentions. The responses of the current sample were analyzed by making two comparisons. The first was a comparison among AD TAFMS groups of the AFSC 3E1X1 career ladder and a comparable sample consisting of other Support AFSCs surveyed in 1998 (Table 45). The second comparison (Table 46, 47, and 48 for AD, ANG, and AFRC respondents, respectively) was across specialty groups identified in the SPECIALTY JOBS section of the report.

Active Duty Job Satisfaction

Table 45 shows that, in general, AD members of the 3E1X1 career field are interested in and satisfied with their jobs, and that they derive a sense of accomplishment from their work. Across all TAFMS groups, members' job satisfaction indices exceed those for the comparable sample, with only a few exceptions. Most of the exceptions are not large enough to indicate morale problems, and one reflects mainly the greater retirement eligibility of senior members, relative to the comparison group.

Table 46 compares these job satisfaction indices between the previous (1996) and present surveys, also for AD members by TAFMS groups. It is apparent that across the board, indices for job interest, use of talents and training, and sense of accomplishment have all increased slightly. Nevertheless, reenlistment intentions show a fairly sharp downturn between survey years. Such a pattern probably reflects general dissatisfaction with the Air Force and the strong civilian job market more than any problems specific to this career field.

AD job satisfaction data by cluster and job groups are provided in Table 47, which also reflects the generally high level of job satisfaction. The overwhelming majority of members fall in the General HVAC/R Cluster, for which satisfaction indices are high and reenlistment intentions are at least fairly good. Lower satisfaction levels are apparent among members of the Mobility/Contingency Job and the Air & Water Distribution Systems Job, both of which have only a handful of AD members.

ANG Job Satisfaction

Only job satisfaction indications across the cluster and job groups are examined for ANG members (Table 48) because of lack of TAFMS data. The generally high satisfaction levels found for AD members are also found here. The only apparent exception, the Air & Water Distribution Systems Job, largely reflects the dissatisfaction of a single member.

AFRC Job Satisfaction

As with ANG, only job satisfaction indications across the cluster and job groups are examined for AFRC members (Table 49) because of lack of TICF data. Once again, very high satisfaction is apparent, with essentially no exceptions.

IMPLICATIONS

As explained in the **INTRODUCTION**, this survey was conducted primarily to ensure the availability of current data for use in guiding the development and evaluation of training and to support planned changes within this career ladder. Typical uses of OA data include reviewing the present AFMAN 36-2108 *Specialty Description* for accuracy and the present STS and POI for adequacy. The findings in this OSR come directly from survey data collected from 3E1X1 personnel worldwide. The data are available to those concerned with making decisions regarding training and utilization within the career field, including the CFM, functional managers, and other interested parties. In addition, demographic (background) and job satisfaction data are available for those concerned with manpower and personnel issues, as well as training issues. However, OSRs present, for the most part, only a high-level summary and overview of the career field. Much of the data will be analyzed further and compiled into a series of extracts directed toward a particular audience or toward answering specific types of questions. These extracts should be consulted whenever additional training or utilization decisions are made.

APPENDIX A

**SELECTED REPRESENTATIVE TASKS PERFORMED BY
MEMBERS OF CAREER LADDER JOBS**

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE A1
GENERAL HVAC/R CLUSTER
(STG061)

TASKS		PERCENT MEMBERS PERFORMING (N=1,127)
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	96
A0009	Fabricate or bend copper tubing	95
B0068	Clean air filters	94
B0039	Adjust or align belt tensions	94
C0250	Remove or replace fuses	94
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	92
A0032	Remove or install piping or tubing, such as water, refrigerant, or fuel lines	91
A0023	Measure and cut pipe by hand	91
A0036	Swage copper tubing	91
C0215	Inspect fuses or circuit breakers	91
C0259	Reset circuit breakers	90
B0161	Remove or replace belts or belt guards	90
C0212	Inspect electrical motors	89
A0031	Remove or install gauges	88
C0214	Inspect electrical wiring or connections	88
A0005	Clean strainers	88
A0011	Inspect gauges or lines	88
B0098	Inspect motor or fan bearings	87
B0089	Inspect drive belts	87
B0186	Service fans or blowers	87
C0235	Perform electrical troubleshooting on air-conditioning systems	87
B0167	Remove or replace fans or blowers	87
A0038	Thread pipe by machine	87
C0239	Perform operational tests on three-phase motors	86
A0024	Measure and cut pipe by machine	86
C0246	Remove or replace electrical wiring	86
C0238	Perform operational tests on single-phase motors	86

TABLE A2

ELECTRICAL COMPONENTS AND CIRCUITS JOB
(STG160)PERCENT
MEMBERS
PERFORMING
(N=45)

TASKS

A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	98
C0235	Perform electrical troubleshooting on air-conditioning systems	96
C0259	Reset circuit breakers	96
C0250	Remove or replace fuses	96
C0214	Inspect electrical wiring or connections	93
C0215	Inspect fuses or circuit breakers	93
C0246	Remove or replace electrical wiring	93
A0009	Fabricate or bend copper tubing	91
B0068	Clean air filters	89
C0212	Inspect electrical motors	89
B0039	Adjust or align belt tensions	89
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	89
L0750	Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols	87
L0735	Perform start-up or shut-down procedures for mobile refrigeration or air-conditioning equipment	84
G0496	Locate refrigerant leaks using soap solutions	84
A0011	Inspect gauges or lines	84
C0234	Perform continuity checks of electrical systems	82
L0710	Load or unload mobile HVAC/R equipment	82
G0510	Recover system refrigerants	80
A0012	Inspect refrigeration or air-conditioning systems component mountings	80
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration HVAC/R equipment	80
B0161	Remove or replace belts or belt guards	78
G0495	Locate refrigerant leaks using electronic or halide leak detectors	76
C0239	Perform operational tests on three-phase motors	76
G0531	Remove or replace refrigerant dryer filters or cartridges	76

TABLE A3

HVAC/R JUNIOR GENERALIST JOB
(STG166)

TASKS		PERCENT MEMBERS PERFORMING (N=85)
B0039	Adjust or align belt tensions	98
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	98
B0068	Clean air filters	95
A0009	Fabricate or bend copper tubing	93
B0069	Clean air handlers	89
B0081	Inspect air handler fans	88
C0250	Remove or replace fuses	88
A0023	Measure and cut pipe by hand	88
B0161	Remove or replace belts or belt guards	87
A0005	Clean strainers	86
A0036	Swage copper tubing	86
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	85
A0024	Measure and cut pipe by machine	84
A0038	Thread pipe by machine	84
B0186	Service fans or blowers	82
C0215	Inspect fuses or circuit breakers	82
B0121	Lubricate bearings, bushings, or damper or valve linkages	78
C0212	Inspect electrical motors	78
B0167	Remove or replace fans or blowers	78
A0031	Remove or install gauges	78
B0044	Adjust dampers	78
B0061	Align motors	76
A0032	Remove or install piping or tubing, such as water, refrigerant, or fuel lines	76
B0089	Inspect drive belts	75
B0098	Inspect motor or fan bearings	74
C0214	Inspect electrical wiring or connections	74
C0235	Perform electrical troubleshooting on air-conditioning systems	73
B0107	Inspect water pumps	73

TABLE A4
HVAC/R GENERALIST JOB
(STG161)

TASKS		PERCENT MEMBERS PERFORMING (N=890)
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	98
C0250	Remove or replace fuses	97
A0009	Fabricate or bend copper tubing	97
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	97
B0068	Clean air filters	96
B0039	Adjust or align belt tensions	96
A0032	Remove or install piping or tubing, such as water, refrigerant, or fuel lines	96
C0238	Perform operational tests on single-phase motors	95
A0036	Swage copper tubing	95
C0212	Inspect electrical motors	95
C0215	Inspect fuses or circuit breakers	94
B0098	Inspect motor or fan bearings	94
C0259	Reset circuit breakers	94
A0023	Measure and cut pipe by hand	94
C0239	Perform operational tests on three-phase motors	94
B0089	Inspect drive belts	94
A0031	Remove or install gauges	94
C0214	Inspect electrical wiring or connections	94
A0005	Clean strainers	94
B0081	Inspect air handler fans	94
B0161	Remove or replace belts or belt guards	93
C0235	Perform electrical troubleshooting on air-conditioning systems	93
B0061	Align motors	93
B0069	Clean air handlers	92
B0082	Inspect blower bearings	92
B0167	Remove or replace fans or blowers	92
B0044	Adjust dampers	92

TABLE A5

STEAM AND HOT WATER DISTRIBUTION JOB
(STG198)

TASKS		PERCENT MEMBERS PERFORMING (N=15)
E0369	Inspect gas burners	100
E0368	Inspect fuel systems for leaks	100
A0031	Remove or install gauges	100
F0407	Fill steam heating system boilers	93
F0390	Blow down steam heating system boiler or water columns	93
F0391	Check steam boiler water levels	93
F0405	Drain steam heating system boilers	93
F0392	Check steam heating system boiler tricocks	93
F0410	Inspect feed-water controls	93
A0032	Remove or install piping or tubing, such as water, refrigerant, or fuel lines	93
B0039	Adjust or align belt tensions	93
F0419	Inspect steam boilers	87
F0416	Inspect or wash down steam heating system boiler water sides	87
F0411	Inspect fire tubes for leaks or soot buildup	87
A0024	Measure and cut pipe by machine	87
F0399	Clean steam heating system boiler gauge glasses	87
F0414	Inspect or clean steam combustion chambers	87
E0367	Adjust oil burner fuel-air ratios	87
E0372	Inspect oil burners	87
E0374	Install gas burners	87
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	87
A0038	Thread pipe by machine	87
A0037	Thread pipe by hand	87
A0030	Remove or install flange gaskets	87
E0371	Inspect or read meters	80
F0436	Light-off steam heating system boilers	80
F0400	Clean steam heating system boiler tubes	80
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	80

TABLE A6

MOBILITY/CONTINGENCY JOB
(STG165)

TASKS		PERCENT MEMBERS PERFORMING (N=17)
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	100
L0742	Practice personal hygiene techniques	100
L0750	Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols	100
L0727	Perform or practice first-aid lifesaving techniques	100
L0708	Inspect mobility bags or kits	100
L0723	Perform chemical warfare agent decontamination procedures	100
L0722	Perform camp security	100
L0724	Perform cover and concealment techniques for work party security	94
L0721	Perform camouflage procedures	94
L0707	Identify and report chemical warfare agents	88
L0729	Perform military field sanitation techniques	88
L0743	Practice self-protection from extreme weather	82
L0726	Perform explosive ordnance reconnaissance	82
L0728	Perform individual movement techniques for work party security	82
L0739	Practice convoy techniques	76
L0704	Don or doff chemical warfare personal protective clothing	71
L0741	Practice expedient methods	71
A0009	Fabricate or bend copper tubing	65
L0738	Practice communications security (COMSEC) or operations security (OPSEC) during contingency exercises or operations	59
L0749	Set up or tear down shelters	59
K0658	Identify and report suspected unexploded ordnance (UXO)	59
A0023	Measure and cut pipe by hand	59
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	59
K0675	Operate RRR equipment	53
L0730	Perform or set up site security	53
B0068	Clean air filters	53

TABLE A7
AIR AND WATER DISTRIBUTION JOB
(STG163)

TASKS	PERCENT MEMBERS PERFORMING (N=13)
A0004 Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	100
A0023 Measure and cut pipe by hand	100
A0024 Measure and cut pipe by machine	100
B0039 Adjust or align belt tensions	92
A0009 Fabricate or bend copper tubing	92
A0005 Clean strainers	92
A0038 Thread pipe by machine	85
A0037 Thread pipe by hand	85
A0002 Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	85
B0044 Adjust dampers	77
A0015 Install check valves	77
A0011 Inspect gauges or lines	77
A0001 Assemble high- or low-pressure fittings	77
B0056 Adjust safety relief valves	69
B0081 Inspect air handler fans	69
B0043 Adjust couplings or pulleys	69
A0036 Swage copper tubing	69
B0069 Clean air handlers	69
A0012 Inspect refrigeration or air-conditioning system component mountings	69
A0032 Remove or install piping or tubing, such as water, refrigerant, or fuel lines	69
A0014 Install black iron steam condensate lines	69
A0018 Install insulating materials on pipes, other than tape	69
A0021 Maintain material safety data sheets (MSDSs)	69
B0061 Align motors	62
B0041 Adjust centrifugal water pump flow	62
B0050 Adjust hot water valves	62

TABLE A8
SUPERVISOR JOB
(STG179)

TASKS	PERCENT MEMBERS ERFORMING (N=83)
M0787 Evaluate personnel for compliance with performance standards	94
M0788 Evaluate personnel for promotion, demotion, reclassification, or special awards	94
M0766 Determine or establish work assignments or priorities	92
M0762 Counsel subordinates concerning personal matters	92
M0811 Write recommendations for awards or decorations	90
M0793 Interpret policies, directives, or procedures for subordinates	90
M0789 Implement safety or security programs	90
M0796 Participate in general meetings, such as staff meetings, briefings, conferences, or workshops, other than conducting	89
M0760 Conduct supervisory performance feedback sessions	89
M0785 Evaluate job hazards or compliance with Air Force Occupational Safety and Health (AFOSH) program	88
M0761 Conduct supervisory orientations for newly assigned personnel	88
L0706 Fire weapons for qualification, such as M-16 rifles or 9mm pistols	88
M0769 Develop or establish work schedules	87
M0768 Develop or establish work methods or procedures	87
M0790 Initiate actions required due to substandard performance of personnel	87
M0757 Conduct safety inspections of equipment or facilities	86
M0758 Conduct self-inspections or self-assessments	84
M0792 Inspect HVAC/R repair operations	82
M0786 Evaluate utilization of equipment, tools, parts, supplies, or workspace	82
M0765 Determine or establish logistics requirements, such as personnel equipment, tools, parts, supplies, or workspace	81
M0810 Write or indorse military performance reports	80
M0754 Assign personnel to work areas or duty positions, other than for mobilities or contingencies	80
N0822 Counsel trainees on training progress	80
L0750 Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols	80

APPENDIX B

TABLES 5-49

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE 5

AVERAGE PERCENT TIME SPENT ON DUTIES
BY CAREER LADDER JOBS

DUTIES	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG165)	AIR & WATER DIST. SYS. JOB (STG163)	SUPERVISOR JOB (STG067)
A PERFORMING GENERAL HEATING, VENTILATING, AIR- CONDITIONING, AND REFRIGERATION (HVAC/R) ACTIVITIES	9	10	39	3
B MAINTAINING AIR AND WATER DISTRIBUTION SYSTEMS	23	8	50	4
C MAINTAINING HVAC/R ELECTRICAL COMPONENTS AND CIRCUITRY	12	4	3	3
D MAINTAINING HVAC/R CONTROLS	9	1	1	1
E MAINTAINING HVAC/R FUEL SYSTEMS AND BURNERS	3	1	*	*
F MAINTAINING STEAM AND HOT WATER GENERATING EQUIPMENT	7	1	3	1
G MAINTAINING AIR-CONDITIONING AND REFRIGERATION SYSTEMS	12	2	1	3
H MAINTAINING AIR COMPRESSING EQUIPMENT	5	*	*	1
I MAINTAINING WARM AIR HEATING OR RADIANT HEATING EQUIPMENT	2	*	*	*
J PERFORMING INDUSTRIAL WATER OR CORROSION TREATMENT ACTIVITIES	1	*	0	*
K PERFORMING PRIME BASE ENGINEER EMERGENCY FORCE (BEEF) ACTIVITIES	2	10	1	5
L PERFORMING MOBILITY AND CONTINGENCY ACTIVITIES	6	41	2	14
M PERFORMING MANAGEMENT AND SUPERVISORY ACTIVITIES	4	11	*	40
N PERFORMING TRAINING ACTIVITIES	2	5	0	12
O PERFORMING GENERAL ADMINISTRATIVE AND TECHNICAL ORDER (TO) SYSTEM ACTIVITIES	1	2	0	5
P PERFORMING GENERAL SUPPLY, EQUIPMENT, AND MAINTENANCE MANAGEMENT ACTIVITIES	2	3	0	7

* Indicates less than 1 percent

TABLE 6

AVERAGE PERCENT TIME SPENT ON DUTIES
BY CAREER LADDER JOBS (AD)

DUTIES	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG165)	AIR & WATER DIST. SYS. JOB (STG163)	SUPERVISOR JOB (STG067)
A PERFORMING GENERAL HEATING, VENTILATING, AIR- CONDITIONING, AND REFRIGERATION (HVAC/R) ACTIVITIES	8	5	39	3
B MAINTAINING AIR AND WATER DISTRIBUTION SYSTEMS	23	2	52	4
C MAINTAINING HVAC/R ELECTRICAL COMPONENTS AND CIRCUITRY	13	5	3	4
D MAINTAINING HVAC/R CONTROLS	8	1	1	1
E MAINTAINING HVAC/R FUEL SYSTEMS AND BURNERS	2	*	*	*
F MAINTAINING STEAM AND HOT WATER GENERATING EQUIPMENT	7	0	3	1
G MAINTAINING AIR-CONDITIONING AND REFRIGERATION SYSTEMS	12	2	1	3
H MAINTAINING AIR COMPRESSING EQUIPMENT	4	1	*	1
I MAINTAINING WARM AIR HEATING OR RADIANT HEATING EQUIPMENT	2	0	*	*
J PERFORMING INDUSTRIAL WATER OR CORROSION TREATMENT ACTIVITIES	1	*	0	*
K PERFORMING PRIME BASE ENGINEER EMERGENCY FORCE (BEEF) ACTIVITIES	2	14	*	4
L PERFORMING MOBILITY AND CONTINGENCY ACTIVITIES	5	42	*	10
M PERFORMING MANAGEMENT AND SUPERVISORY ACTIVITIES	7	17	*	43
N PERFORMING TRAINING ACTIVITIES	3	1	0	11
O PERFORMING GENERAL ADMINISTRATIVE AND TECHNICAL ORDER (TO) SYSTEM ACTIVITIES	1	4	0	5
P PERFORMING GENERAL SUPPLY, EQUIPMENT, AND MAINTENANCE MANAGEMENT ACTIVITIES	2	5	0	9

* Indicates less than 1 percent

TABLE 7

AVERAGE PERCENT TIME SPENT ON DUTIES
BY CAREER LADDER JOBS (ANG)

DUTIES	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG165)	AIR & WATER DIST. SYS. JOB (STG163)	SUPERVISOR JOB (STG067)
A PERFORMING GENERAL HEATING, VENTILATING, AIR- CONDITIONING, AND REFRIGERATION (HVAC/R) ACTIVITIES	10	14	41	3
B MAINTAINING AIR AND WATER DISTRIBUTION SYSTEMS	21	12	39	4
C MAINTAINING HVAC/R ELECTRICAL COMPONENTS AND CIRCUITRY	14	4	2	3
D MAINTAINING HVAC/R CONTROLS	8	1	0	2
E MAINTAINING HVAC/R FUEL SYSTEMS AND BURNERS	2	2	0	*
F MAINTAINING STEAM AND HOT WATER GENERATING EQUIPMENT	5	1	0	1
G MAINTAINING AIR-CONDITIONING AND REFRIGERATION SYSTEMS	12	*	0	2
H MAINTAINING AIR COMPRESSING EQUIPMENT	4	*	0	2
I MAINTAINING WARM AIR HEATING OR RADIANT HEATING EQUIPMENT	2	2	0	*
J PERFORMING INDUSTRIAL WATER OR CORROSION TREATMENT ACTIVITIES	1	0	0	*
K PERFORMING PRIME BASE ENGINEER EMERGENCY FORCE (BEEF) ACTIVITIES	2	5	2	5
L PERFORMING MOBILITY AND CONTINGENCY ACTIVITIES	10	43	16	23
M PERFORMING MANAGEMENT AND SUPERVISORY ACTIVITIES	4	8	0	32
N PERFORMING TRAINING ACTIVITIES	2	4	0	15
O PERFORMING GENERAL ADMINISTRATIVE AND TECHNICAL ORDER (TO) SYSTEM ACTIVITIES	1	1	0	3
P PERFORMING GENERAL SUPPLY, EQUIPMENT, AND MAINTENANCE MANAGEMENT ACTIVITIES	2	2	0	4

* Indicates less than 1 percent

TABLE 8

AVERAGE PERCENT TIME SPENT ON DUTIES
BY CAREER LADDER JOBS (AFRC)

DUTIES	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG165)	AIR & WATER DIST. SYS. JOB (STG163)	SUPERVISOR JOB (STG067)
A PERFORMING GENERAL HEATING, VENTILATING, AIR- CONDITIONING, AND REFRIGERATION (HVAC/R) ACTIVITIES	9	11	42	4
B MAINTAINING AIR AND WATER DISTRIBUTION SYSTEMS	22	8	58	4
C MAINTAINING HVAC/R ELECTRICAL COMPONENTS AND CIRCUITRY	12	4	0	3
D MAINTAINING HVAC/R CONTROLS	7	*	0	1
E MAINTAINING HVAC/R FUEL SYSTEMS AND BURNERS	3	1	0	*
F MAINTAINING STEAM AND HOT WATER GENERATING EQUIPMENT	6	3	0	*
G MAINTAINING AIR-CONDITIONING AND REFRIGERATION SYSTEMS	10	4	0	2
H MAINTAINING AIR COMPRESSING EQUIPMENT	3	*	0	*
I MAINTAINING WARM AIR HEATING OR RADIANT HEATING EQUIPMENT	2	0	0	*
J PERFORMING INDUSTRIAL WATER OR CORROSION TREATMENT ACTIVITIES	1	0	0	0
K PERFORMING PRIME BASE ENGINEER EMERGENCY FORCE (BEEF) ACTIVITIES	3	12	0	10
L PERFORMING MOBILITY AND CONTINGENCY ACTIVITIES	9	38	0	25
M PERFORMING MANAGEMENT AND SUPERVISORY ACTIVITIES	6	10	0	30
N PERFORMING TRAINING ACTIVITIES	4	7	0	14
O PERFORMING GENERAL ADMINISTRATIVE AND TECHNICAL ORDER (TO) SYSTEM ACTIVITIES	1	1	0	3
P PERFORMING GENERAL SUPPLY, EQUIPMENT, AND MAINTENANCE MANAGEMENT ACTIVITIES	2	1	0	4

* Indicates less than 1 percent

TABLE 9

SELECTED BACKGROUND DATA FOR CAREER LADDER JOBS (PERCENT)

	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG165)	AIR & WATER DIST. SYS. JOB (STG163)	SUPERVISOR JOB (STG067)
TOTAL NUMBER IN GROUP	1127	17	13	83
<u>DAFSC DISTRIBUTION</u>				
3E131	32	0	38	0
3E151	50	71	46	23
3E171	17	29	15	61
3E191	1	0	0	16
<u>PAY GRADE DISTRIBUTION</u>				
E1-E3	26	0	46	0
E-4	26	12	15	4
E-5	27	65	23	12
E-6	14	0	8	19
E-7	6	23	8	52
E-8	1	0	0	13
E-9	0	0	0	0
AVERAGE NUMBER OF TASKS PERFORMED	379	69	65	153

TABLE 10

SELECTED BACKGROUND DATA FOR CAREER LADDER JOBS (AD) (PERCENT)

	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG165)	AIR & WATER DIST. SYS. JOB (STG163)	SUPERVISOR JOB (STG067)
TOTAL NUMBER IN GROUP	855	5	10	58
DAFSC DISTRIBUTION				
3E131	42	0	50	0
3E151	49	60	30	28
3E171	9	40	20	64
3E191	0	0	0	9
PAYGRADE DISTRIBUTION				
E1-E3	34	0	0	0
E-4	28	20	60	3
E-5	25	40	10	16
E-6	11	0	10	17
E-7	3	40	10	55
E-8	0	0	0	9
E-9	0	0	0	0
AVERAGE NUMBER OF TASKS PERFORMED	396	67	66	151

TABLE 11

SELECTED BACKGROUND DATA FOR CAREER LADDER JOBS (ANG) (PERCENT)

	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG165)	AIR & WATER DIST. SYS. JOB (STG163)	SUPERVISOR JOB (STG067)
TOTAL NUMBER IN GROUP	189	5	2	14
<u>DAFSC DISTRIBUTION</u>				
3E131	1	0	0	0
3E151	60	80	100	7
3E171	38	20	0	64
3E191	1	0	0	29
<u>PAYGRADE DISTRIBUTION</u>				
E1-E3	3	0	0	0
E-4	23	20	50	7
E-5	37	80	50	0
E-6	25	0	0	14
E-7	11	0	0	65
E-8	2	0	0	14
E-9	0	0	0	0
AVERAGE NUMBER OF TASKS PERFORMED	303	64	55	163

TABLE 12

SELECTED BACKGROUND DATA FOR CAREER LADDER JOBS (AFRC) (PERCENT)

	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG165)	AIR & WATER DIST. SYS. JOB (STG163)	SUPERVISOR JOB (STG067)
TOTAL NUMBER IN GROUP	83	7	1	11
<u>DAFSC DISTRIBUTION</u>				
3E131	0	0	0	0
3E151	43	71	100	18
3E171	45	29	0	45
3E191	12	0	0	36
<u>PAYGRADE DISTRIBUTION</u>				
E1-E3	1	0	0	0
E-4	11	0	0	0
E-5	25	71	100	9
E-6	27	0	0	36
E-7	27	29	0	18
E-8	10	0	0	36
E-9	0	0	0	0
AVERAGE NUMBER OF TASKS PERFORMED	374	75	72	151

TABLE 13

SPECIALTY JOB COMPARISON BETWEEN CURRENT AND 1996 SURVEYS

CURRENT SURVEY (N=1,398)	1996 SURVEY (N=917)
I. General HVAC/R Cluster	II. General HVAC/R Technician Cluster
A. HVAC/R Generalist Job	Embedded within cluster
B. HVAC/R Junior Generalist Job	I. Entry-Level Job (part)
C. Electrical Components and Circuits Job	No similar job identified – embedded within cluster?
D. Steam and Hot Water Distribution Systems Job	III. Steam and Hot Water Job
II. Mobility/Contingency Job	VI. Mobility Job
III. Air and Water Distribution Systems Job	I. Entry-Level Job (part)
IV. Supervisor Job	VII. Supervisor Job
	VIII. Functional Manager Job
Contracted out	IV. Steam Plant Job
No similar job identified	V. Quality Assurance Job

TABLE 14

DISTRIBUTION OF AFSC 3E1X1 AD
SKILL-LEVEL MEMBERS ACROSS CAREER LADDER JOBS (PERCENT)

JOB	3E131 (N=388)	3E151 (N=490)	3E171 (N=148)	3E191 (N=6)
GENERAL HVAC/R CLUSTER	92	85	54	17
MOBILITY/CONTINGENCY JOB	0	1	1	0
AIR AND WATER DISTRIBUTION SYSTEMS JOB	1	1	1	0
SUPERVISOR JOB	0	3	25	83
NOT GROUPED	7	10	19	0

TABLE 15

TIME SPENT ON DUTIES BY MEMBERS OF AFSC 3E1X1 AD
SKILL-LEVEL GROUPS
(RELATIVE PERCENT OF JOB TIME)

DUTIES	DAFSC 3E131 (N=388)	DAFSC 3E151 (N=490)	DAFSC 3E171 (N=148)	DAFSC 3E191 (N=6)
A PERFORMING GENERAL HEATING, VENTILATING, AIR-CONDITIONING, AND REFRIGERATION (HVAC/R) ACTIVITIES	10	8	6	1
B MAINTAINING AIR AND WATER DISTRIBUTION SYSTEMS	26	22	14	3
C MAINTAINING HVAC/R ELECTRICAL COMPONENTS AND CIRCUITRY	13	12	9	1
D MAINTAINING HVAC/R CONTROLS	9	8	7	*
E MAINTAINING HVAC/R FUEL SYSTEMS AND BURNERS	3	3	2	1
F MAINTAINING STEAM AND HOT WATER GENERATING EQUIPMENT	8	7	4	1
G MAINTAINING AIR-CONDITIONING AND REFRIGERATION SYSTEMS	12	12	7	1
H MAINTAINING AIR COMPRESSING EQUIPMENT	5	4	3	1
I MAINTAINING WARM AIR HEATING OR RADIANT HEATING EQUIPMENT	2	2	1	1
J PERFORMING INDUSTRIAL WATER OR CORROSION TREATMENT ACTIVITIES	1	1	1	*
K PERFORMING PRIME BASE ENGINEER EMERGENCY FORCE (BEEF) ACTIVITIES	2	2	2	7
L PERFORMING MOBILITY AND CONTINGENCY ACTIVITIES	5	6	7	14
M PERFORMING MANAGEMENT AND SUPERVISORY ACTIVITIES	1	6	24	55
N PERFORMING TRAINING ACTIVITIES	1	3	7	4
O PERFORMING GENERAL ADMINISTRATIVE AND TECHNICAL ORDER (TO) SYSTEM ACTIVITIES	*	1	3	5
P PERFORMING GENERAL SUPPLY, EQUIPMENT, AND MAINTENANCE MANAGEMENT ACTIVITIES	1	3	6	4

*Indicates less than 1 percent

TABLE 16

REPRESENTATIVE TASKS PERFORMED BY DAFSC 3E131 AD PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=338)
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	94
A0009	Fabricate or bend copper tubing	93
B0068	Clean air filters	92
B0039	Adjust or align belt tensions	91
C0250	Remove or replace fuses	90
A0005	Clean strainers	90
A0038	Thread pipe by machine	89
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	89
A0036	Swage copper tubing	88
A0032	Remove or install piping or tubing, such as water, refrigerant, or fuel lines	88
B0161	Remove or replace belts or belt guards	87
A0024	Measure and cut pipe by machine	87
B0069	Clean air handlers	87
A0023	Measure and cut pipe by hand	87
A0031	Remove or install gauges	86
C0215	Inspect fuses or circuit breakers	86
B0186	Service fans or blowers	86
A0015	Install check valves	86
B0044	Adjust dampers	86
C0212	Inspect electrical motors	85
B0098	Inspect motor or fan bearings	85
B0081	Inspect air handler fans	85
C0259	Reset circuit breakers	85
C0238	Perform operational tests on single-phase motors	85
B0121	Lubricate bearings, bushings, or damper or valve linkages	84
A0011	Inspect gauges or lines	84
B0107	Inspect water pumps	84
B0061	Align motors	83
B0043	Adjust couplings or pulleys	83

Average number of tasks performed: 354

TABLE 17

REPRESENTATIVE TASKS PERFORMED BY DAFSC 3E151 AD PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=490)
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	89
A0009	Fabricate or bend copper tubing	88
B0039	Adjust or align belt tensions	88
C0250	Remove or replace fuses	88
C0215	Inspect fuses or circuit breakers	86
B0068	Clean air filters	85
A0036	Swage copper tubing	85
C0212	Inspect electrical motors	84
A0023	Measure and cut pipe by hand	84
A0032	Remove or install piping or tubing, such as water, refrigerant, or fuel lines	84
B0061	Align motors	84
C0214	Inspect electrical wiring or connections	84
A0031	Remove or install gauges	83
C0259	Reset circuit breakers	83
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	83
B0098	Inspect motor or fan bearings	82
C0239	Perform operational tests on three-phase motors	82
A0011	Inspect gauges or lines	81
A0038	Thread pipe by machine	81
C0235	Perform electrical troubleshooting on air-conditioning systems	81
B0089	Inspect drive belts	81
A0029	Read or interpret blueprints, diagrams, drawings, or specifications	81
A0005	Clean strainers	81
C0246	Remove or replace electrical wiring	80
B0161	Remove or replace belts or belt guards	80
B0082	Inspect blower bearings	80
B0167	Remove or replace fans or blowers	80
C0257	Remove or replace three-phase electrical motors	80

Average number of tasks performed: 297

TABLE 18

TASKS THAT BEST DIFFERENTIATE BETWEEN AD DAFSC 3E131 AND DAFSC 3E151 PERSONNEL

TASKS		DAFSC 3E131 (N=388)	DAFSC 3E151 (N=490)	DIFFERENCE
B0168	Remove or replace high-temperature water heating system air-bleed valves	54	33	21
N0822	Counsel trainees on training progress	10	56	-46
M0762	Counsel subordinates concerning personal matters	11	54	-43
M0760	Conduct supervisory performance feedback sessions	10	51	-41
M0811	Write recommendations for awards or decorations	6	48	-41
M0787	Evaluate personnel for compliance with performance standards	10	49	-39
N0817	Certify trainees on task knowledge for specialty training standards (STSS)	7	45	-38
N0832	Evaluate progress of trainees	9	48	-38
N0821	Conduct OJT	25	61	-36
M0810	Write or indorse military performance reports	8	43	-35
N0837	Maintain training records or files	12	47	-35
M0761	Conduct supervisory orientations for newly assigned personnel	10	44	-34
M0788	Evaluate personnel for promotion, demotion, reclassification, or special awards	9	42	-33
N0823	Determine training requirements	6	39	-33
N0841	Verify CDC course completions	11	42	-31
M0766	Determine or establish work assignments or priorities	15	44	-29
M0793	Interpret policies, directives, or procedures for subordinates	12	40	-29
P0876	Inventory equipment, tools, parts, or supplies	20	49	-29
N0816	Brief personnel concerning training programs or matters	8	36	-28
M0790	Initiate actions required due to substandard performance of personnel	10	37	-27
P0875	Initiate requisitions for equipment, tools, parts, or supplies	10	35	-26
M0783	Evaluate individuals for specialized training	7	28	-20

TABLE 19

REPRESENTATIVE TASKS PERFORMED BY DAFSC 3E171 AD PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=148)
M0811	Write recommendations for awards or decorations	86
M0762	Counsel subordinates concerning personal matters	79
M0810	Write or indorse military performance reports	77
M0760	Conduct supervisory performance feedback sessions	76
M0787	Evaluate personnel for compliance with performance standards	75
M0796	Participate in general meetings, such as staff meetings, briefings, conferences, or workshops, other than conducting	71
M0766	Determine or establish work assignments or priorities	71
M0788	Evaluate personnel for promotion, demotion, reclassification, or special awards	70
M0793	Interpret policies, directives, or procedures for subordinates	70
M0792	Inspect HVAC/R repair operations	70
M0761	Conduct supervisory orientations for newly assigned personnel	70
M0765	Determine or establish logistics requirements, such as personnel, equipment, tools, parts, supplies, or workspace	69
M0769	Develop or establish work schedules	69
N0817	Certify trainees on task knowledge for specialty training standards (STSs)	69
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	69
N0822	Counsel trainees on training progress	68
A0029	Read or interpret blueprints, diagrams, drawings, or specifications	68
M0789	Implement safety or security programs	68
N0821	Conduct OJT	68
M0785	Evaluate job hazards or compliance with Air Force Occupational Safety and Health (AFOSH) program	68
M0790	Initiate actions required due to substandard performance of personnel	66
N0823	Determine training requirements	66
N0832	Evaluate progress of trainees	65
N0837	Maintain training records or files	64
M0758	Conduct self-inspections or self-assessments	64

Average number of tasks performed: 148

TABLE 20

TASKS THAT BEST DIFFERENTIATE BETWEEN AD DAFSC 3E151 AND DAFSC 3E171 PERSONNEL

TASKS	DAFSC 3E151 (N=490)	DAFSC 3E171 (N=148)	DIFFERENCE
B0068 Clean air filters	85	50	35
B0162 Remove or replace bearings or bushings, such as in motors, compressors, pumps, or shafts	79	46	33
B0039 Adjust or align belt tensions	88	56	32
A0002 Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	89	57	31
A0036 Swage copper tubing	85	54	31
C0250 Remove or replace fuses	88	58	30
B0061 Align motors	84	55	29
A0004 Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	83	54	29
M0805 Schedule personnel for temporary duty (TDY) assignments, leaves, or passes	21	58	-38
M0811 Write recommendations for awards or decorations	48	86	-38
M0812 Write replies to inspection reports	16	53	-37
M0769 Develop or establish work schedules	35	69	-34
M0794 Investigate accidents or incidents	19	53	-34
M0810 Write or indorse military performance reports	43	77	-34
M0765 Determine or establish logistics requirements, such as personnel, equipment, tools, parts, supplies, or workspace	36	69	-33
M0796 Participate in general meetings, such as staff meetings, briefings, conferences, or workshops, other than conducting	38	71	-33

TABLE 21

REPRESENTATIVE TASKS PERFORMED BY DAFSC 3E191 AD PERSONNEL

TASKS	PERCENT MEMBERS PERFORMING (N=9)
M0752 Analyze workload requirements	100
M0762 Counsel subordinates concerning personal matters	100
M0766 Determine or establish work assignments or priorities	100
M0810 Write or indorse military performance reports	100
M0793 Interpret policies, directives, or procedures for subordinates	100
M0756 Conduct general meetings, such as staff meetings, briefings, conferences, or workshops	100
M0811 Write recommendations for awards or decorations	100
M0760 Conduct supervisory performance feedback sessions	100
M0780 Establish performance standards for subordinates	100
M0768 Develop or establish work methods or procedures	100
M0809 Write or indorse civilian performance appraisals	100
M0782 Evaluate budget requirements	100
M0753 Annotate time and attendance sheets for civilian employees	100
M0787 Evaluate personnel for compliance with performance standards	100
M0755 Assign sponsors for newly assigned personnel	100
M0790 Initiate actions required due to substandard performance of personnel	100
M0761 Conduct supervisory orientations for newly assigned personnel	100
M0788 Evaluate personnel for promotion, demotion, reclassification, or special awards	100
M0781 Establish procedures for accountability of equipment, tools, parts, or supplies	100
M0807 Write job or position descriptions	100
L0704 Don or doff chemical warfare personal protective clothing	100
M0789 Implement safety or security programs	100
M0785 Evaluate job hazards or compliance with Air Force Occupational Safety and Health (AFOSH) program	100
M0794 Investigate accidents or incidents	100
L0708 Inspect mobility bags or kits	100
L0743 Practice self-protection from extreme weather	100
L0706 Fire weapons for qualification, such as M-16 rifles or 9mm pistols	100
L0742 Practice personal hygiene techniques	100
L0750 Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols	100

Average number of tasks performed: 161

TABLE 22

TASKS THAT BEST DIFFERENTIATE BETWEEN AD DAFSC 3E171 AND DAFSC 3E191 PERSONNEL

TASKS	DAFSC 3E171 (N=148)	DAFSC 3E191 (N=6)	DIFFERENCE
C0231 Measure motor current draws	60	*	60
B0086 Inspect dampers	60	*	60
B0088 Inspect direct expansion coils	55	*	55
B0061 Align motors	55	*	55
B0085 Inspect damper travels	53	*	53
A0001 Assemble high- or low-pressure fittings	51	*	51
C0227 Install start or run capacitors	49	*	49
B0190 Service water pumps	49	*	49
G0495 Locate refrigerant leaks using electronic or halide leak detectors	49	*	49
D0359 Troubleshoot electrical control systems, other than timers	49	*	49
G0530 Remove or replace refrigerant compressors	48	*	48
K0653 Develop camp cantonment layouts	14	83	-70
M0809 Write or indorse civilian performance appraisals	34	100	-66
K0658 Identify and report suspected unexploded ordnance (UXO)	39	100	-61
M0753 Annotate time and attendance sheets for civilian employees	39	100	-61
K0669 Lay out bare base site facilities or utilities	8	67	-59
M0782 Evaluate budget requirements	43	100	-57
K0652 Develop base denial plans	9	67	-57
L0712 Maintain accountability of personnel selected to fill OPLAN requirements	11	67	-56
M0802 Review civilian employee injury and claim forms	28	83	-55
K0651 Develop bare base plans	11	67	-55
L0737 Practice command and control techniques	29	83	-54

TABLE 23

DISTRIBUTION OF AFSC 3E1X1 ANG
SKILL-LEVEL MEMBERS ACROSS CAREER LADDER JOBS (PERCENT)

JOB	3E131 (N=2)	3E151 (N=141)	3E171 (N=90)	3E191 (N=7)
GENERAL HVAC/R CLUSTER	100	59	80	29
MOBILITY/CONTINGENCY JOB	0	3	1	0
AIR AND WATER DISTRIBUTION SYSTEMS JOB	0	1	0	0
SUPERVISOR JOB	0	1	10	57
NOT GROUPED	0	36	9	14

TABLE 24

TIME SPENT ON DUTIES BY MEMBERS OF AFSC 3E1X1 ANG
SKILL-LEVEL GROUPS
(RELATIVE PERCENT OF JOB TIME)

DUTIES	DAFSC 3E131 (N=2)	DAFSC 3E151 (N=141)	DAFSC 3E171 (N=90)	DAFSC 3E191 (N=7)
A PERFORMING GENERAL HEATING, VENTILATING, AIR-CONDITIONING, AND REFRIGERATION (HVAC/R) ACTIVITIES	13	12	8	4
B MAINTAINING AIR AND WATER DISTRIBUTION SYSTEMS	26	22	17	9
C MAINTAINING HVAC/R ELECTRICAL COMPONENTS AND CIRCUITRY	16	13	12	4
D MAINTAINING HVAC/R CONTROLS	5	7	7	2
E MAINTAINING HVAC/R FUEL SYSTEMS AND BURNERS	*	2	2	1
F MAINTAINING STEAM AND HOT WATER GENERATING EQUIPMENT	1	4	5	2
G MAINTAINING AIR-CONDITIONING AND REFRIGERATION SYSTEMS	4	10	10	3
H MAINTAINING AIR COMPRESSING EQUIPMENT	4	3	4	1
I MAINTAINING WARM AIR HEATING OR RADIANT HEATING EQUIPMENT	1	2	2	*
J PERFORMING INDUSTRIAL WATER OR CORROSION TREATMENT ACTIVITIES	*	1	1	*
K PERFORMING PRIME BASE ENGINEER EMERGENCY FORCE (BEEF) ACTIVITIES	4	3	3	4
L PERFORMING MOBILITY AND CONTINGENCY ACTIVITIES	21	14	11	16
M PERFORMING MANAGEMENT AND SUPERVISORY ACTIVITIES	1	3	9	34
N PERFORMING TRAINING ACTIVITIES	2	1	6	15
O PERFORMING GENERAL ADMINISTRATIVE AND TECHNICAL ORDER (TO) SYSTEM ACTIVITIES	0	*	1	3
P PERFORMING GENERAL SUPPLY, EQUIPMENT, AND MAINTENANCE MANAGEMENT ACTIVITIES	1	2	2	1

*Indicates less than 1 percent

TABLE 25

REPRESENTATIVE TASKS PERFORMED BY DAFSC 3E151 ANG PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=141)
B0068	Clean air filters	91
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	86
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	84
A0009	Fabricate or bend copper tubing	84
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	82
B0039	Adjust or align belt tensions	79
A0023	Measure and cut pipe by hand	79
A0012	Inspect refrigeration or air-conditioning system component mountings	78
C0250	Remove or replace fuses	78
A0036	Swage copper tubing	78
A0011	Inspect gauges or lines	77
L0750	Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols	76
C0235	Perform electrical troubleshooting on air-conditioning systems	74
C0259	Reset circuit breakers	74
C0215	Inspect fuses or circuit breakers	73
L0708	Inspect mobility bags or kits	72
B0089	Inspect drive belts	72
A0031	Remove or install gauges	72
C0212	Inspect electrical motors	72
B0069	Clean air handlers	71
A0032	Remove or install piping or tubing, such as water, refrigerant, or fuel lines	70
B0161	Remove or replace belts or belt guards	70
C0214	Inspect electrical wiring or connections	70
A0005	Clean strainers	67
C0236	Perform electrical troubleshooting on refrigeration systems, other than controls	67
G0496	Locate refrigerant leaks using soap solutions	67
L0707	Identify and report chemical warfare agents	67
A0038	Thread pipe by machine	67

Average number of tasks performed: 227

TABLE 26

REPRESENTATIVE TSKS PERFORMED BY DAFSC 3E171 ANG PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=90)
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	90
L0750	Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols	89
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	88
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	87
A0023	Measure and cut pipe by hand	87
B0068	Clean air filters	86
C0259	Reset circuit breakers	86
B0039	Adjust or align belt tensions	86
L0708	Inspect mobility bags or kits	84
A0009	Fabricate or bend copper tubing	84
A0029	Read or interpret blueprints, diagrams, drawings, or specifications	82
C0215	Inspect fuses or circuit breakers	81
A0011	Inspect gauges or lines	81
A0012	Inspect refrigeration or air-conditioning system component mountings	81
L0742	Practice personal hygiene techniques	80
C0214	Inspect electrical wiring or connections	80
C0250	Remove or replace fuses	80
C0235	Perform electrical troubleshooting on air-conditioning systems	79
L0707	Identify and report chemical warfare agents	79
C0212	Inspect electrical motors	79
C0246	Remove or replace electrical wiring	79
L0704	Don or doff chemical warfare personal protective clothing	77
L0727	Perform or practice first-aid lifesaving techniques	77
L0743	Practice self-protection from extreme weather	77
G0495	Locate refrigerant leaks using electronic or halide leak detectors	77
B0167	Remove or replace fans or blowers	77
B0098	Inspect motor or fan bearings	76
B0082	Inspect blower bearings	76
B0089	Inspect drive belts	76

Average number of tasks performed: 313

TABLE 27

TASKS THAT BEST DISTINGUISH BETWEEN ANG DAFSC 3E151 AND DAFSC 3E171 PERSONNEL

TASKS	DAFSC 3E151 (N=141)	DAFSC 3E171 (N=90)	DIFFERENCE
N0822 Counsel trainees on training progress	13	71	-58
N0817 Certify trainees on task knowledge for specialty training standards (STSs)	12	64	-52
N0837 Maintain training records or files	20	68	-48
N0823 Determine training requirements	8	54	-47
N0814 Assign on-the-job training (OJT) trainers	8	54	-47
N0841 Verify CDC course completions	11	58	-47
M0766 Determine or establish work assignments or priorities	11	58	-47
N0832 Evaluate progress of trainees	13	59	-46
N0821 Conduct OJT	28	72	-45
M0762 Counsel subordinates concerning personal matters	12	56	-44
M0769 Develop or establish work schedules	9	52	-44
M0761 Conduct supervisory orientations for newly assigned personnel	6	49	-43
N0816 Brief personnel concerning training programs or matters	9	52	-43
M0792 Inspect HVAC/R repair operations	33	73	-41
M0788 Evaluate personnel for promotion, demotion, reclassification, or special awards	10	48	-38
P0876 Inventory equipment, tools, parts, or supplies	33	71	-38
M0768 Develop or establish work methods or procedures	16	52	-37
M0811 Write recommendations for awards or decorations	9	47	-37
M0787 Evaluate personnel for compliance with performance standards	13	49	-36

TABLE 28

REPRESENTATIVE TASKS PERFORMED BY DAFSC 3E191 ANG PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=7)
M0788	Evaluate personnel for promotion, demotion, reclassification, or special awards	100
M0796	Participate in general meetings, such as staff meetings, briefings, conferences, or workshops, other than conducting	100
M0762	Counsel subordinates concerning personal matters	100
N0822	Counsel trainees on training progress	100
M0760	Conduct supervisory performance feedback sessions	100
N0841	Verify CDC course completions	100
N0832	Evaluate progress of trainees	86
M0755	Assign sponsors for newly assigned personnel	86
M0761	Conduct supervisory orientations for newly assigned personnel	86
M0811	Write recommendations for awards or decorations	86
L0742	Practice personal hygiene techniques	86
L0743	Practice self-protection from extreme weather	86
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	86
L0707	Identify and report chemical warfare agents	86
M0791	Initiate personnel action requests	71
N0816	Brief personnel concerning training programs or matters	71
M0756	Conduct general meetings, such as staff meetings, briefings, conferences, or workshops	71
N0814	Assign on-the-job training (OJT) trainers	71
M0793	Interpret policies, directives, or procedures for subordinates	71
M0757	Conduct safety inspections of equipment or facilities	71
N0823	Determine training requirements	71
L0723	Perform chemical warfare agent decontamination procedures	71
L0704	Don or doff chemical warfare personal protective clothing	71
L0724	Perform cover and concealment techniques for work party security	71
L0730	Perform or set up site security	71
N0825	Develop or procure training materials or aids	71
N0840	Prepare training schedules	71
L0727	Perform or practice first-aid lifesaving techniques	71
L0721	Perform camouflage procedures	71
M0769	Develop or establish work schedules	71

Average number of tasks performed: 172

TABLE 29

TASKS THAT BEST DIFFERENTIATE BETWEEN ANG DAFSC 3E171 AND DAFSC 3E191 PERSONNEL

TASKS	DAFSC 3E171 (N=90)	DAFSC 3E191 (N=7)	DIFFERENCE
C0255 Remove or replace single-phase electrical motors	70	*	70
B0053 Adjust mechanical linkages	68	*	68
C0215 Inspect fuses or circuit breakers	81	14	67
C0214 Inspect electrical wiring or connections	80	14	66
C0246 Remove or replace electrical wiring	79	14	65
C0202 Adjust limit switches	59	0	59
C0264 Solder electrical connections	72	14	58
C0241 Remove or replace circuit breakers	71	14	57
C0239 Perform operational tests on three-phase motors	70	14	56
C0234 Perform continuity checks of electrical systems	69	14	55
M0760 Conduct supervisory performance feedback sessions	41	100	-59
M0755 Assign sponsors for newly assigned personnel	31	86	-55
M0796 Participate in general meetings, such as staff meetings, briefings, conferences, or workshops, other than conducting	48	100	-52
M0788 Evaluate personnel for promotion, demotion, reclassification, or special awards	48	100	-52
M0767 Develop inputs to mobility, contingency, disaster preparedness, or unit emergency or alert plans	28	71	-44
M0762 Counsel subordinates concerning personal matters	56	100	-44
M0791 Initiate personnel action requests	29	71	-43
N0841 Verify CDC course completions	58	100	-42
L0700 Determine specific source of personnel requirements for deployment manning documents	3	43	-40
M0811 Write recommendations for awards or decorations	47	86	-39

TABLE 30

DISTRIBUTION OF AFSC 3E1X1 AFRC
SKILL-LEVEL MEMBERS ACROSS CAREER LADDER JOBS

JOB	3E151 (N=62)	3E171 (N=48)	3E191 (N=16)
GENERAL HVAC/R CLUSTER	36	37	10
MOBILITY/CONTINGENCY JOB	5	2	0
AIR AND WATER DISTRIBUTION SYSTEMS JOB	1	0	0
SUPERVISOR JOB	2	5	4
NOT GROUPED	18	4	2

TABLE 31

TIME SPENT ON DUTIES BY MEMBERS OF AFSC 3E1X1 AFRC
SKILL-LEVEL GROUPS
(RELATIVE PERCENT OF JOB TIME)

DUTIES	DAFSC 3E151 (N=62)	DAFSC 3E171 (N=48)	DAFSC 3E191 (N=16)
A PERFORMING GENERAL HEATING, VENTILATING, AIR-CONDITIONING, AND REFRIGERATION (HVAC/R) ACTIVITIES	12	8	7
B MAINTAINING AIR AND WATER DISTRIBUTION SYSTEMS	20	18	12
C MAINTAINING HVAC/R ELECTRICAL COMPONENTS AND CIRCUITRY	10	10	5
D MAINTAINING HVAC/R CONTROLS	5	6	3
E MAINTAINING HVAC/R FUEL SYSTEMS AND BURNERS	2	2	1
F MAINTAINING STEAM AND HOT WATER GENERATING EQUIPMENT	4	5	3
G MAINTAINING AIR-CONDITIONING AND REFRIGERATION SYSTEMS	9	9	5
H MAINTAINING AIR COMPRESSING EQUIPMENT	2	3	1
I MAINTAINING WARM AIR HEATING OR RADIANT HEATING EQUIPMENT	1	2	1
J PERFORMING INDUSTRIAL WATER OR CORROSION TREATMENT ACTIVITIES	1	1	1
K PERFORMING PRIME BASE ENGINEER EMERGENCY FORCE (BEEF) ACTIVITIES	5	4	7
L PERFORMING MOBILITY AND CONTINGENCY ACTIVITIES	21	13	20
M PERFORMING MANAGEMENT AND SUPERVISORY ACTIVITIES	4	10	20
N PERFORMING TRAINING ACTIVITIES	2	6	9
O PERFORMING GENERAL ADMINISTRATIVE AND TECHNICAL ORDER (TO) SYSTEM ACTIVITIES	1	1	2
P PERFORMING GENERAL SUPPLY, EQUIPMENT, AND MAINTENANCE MANAGEMENT ACTIVITIES	1	2	3

*Indicates less than 1 percent

TABLE 32

REPRESENTATIVE TASKS PERFORMED BY DAFSC 3E151 AFRC PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=62)
L0750	Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols	85
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	85
B0068	Clean air filters	77
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	77
A0023	Measure and cut pipe by hand	74
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	73
L0742	Practice personal hygiene techniques	71
A0009	Fabricate or bend copper tubing	69
B0039	Adjust or align belt tensions	68
B0069	Clean air handlers	68
B0081	Inspect air handler fans	66
A0024	Measure and cut pipe by machine	66
B0089	Inspect drive belts	63
A0037	Thread pipe by hand	63
A0036	Swage copper tubing	63
L0704	Don or doff chemical warfare personal protective clothing	61
L0708	Inspect mobility bags or kits	61
C0250	Remove or replace fuses	61
A0011	Inspect gauges or lines	61
B0082	Inspect blower bearings	61
A0038	Thread pipe by machine	60
A0005	Clean strainers	60
A0032	Remove or install piping or tubing, such as water, refrigerant, or fuel lines	60
B0161	Remove or replace belts or belt guards	58
A0031	Remove or install gauges	58
C0259	Reset circuit breakers	58
B0098	Inspect motor or fan bearings	58
C0212	Inspect electrical motors	58

Average number of tasks performed: 214

TABLE 33

REPRESENTATIVE TASKS PERFORMED BY DAFSC 3E171 AFRC PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=48)
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	98
L0750	Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols	92
A0004	Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment	92
L0708	Inspect mobility bags or kits	90
L0742	Practice personal hygiene techniques	88
B0068	Clean air filters	88
B0039	Adjust or align belt tensions	88
A0009	Fabricate or bend copper tubing	85
A0002	Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping	85
L0739	Practice convoy techniques	83
B0069	Clean air handlers	83
C0250	Remove or replace fuses	83
A0011	Inspect gauges or lines	83
A0023	Measure and cut pipe by hand	83
A0036	Swage copper tubing	83
B0044	Adjust dampers	83
L0727	Perform or practice first-aid lifesaving techniques	81
B0161	Remove or replace belts or belt guards	81
A0031	Remove or install gauges	81
C0212	Inspect electrical motors	81
C0215	Inspect fuses or circuit breakers	81
A0012	Inspect refrigeration or air-conditioning system component mountings	81
A0032	Remove or install piping or tubing, such as water, refrigerant, or fuel lines	81
L0707	Identify and report chemical warfare agents	79
L0741	Practice expedient methods	79
B0139	Remove or install central HVAC/R units	79
B0081	Inspect air handler fans	79
B0082	Inspect blower bearings	79

Average number of tasks performed: 344

TABLE 34

TASKS THAT BEST DIFFERENTIATE BETWEEN AFRC DAFSC 3E151 AND DAFSC 3E171 PERSONNEL

TASKS	DAFSC 3E151 (N=62)	DAFSC 3E171 (N=48)	DIFFERENCE
M0761 Conduct supervisory orientations for newly assigned personnel	13	69	-56
M0760 Conduct supervisory performance feedback sessions	11	67	-55
M0787 Evaluate personnel for compliance with performance standards	16	69	-53
M0788 Evaluate personnel for promotion, demotion, reclassification, or special awards	11	65	-53
M0768 Develop or establish work methods or procedures	13	60	-48
N0841 Verify CDC course completions	16	65	-48
M0769 Develop or establish work schedules	18	65	-47
M0810 Write or indorse military performance reports	5	52	-47
N0817 Certify trainees on task knowledge for specialty training standards (STSs)	19	67	-47
N0822 Counsel trainees on training progress	19	67	-47
N0816 Brief personnel concerning training programs or matters	15	60	-46
N0837 Maintain training records or files	29	75	-46
M0754 Assign personnel to work areas or duty positions, other than for mobilities or contingencies	8	54	-46
N0832 Evaluate progress of trainees	19	65	-45
M0789 Implement safety or security programs	18	60	-43
N0823 Determine training requirements	13	56	-43
N0821 Conduct OJT	35	77	-42
M0790 Initiate actions required due to substandard performance of personnel	8	50	-42

TABLE 35

REPRESENTATIVE TASKS PERFORMED BY DAFSC 3E191 AFRC PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=16)
L0727	Perform or practice first-aid lifesaving techniques	100
L0750	Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols	100
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	94
L0729	Perform military field sanitation techniques	94
L0704	Don or doff chemical warfare personal protective clothing	88
L0742	Practice personal hygiene techniques	88
L0741	Practice expedient methods	88
N0832	Evaluate progress of trainees	88
N0822	Counsel trainees on training progress	88
M0788	Evaluate personnel for promotion, demotion, reclassification, or special awards	88
M0796	Participate in general meetings, such as staff meetings, briefings, conferences, or workshops, other than conducting	81
L0749	Set up or tear down shelters	81
M0811	Write recommendations for awards or decorations	81
N0814	Assign on-the-job training (OJT) trainers	81
M0758	Conduct self-inspections or self-assessments	81
M0787	Evaluate personnel for compliance with performance standards	81
M0762	Counsel subordinates concerning personal matters	81
M0769	Develop or establish work schedules	81
M0757	Conduct safety inspections of equipment or facilities	75
L0743	Practice self-protection from extreme weather	75
M0754	Assign personnel to work areas or duty positions, other than for mobilities or contingencies	75
N0841	Verify CDC course completions	75
M0761	Conduct supervisory orientations for newly assigned personnel	75
L0707	Identify and report chemical warfare agents	75
K0661	Inspect and report base damages	75
M0786	Evaluate utilization of equipment, tools, parts, supplies, or workspace	75
M0794	Investigate accidents or incidents	75
M0755	Assign sponsors for newly assigned personnel	69
M0756	Conduct general meetings, such as staff meetings, briefings, conferences, or workshops	69

Average number of tasks performed: 277

TABLE 36

TASKS THAT BEST DIFFERENTIATE BETWEEN AFRC DAFSC 3E171 AND DAFSC 3E191 PERSONNEL

TASKS	DAFSC 3E171 (N=48)	DAFSC 3E191 (N=16)	DIFFERENCE
G0509	71	25	46
B0044	83	38	46
G0531	71	25	46
B0048	71	25	46
C0215	81	38	44
E0371	54	13	42
G0530	67	25	42
C0238	77	38	40
C0231	71	31	40
K0651	13	63	-50
M0773	21	69	-48
M0774	17	63	-46
L0690	19	63	-44
M0770	27	69	-42
M0794	35	75	-40
M0756	29	69	-40
K0669	21	56	-35

TABLE 37

RELATIVE PERCENT OF TIME SPENT ACROSS DUTIES BY
FIRST ENLISTMENT (1-48 MONTHS TAFMS) AFSC 3E1X1 AD PERSONNEL

DUTIES		PERCENT TIME SPENT
A	PERFORMING GENERAL HEATING, VENTILATING, AIR-CONDITIONING, AND REFRIGERATION (HVAC/R) ACTIVITIES	10
B	MAINTAINING AIR AND WATER DISTRIBUTION SYSTEMS	26
C	MAINTAINING HVAC/R ELECTRICAL COMPONENTS AND CIRCUITRY	13
D	MAINTAINING HVAC/R CONTROLS	9
E	MAINTAINING HVAC/R FUEL SYSTEMS AND BURNERS	3
F	MAINTAINING STEAM AND HOT WATER GENERATING EQUIPMENT	8
G	MAINTAINING AIR-CONDITIONING AND REFRIGERATION SYSTEMS	12
H	MAINTAINING AIR COMPRESSING EQUIPMENT	5
I	MAINTAINING WARM AIR HEATING OR RADIANT HEATING EQUIPMENT	2
J	PERFORMING INDUSTRIAL WATER OR CORROSION TREATMENT ACTIVITIES	2
K	PERFORMING PRIME BASE ENGINEER EMERGENCY FORCE (BEEF) ACTIVITIES	2
L	PERFORMING MOBILITY AND CONTINGENCY ACTIVITIES	5
M	PERFORMING MANAGEMENT AND SUPERVISORY ACTIVITIES	1
N	PERFORMING TRAINING ACTIVITIES	*
O	PERFORMING GENERAL ADMINISTRATIVE AND TECHNICAL ORDER (TO) SYSTEM ACTIVITIES	8
P	PERFORMING GENERAL SUPPLY, EQUIPMENT, AND MAINTENANCE MANAGEMENT ACTIVITIES	1

* Indicates less than 1 percent

TABLE 38

REPRESENTATIVE TASKS PERFORMED BY FIRST ENLISTMENT (1-48 MONTHS TAFMS)
AD PERSONNEL

TASKS		PERCENT MEMBERS PERFORMING (N=417)
B0043	Adjust couplings or pulleys	83
C0239	Perform operational tests on three-phase motors	83
B0107	Inspect water pumps	83
B0162	Remove or replace bearings or bushings, such as in motors, compressors, pumps, or shafts	82
B0109	Install circulating pumps	82
C0214	Inspect electrical wiring or connections	82
B0167	Remove or replace fans or blowers	81
B0164	Remove or replace couplings or pulleys	81
C0235	Perform electrical troubleshooting on air-conditioning systems	81
B0082	Inspect blower bearings	81
C0246	Remove or replace electrical wiring	81
B0151	Remove or install solenoid valves	81
G0496	Locate refrigerant leaks using soap solutions	81
B0131	Perform RWP inspections on fan-coil units	80
A0013	Install air bleed valves	79
A0018	Install insulating materials on pipes, other than preformed insulation	79
L0706	Fire weapons for qualification, such as M-16 rifles or 9mm pistols	78
A0001	Assemble high- or low-pressure fittings	78
B0091	Inspect fan coil units	77
C0257	Remove or replace three-phase electrical motors	77
B0048	Adjust hand-operated valves	77
B0079	Examine water valves or tubes for leaks	77
B0190	Service water pumps	77
B0076	Determine drive belt sizes	77
A0012	Inspect refrigeration or air-conditioning system component mountings	77
C0261	Reverse direction of rotation on electrical motors	77

Average number of tasks performed: 361

TABLE 39

HVAC/R CONTROL SYSTEMS MAINTAINED BY AD
FIRST-ENLISTMENT AFSC 3E1X1 PERSONNEL (PERCENT MAINTAINING)

CONTROL SYSTEM	1ST ENL (N=417)
Honeywell	74
Johnson	65
Barber-Coleman	60
Robert-Shaw	49
Powers	32
Siebe	22
Stafea	15
None	16
Other	10

TABLE 40

SYSTEMS AND EQUIPMENT MAINTAINED BY AD
FIRST-ENLISTMENT AFSC 3E1X1 PERSONNEL (PERCENT MAINTAINING)

EQUIPMENT	1ST ENL (N=417)
Air Handling Units (AHUs)	92
Pumps	88
Air compressors, real property installed equipment	83
Computer room air conditioning systems	83
Central air conditioners, 5-ton or below	79
Window air conditioning units	78
Package air conditioning or refrigeration units	77
Gas-fired equipment	76
Heat pumps	76
Central air conditioners, over 5 ton	75
Combo heating and evaporative cooling units	72
Ventilating equipment	68
Forced warm air heating systems	67
Commercial reciprocating chilled water systems	65
Commercial water heaters	64
Low-pressure steam heating systems	63
Tent heaters	63
Equipment-cooling refrigeration equipment	62
Low-temperature water heating systems	62
Walk-in refrigeration boxes	62
Ice machines	61
Cooling towers	61
Space heaters	60
Domestic water heaters	57
Refrigerated drinking fountains	55
Evaporative coolers	55
Sectional walk-in refrigeration equipment	54
High-pressure steam heating systems	53
Unit heaters	51
Refrigeration systems, other than portable	51

TABLE 41

EQUIPMENT AND TOOLS USED BY AD
FIRST-ENLISTMENT AFSC 3E1X1 PERSONNEL (PERCENT USING)

EQUIPMENT	1ST ENL (N=417)
Acetylene torch kits	94
Clamp-on ammeters	92
Pipe cutting and threading equipment	92
Flaring and swaging tool kits	90
Digital multimeters	89
Vacuum pumps	89
Manifold gauge assemblies	87
Tube cutters	86
Service valve wrenches	86
Refrigerant reclaim units	86
Oxygen acetylene welding equipment	85
Crimping tools	85
Portable power drills	83
Electronic leak detectors	82
Protective clothing	81
Tube benders	81
Bearing pullers	78
Pully pullers	77
Ohmmeters, other than megohmmeters	72
Ammeters, other than clamp-on	72
Propane torch kits	69
Drill presses	68
Soldering guns or irons	67
Grinders	65
Thermometers, electronic	65
Thermometers, mercury	64
Analog multimeters	64
Calculators	62
Thermometers, digital	60

TABLE 42

EXAMPLES OF AFSC 3E1X1 TASKS WITH HIGHEST TRAINING EMPHASIS RATINGS

TASKS	TNG EMP	PERCENT MEMBERS PERFORMING					
		1-24 MOS TAFMS	1-48 MOS TAFMS	3- SKL LVL	5- SKL LVL	7- SKL LVL	
C235	6.40	79	81	82	81	57	
A29	6.30	68	76	76	81	68	
C236	6.26	74	76	76	75	55	
G510	6.05	72	75	76	75	54	
A2	5.72	94	93	94	89	57	
G496	5.72	80	81	80	78	52	
C237	5.70	62	63	63	58	43	
G486	5.70	63	66	65	67	49	
C268	5.58	59	61	61	71	53	
C231	5.51	69	71	71	74	60	
G508	5.51	68	73	71	69	49	
C239	5.49	83	83	83	82	56	
C238	5.47	83	83	85	77	55	
C233	5.42	69	72	72	75	59	
C261	5.37	74	76	77	77	57	
G495	5.35	64	67	65	69	49	
C266	5.26	58	61	61	60	49	
C265	5.21	55	61	61	60	47	
C267	5.21	63	66	65	67	51	
I621	5.21	52	58	56	57	47	
C234	5.14	68	72	72	77	55	

TE MEAN = 2.54; S.D. = 2.43; HIGH = 4.97

TABLE 43

EXAMPLES OF AFSC 3E1X1 TASKS WITH HIGHEST TASK DIFFICULTY RATINGS

TASKS	TSK DIF	PERCENT MEMBERS PERFORMING				
		1-24 MOS TAFMS	1-48 MOS TAFMS	3- SKL LVL	5- SKL LVL	7- SKL LVL
D308	8.25	28	33	31	25	22
B127	7.92	38	47	47	44	33
D333	7.86	29	34	32	32	28
D332	7.73	28	34	34	35	30
D334	7.67	28	31	30	30	26
D303	7.59	30	35	33	38	40
D290	7.56	21	25	24	21	17
D291	7.47	19	23	22	19	11
D304	7.45	24	29	27	31	25
D361	7.45	46	48	47	44	33
D331	7.42	11	15	13	20	19
D292	7.34	30	32	32	30	28
B134	7.27	19	26	26	27	24
D287	7.25	31	34	33	28	24
A29	7.23	68	76	76	81	68
D293	7.13	30	35	35	31	28
D294	7.10	26	30	28	27	27
D360	7.06	57	56	55	51	32
B123	7.06	31	34	32	29	21
D299	7.02	24	26	26	24	18
D288	7.01	35	36	36	29	25

TD MEAN = 5.00; S.D. = 1.00; HIGH = 6.00

TABLE 44

EXAMPLE TASKS PERFORMED BY 20 PERCENT OR MORE AD
3E1X1 MEMBERS AND NOT REFERENCED TO THE STS

TASKS	TNG EMP	PERCENT PERFORMING				TSK DIF
		1-24	1-48	3-		
		MOS TAFMS	MOS TAFMS	SKILL LEVEL		
C212	Inspect electrical motors	5.09	83	84	85	4.58
C268	Wire control circuits	5.58	59	61	61	5.86
C233	Measure motor running currents with clamp-on meters	5.42	69	72	72	3.92
C266	Test motor start or run capacitors	5.26	58	61	61	5.05
C265	Test motor start or run windings	5.21	55	61	61	5.03
C267	Test transformers	5.21	63	66	65	4.72
C234	Perform continuity checks of electrical systems	5.14	68	72	72	4.33
C215	Inspect fuses or circuit breakers	5.07	86	85	86	4.14
G491	Evacuate or dehydrate refrigeration or air conditioning systems using vacuum pumps	5.05	58	62	62	4.74
C214	Inspect electrical wiring or connections	5.05	80	82	82	4.41
D333	Operate DDC systems	3.65	29	34	32	7.86
D356	Remove or replace DDC sensors	3.35	27	32	30	5.76
D308	Install direct digital control (DDC) systems	2.26	28	33	31	8.25

TABLE 45

COMPARISON OF JOB SATISFACTION INDICATORS
TO COMPARABLE SAMPLE BY TAFMS GROUPS
(PERCENT MEMBERS RESPONDING)

	1-48 MOS TAFMS			49-96 MOS TAFMS			97+ MOS TAFMS		
	1999	3E1X1	COMP SAMPLE (N=249)	1999	3E1X1	COMP SAMPLE (N=190)	1999	3E1X1	COMP SAMPLE (N=383)
<u>EXPRESSED JOB INTEREST</u>									
INTERESTING	82		77	81		80	87		81
SO-SO	10		13	11		10	9		12
DULL	7		10	8		10	4		7
<u>PERCEIVED USE OF TALENTS</u>									
FAIRLY WELL TO PERFECT	87		84	89		82	90		83
NONE TO VERY LITTLE	13		16	11		18	10		17
<u>PERCEIVED USE OF TRAINING</u>									
FAIRLY WELL TO PERFECT	90		88	84		85	85		87
NONE TO VERY LITTLE	10		12	16		15	15		13
<u>SENSE OF ACCOMPLISHMENT FROM JOB</u>									
SATISFIED	81		74	77		72	79		73
NEUTRAL	9		10	9		11	9		9
DISSATISFIED	10		16	14		17	12		18
<u>REENLISTMENT INTENTIONS</u>									
YES OR PROBABLY YES	50		47	58		54	66		72
NO OR PROBABLY NO	50		53	42		46	8		11
WILL RETIRE	N/A		N/A	N/A		N/A	26		17

TABLE 46

COMPARISON OF JOB SATISFACTION INDICATORS
BETWEEN 1999 AND 1996 SURVEYS BY TAFMS GROUPS
(PERCENT MEMBERS RESPONDING)

	<u>1-48 MOS TAFMS</u>		<u>49-96 MOS TAFMS</u>		<u>97+ MOS TAFMS</u>	
	1999	1996	1999	1996	1999	1996
	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
	(N=417)	(N=321)	(N=168)	(N=138)	(N=447)	(N=457)
<u>EXPRESSED JOB INTEREST</u>						
INTERESTING	82	82	81	85	87	80
SO-SO	10	12	11	8	9	13
DULL	7	6	8	7	4	7
<u>PERCEIVED USE OF TALENTS</u>						
FAIRLY WELL TO PERFECT	87	84	89	87	90	83
NONE TO VERY LITTLE	13	16	11	13	10	17
<u>PERCEIVED USE OF TRAINING</u>						
FAIRLY WELL TO PERFECT	90	87	84	82	85	74
NONE TO VERY LITTLE	10	13	16	18	15	26
<u>SENSE OF ACCOMPLISHMENT FROM JOB</u>						
SATISFIED	81	74	77	74	79	72
NEUTRAL	9	15	9	11	9	9
DISSATISFIED	10	11	14	15	12	19
<u>REENLISTMENT INTENTIONS</u>						
YES OR PROBABLY YES	50	56	58	83	66	70
NO OR PROBABLY NO	50	44	42	17	8	12
WILL RETIRE	N/A	N/A	N/A	N/A	26	18

TABLE 47

JOB SATISFACTION INDICATORS FOR
IDENTIFIED JOB GROUPS AND CLUSTERS (PERCENT MEMBERS RESPONDING)
(AD)

	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG0165)	AIR & WATER DIST. SYS. JOB (STG0163)	SUPERVISOR JOB (STG179)
<u>EXPRESSED JOB INTEREST</u>				
INTERESTING	86	40	60	90
SO-SO	9	40	20	3
DULL	5	20	20	7
<u>PERCEIVED USE OF TALENTS</u>				
FAIRLY WELL TO PERFECT	91	60	90	88
NONE TO VERY LITTLE	9	40	10	12
<u>PERCEIVED USE OF TRAINING</u>				
FAIRLY WELL TO PERFECT	90	40	90	81
NONE TO VERY LITTLE	10	60	10	19
<u>SENSE OF ACCOMPLISHMENT FROM JOB</u>				
SATISFIED	90	60	80	91
NEUTRAL	10	40	20	9
DISSATISFIED				
<u>REENLISTMENT INTENTIONS</u>				
YES OR PROBABLY YES	59	60	50	52
NO OR PROBABLY NO	31	0	40	16
WILL RETIRE	10	40	10	32

TABLE 48

JOB SATISFACTION INDICATORS FOR
IDENTIFIED JOB GROUPS AND CLUSTERS (PERCENT MEMBERS RESPONDING)
(ANG)

	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG0165)	AIR & WATER DIST. SYS. JOB (STG0163)	SUPERVISOR JOB (STG179)
<u>EXPRESSED JOB INTEREST</u>				
INTERESTING	81	100	50	93
SO-SO	14	0	0	0
DULL	5	0	50	7
<u>PERCEIVED USE OF TALENTS</u>				
FAIRLY WELL TO PERFECT	83	100	0	93
NONE TO VERY LITTLE	17	0	100	7
<u>PERCEIVED USE OF TRAINING</u>				
FAIRLY WELL TO PERFECT	85	100	0	93
NONE TO VERY LITTLE	15	0	100	7
<u>SENSE OF ACCOMPLISHMENT FROM JOB</u>				
SATISFIED	74	100	50	71
NEUTRAL	13	0	50	7
DISSATISFIED	13	0	0	21

TABLE 49

JOB SATISFACTION INDICATORS FOR
IDENTIFIED JOB GROUPS AND CLUSTERS (PERCENT MEMBERS RESPONDING)
(AFRC)

	GENERAL HVAC/R CLUSTER (STG061)	MOBILITY/ CONTINGENCY JOB (STG0165)	AIR & WATER DIST. SYS. JOB (STG0163)	SUPERVISOR JOB (STG179)
<u>EXPRESSED JOB INTEREST</u>				
INTERESTING	92	57	100	100
SO-SO	4	43	0	0
DULL	5	0	0	0
<u>PERCEIVED USE OF TALENTS</u>				
FAIRLY WELL TO PERFECT	78	86	100	91
NONE TO VERY LITTLE	22	14	0	9
<u>PERCEIVED USE OF TRAINING</u>				
FAIRLY WELL TO PERFECT	81	86	100	82
NONE TO VERY LITTLE	19	14	0	18
<u>SENSE OF ACCOMPLISHMENT FROM JOB</u>				
SATISFIED	73	57	100	82
NEUTRAL	11	29	0	18
DISSATISFIED	16	14	0	0

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C
LISTING OF MODULES AND TASK STATEMENTS

THIS PAGE INTENTIONALLY LEFT BLANK

These task modules (TMs) were developed in order to organize and summarize the extensive task information of this specialty. The TMs were developed by statistically clustering tasks, which are coperformed by the same incumbents, then asking SMEs to refine the statistical clusters and provide titles for the resulting groups. Statistical copformance is a measure of how probable it is that a task will be performed with another task, based upon the responses of surveyed personnel. For example, if an individual performs one storeroom task, the probability is very high that he or she will perform other equipment/supply tasks. Thus, the group of supply/equipment tasks can be considered a "natural group" of associated or related tasks (see TM 5 below). The statistical clustering generally approximates these "natural groupings", while SME judgments correct any problems that result from, for example, statistical anomalies.

The title of each TM is a best estimate as to the generic subject content of the group of tasks. The TMs are useful for organizing the task data into meaningful units and as a way to concisely summarize the extensive job data. However, TMs are only one way to organize the information. Other strategies may also be valid.

TM01 - CONTINGENCIES

- K0642 Assist in evaluating airfield assault strips
- K0643 Assist in evaluating landing zones
- K0645 Compute repair quality criteria (RQC) for rapid runway repairs (RRRs)
- K0646 Construct berms or dikes
- K0647 Construct fiberglass reinforced polyurethane (FRP) for runway repairs
- K0648 Construct field fortifications
- K0649 Construct field latrines
- K0650 Construct field utility systems
- K0651 Develop bare base plans
- K0652 Develop base denial plans
- K0653 Develop camp cantonment layouts
- K0654 Erect bare base structures
- K0655 Erect concrete portable revetments for aircraft parking
- K0656 Erect steel revetments
- K0657 Establish assault strips
- K0658 Identify and report suspected unexploded ordnance (UXO)
- K0659 Identify bomb crater damages
- K0660 Identify natural and man-made resources for cantonment areas
- K0661 Inspect and report base damages
- K0662 Install aircraft arresting systems
- K0663 Install airfield lighting or navigational aids
- K0664 Install polyurethane impregnated fiberglass mats (IFMs)

- K0665 Install secondary distribution centers
- K0666 Install tent lighting
- K0667 Lay or assemble AM-2 matting
- K0668 Lay out aircraft revetments
- K0669 Lay out bare base site facilities or utilities
- K0670 Lay out minimum operating strip (MOS) centerlines
- K0671 Lay out taxiway and runway traffic markings
- K0672 Maintain airfield lighting
- K0673 Maintain field engineering directives
- K0674 Maintain secondary distribution centers
- K0675 Operate RRR equipment
- K0676 Perform bomb damage repairs, other than crater repairs
- K0677 Perform camp cantonment construction techniques
- K0678 Perform crater layout surveys
- K0679 Perform crater profile measurements (CPMs)
- K0680 Perform damage control command and control activities
- K0681 Perform damage control duties, other than command and control activities
- K0682 Perform emergency shutoff procedures for base utility systems
- K0683 Perform scab or spall repairs
- K0684 Perform small crater crushed-stone repairs
- K0685 Perform survival recovery cell operations
- K0686 Prepare cantonment area maps
- K0687 Repair bomb craters
- K0688 Tow AM-2 matting
- L0689 Assemble or disassemble mobile HVAC/R equipment
- L0690 Assign personnel to mobility or contingency positions
- L0691 Brief deploying personnel
- L0692 Complete operations plan (OPLAN) sourcing requirements
- L0693 Compute OPLAN requirements status listings
- L0694 Conduct contingency operation/mobility planning and execution system (COMPES) programs
- L0695 Conduct mobility or deployment site surveys
- L0696 Coordinate deployment of personnel with other MAJCOMs or joint service commands
- L0697 Coordinate exercise sourcing requirements with functional managers
- L0698 Coordinate specific source of personnel requirements with appropriate agencies
- L0699 Determine cost factors for support agreements
- L0700 Determine specific source of personnel requirements for deployment manning documents
- L0701 Develop contingency exercise mobility (CEM) orders
- L0702 Develop mobility inspection checklists
- L0703 Dig trenches
- L0704 Don or doff chemical warfare personal protective clothing
- L0705 Draft or write mobility or deployment after-action reports

- L0706 Fire weapons for qualification, such as M-16 rifles or 9mm pistols
- L0707 Identify and report chemical warfare agents
- L0708 Inspect mobility bags or kits
- L0709 Inspect packed or palletized mobility or contingency equipment prior to transport
- L0710 Load or unload mobile HVAC/R equipment
- L0711 Load plan aircraft for deployments
- L0712 Maintain accountability of personnel selected to fill OPLAN requirements
- L0713 Maintain base OPLAN files
- L0714 Maintain contingency HVAC/R systems or equipment
- L0715 Maintain disaster preparedness checklists
- L0716 Maintain overseas utility systems
- L0717 Maintain war reserve supply kits (WRSKs)
- L0718 Maintain or update contingency plans
- L0719 Monitor operations of mobile equipment, such as generators or HVAC/R equipment
- L0720 Pack or palletize mobility or contingency equipment for shipment or movement
- L0721 Perform camouflage procedures
- L0722 Perform camp security
- L0723 Perform chemical warfare agent decontamination procedures
- L0724 Perform cover and concealment techniques for work party security
- L0725 Perform disease or pestilence countermeasures
- L0726 Perform explosive ordnance reconnaissance
- L0727 Perform or practice first-aid lifesaving techniques
- L0728 Perform individual movement techniques for work party security
- L0729 Perform military field sanitation techniques
- L0730 Perform or set up site security
- L0731 Perform pallet buildup activities
- L0732 Perform plans file and mobility file matches
- L0733 Perform predeployment reconnaissance surveys
- L0734 Perform start-up or shut-down procedures for mobile generators
- L0735 Perform start-up or shut-down procedures for mobile refrigeration or air-conditioning equipment
- L0736 Perform weapons fire control duties
- L0737 Practice command and control techniques
- L0738 Practice communications security (COMSEC) or operations security (OPSEC) during contingency exercises or operations
- L0739 Practice convoy techniques
- L0740 Practice demolition or base denial techniques
- L0741 Practice expedient methods
- L0742 Practice personal hygiene techniques
- L0743 Practice self-protection from extreme weather
- L0744 Prepare sites at deployed locations, such as cutting grass or removing snow
- L0745 Process classified materials or documents at deployed locations
- L0746 Provide OPLAN requirements status listings to unit commanders

L0747 Remove or install batteries
L0748 Request or distribute mobility requirements documents
L0749 Set up or tear down shelters
L0750 Tear down, inspect, clean, and reassemble weapons, such as M-16 rifles or 9mm pistols
M0775 Draft host-tenant or interservice agreements
O0846 Destroy classified materials or documents
O0847 Establish or maintain accountability records for classified materials or documents
O0848 Establish or maintain automated technical order management system (ATOMS) accounts
O0851 Initiate classified reports, messages, or documents
O0854 Inventory classified materials or documents
O0857 Maintain publications libraries, other than technical order (TO) libraries
O0858 Maintain time compliance technical orders (TCTOs)
O0859 Maintain TO libraries
O0860 Participate in TCTO meetings
O0861 Prepare administrative or classified materials or documents for mailing, transporting, or issue
O0862 Review TO changes
O0874 Draft recommendations for changes in equipment
P0875 Initiate requisitions for equipment, tools, parts, or supplies
P0876 Inventory equipment, tools, parts, or supplies
P0877 Issue or log turn-ins of equipment, tools, parts, or supplies
P0883 Pick up, deliver, or store equipment, tools, parts, or supplies

TM02 - SERVICE HVAC

A0002 Braze, weld, or silver solder lines or fittings, such as condensers, receivers, evaporators, tubing, or piping
A0004 Clean drains on heating, ventilation, air-conditioning, and refrigeration (HVAC/R) equipment
A0005 Clean strainers
A0009 Fabricate or bend copper tubing
A0011 Inspect gauges or lines
A0012 Inspect refrigeration or air-conditioning system component mountings
A0023 Measure and cut pipe by hand
A0024 Measure and cut pipe by machine
A0029 Read or interpret blueprints, diagrams, drawings, or specifications
A0031 Remove or install gauges
A0032 Remove or install piping or tubing, such as water, refrigerant, or fuel lines
A0036 Swage copper tubing
A0037 Thread pipe by hand

- A0038 Thread pipe by machine
- B0039 Adjust or align belt tensions
- B0043 Adjust couplings or pulleys
- B0044 Adjust dampers
- B0061 Align motors
- B0068 Clean air filters
- B0069 Clean air handlers
- B0076 Determine drive belt sizes
- B0080 Inspect air filtering systems
- B0081 Inspect air handler fans
- B0082 Inspect blower bearings
- B0089 Inspect drive belts
- B0091 Inspect fan coil units
- B0098 Inspect motor or fan bearings
- B0107 Inspect water pumps
- B0109 Install circulating pumps
- B0121 Lubricate bearings, bushings, or damper or valve linkages
- B0131 Perform RWP inspections on fan-coil units
- B0139 Remove or install central HVAC/R units
- B0148 Remove or install package air-conditioning units
- B0151 Remove or install solenoid valves
- B0157 Remove or install window air-conditioning units
- B0161 Remove or replace belts or belt guards
- B0162 Remove or replace bearings or bushings, such as in motors, compressors, pumps, or shafts
- B0164 Remove or replace couplings or pulleys
- B0167 Remove or replace fans or blowers
- B0178 Remove or replace solenoid valve components, such as coils or valve bodies
- B0186 Service fans or blowers
- B0190 Service water pumps
- B0191 Shut down HVAC/R systems for civil engineering (CE) or contractor maintenance
- B0198 Troubleshoot solenoid valves
- C0207 Calculate proper size pulleys
- C0212 Inspect electrical motors
- C0213 Inspect electrical power supplies, other than controls
- C0214 Inspect electrical wiring or connections
- C0215 Inspect fuses or circuit breakers
- C0231 Measure motor current draws
- C0233 Measure motor running currents with clamp-on meters
- C0234 Perform continuity checks of electrical systems
- C0235 Perform electrical troubleshooting on air-conditioning systems
- C0236 Perform electrical troubleshooting on refrigeration systems, other than controls
- C0238 Perform operational tests on single-phase motors
- C0239 Perform operational tests on three-phase motors

C0241 Remove or replace circuit breakers
C0246 Remove or replace electrical wiring
C0250 Remove or replace fuses
C0255 Remove or replace single-phase electrical motors
C0257 Remove or replace three-phase electrical motors
C0259 Reset circuit breakers
C0260 Reset motor thermal overloads
C0261 Reverse direction of rotation on electrical motors
C0263 Service electrical motors
F0396 Clean new tube ends with emery cloth
F0404 Cut tubes to prescribed length
G0486 Charge air-conditioning or refrigeration systems with refrigerant, other than centrifugal systems
G0491 Evacuate or dehydrate refrigeration or air-conditioning systems using vacuum pumps
G0495 Locate refrigerant leaks using electronic or halide leak detectors
G0496 Locate refrigerant leaks using soap solutions
G0504 Perform preoperational or postoperational checks on refrigeration or air-conditioning systems
G0505 Perform RWP inspections on refrigeration systems
G0507 Pressure check refrigeration systems with dry nitrogen
G0508 Pump down refrigeration or air-conditioning systems
G0509 Purge refrigerant lines or units
G0510 Recover system refrigerants
G0530 Remove or replace refrigerant compressors
G0531 Remove or replace refrigerant dryer filters or cartridges
G0541 Service air-cooled condensers
G0555 Service window air-conditioning units
H0575 Adjust air compressor belts
H0579 Drain air tanks
H0580 Examine oil levels in compressors or crankcases
H0595 Perform RWP inspections on air compressor systems

TM03 - INSTALL/REMOVE MECHANICAL COMPONENTS

A0013 Install air bleed valves
A0014 Install black iron steam condensate lines
A0015 Install check valves
A0016 Install distribution lines on HVAC/R systems
A0017 Install HVAC/R gauge glasses
A0018 Install insulating materials on pipes, other than preformed insulation

A0019 Install preformed insulation
A0026 Measure and cut preformed insulation
A0030 Remove or install flange gaskets
A0033 Remove or install pressure regulators, such as air, water, refrigerant, or
crankcase regulators
B0048 Adjust hand-operated valves
B0050 Adjust hot water valves
B0053 Adjust mechanical linkages
B0055 Adjust packing on water pumps
B0070 Clean chilled water coils
B0071 Clean direct or indirect expansion coils
B0072 Clean hot water coils
B0077 Examine mechanical operation of dampers
B0078 Examine mechanical operation of water valves
B0079 Examine water valves or tubes for leaks
B0083 Inspect centrifugal water pump operations
B0084 Inspect chilled water coils
B0085 Inspect damper travels
B0086 Inspect dampers
B0088 Inspect direct expansion coils
B0093 Inspect hot water coils
B0100 Inspect safety relief valves
B0106 Inspect water expansion tanks
B0110 Install feed or condensate pumps
B0135 Purge air or contaminants from water lines
B0137 Remove or install air vents
B0152 Remove or install space heaters
B0155 Remove or install unit heaters
B0160 Remove or replace balancing valves
B0172 Remove or replace HVAC/R water valves
B0173 Remove or replace insulating materials on ducts, other than asbestos insulation
B0174 Remove or replace mechanical seals, such as on water pumps or compressors
B0197 Troubleshoot oil separators
J0627 Drain water or antifreeze

TM04 - INSTALL/REMOVE ELECTRICAL COMPONENTS

C0219 Inspect start or run capacitors
C0220 Inspect transformers
C0222 Install motor starters

C0227 Install start or run capacitors
C0228 Install transformers
C0244 Remove or replace electrical motor starter components, such as relays or magnetic starters
C0245 Remove or replace electrical motor starters
C0252 Remove or replace heater elements
C0253 Remove or replace limit switches
C0258 Remove or replace time delay relays
C0262 Service electrical motor starters
C0265 Test motor start or run windings
C0266 Test motor start or run capacitors
C0267 Test transformers
C0268 Wire control circuits

0005 TM05 - INSTALL/REMOVE/INSPECT BOILER COMPONENTS

A0007 Dispose of capacitors
A0027 Pack contaminated refrigerants for shipment, including labeling, storing, or handling
B0146 Remove or install oil filters
D0355 Remove or install threaded fittings
D0359 Troubleshoot electrical control systems, other than timers
E0368 Inspect fuel systems for leaks
E0369 Inspect gas burners
F0472 Troubleshoot heating systems or boilers

TM06 - MAINTAIN BRAZING/SOLDERING EQUIPMENT

A0001 Assemble high- or low-pressure fittings
A0010 Identify high- or low-pressure fittings
A0020 Maintain acetylene brazing equipment
A0021 Maintain material safety data sheets (MSDSs)
A0022 Maintain oxyacetylene brazing equipment

TM07 - HVAC ELECTRICAL/MECHANICAL CONTROLS

B0046 Adjust dual duct terminal devices

B0052 Adjust induction terminal devices
B0054 Adjust mixed air systems
B0062 Calibrate dual duct terminal devices
B0073 Clean pipe water heating systems
B0090 Inspect dual duct terminal devices
B0096 Inspect ion filters
B0097 Inspect mixed air systems
B0101 Inspect steam coils
B0103 Inspect steam traps
B0113 Install heating blowers
B0114 Install pressure regulating valves (PRVs)
B0115 Install reciprocating pumps
B0116 Install safety relief valves, other than boiler safety relief valves
B0117 Install steam heating system valves or fittings
B0119 Install water regulating valves
B0120 Isolate pipe water heating system malfunctions
B0128 Perform preoperational, operational, or postoperational checks on chilled water circuits
B0163 Remove or replace chilled water coils
B0170 Remove or replace hot water coils
B0175 Remove or replace oil pumps
B0176 Remove or replace pump packing materials
B0179 Remove or replace steam coils
B0180 Remove or replace steam heating system pressure relief valves
B0188 Service refrigerant flow controls
B0189 Service water expansion tanks
B0192 Trace steam distribution systems
B0196 Troubleshoot oil pumps
C0200 Adjust float switches
C0201 Adjust flow or sail switches
C0202 Adjust limit switches
C0204 Adjust temperature-actuated switches
C0205 Adjust time delay relays
C0216 Inspect hands-off automatic switches
C0218 Inspect motor starters for proper heater sizes
C0230 Isolate electrical system malfunctions
C0240 Remove or replace across-the-line starters
C0242 Remove or replace control stations or switches
C0243 Remove or replace electric motor components, other than bushings or bearings
C0248 Remove or replace float switches
C0249 Remove or replace flow or sail switches
C0251 Remove or replace hands-off automatic switches
C0256 Remove or replace temperature-actuated switches
C0264 Solder electrical connections

- D0276 Adjust or set timers
- D0306 Inspect timers
- D0325 Install pressure controls
- D0327 Install safety controls
- D0328 Install timers
- D0330 Install valve or damper linkages
- D0348 Remove or install electrical or electronic HVAC/R control systems
- D0349 Remove or install electrically operated valves
- D0350 Remove or install electronic actuator motors
- D0354 Remove or install mechanical linkages
- D0358 Test safety control operations
- D0362 Troubleshoot low-ambient temperature controls, such as dampers or condenser fan speed controls
- D0364 Troubleshoot timers
- D0365 Troubleshoot water flow control switches

TM08 - TROUBLESHOOT AC CONTROLS

- G0489 Determine refrigerant line sizes
- G0494 Locate refrigerant leaks using dye solutions
- G0501 Perform periodic inspections on refrigerant recovery equipment
- G0502 Perform periodic inspections on vacuum pumps
- G0514 Remove or replace components of refrigerant metering devices, such as AEVs, TEVs, or electronic expansion valves (EEVs)
- G0516 Remove or replace condensers
- G0519 Remove or replace crankcase oil heaters, other than on air compressors
- G0522 Remove or replace evaporators
- G0523 Remove or replace heat pump components
- G0524 Remove or replace heat pumps
- G0527 Remove or replace reciprocating air-conditioning system components
- G0536 Remove or replace refrigeration systems
- G0543 Service direct expansion evaporators
- G0545 Service heat pumps
- G0549 Service refrigerant compressors with lubricants
- G0550 Service refrigerant recovery equipment
- G0553 Service vacuum pumps
- G0559 Troubleshoot components of refrigerant metering devices, such as AEVs, TEVs, or EEVs
- G0562 Troubleshoot direct expansion evaporators
- G0563 Troubleshoot heat pumps
- G0566 Troubleshoot reciprocating-type refrigerant compressors

- H0572 Add or change oil in air compressors, other than screw-type air compressors
- H0576 Adjust air compressor pressure controls
- H0577 Adjust air compressor regulators
- H0578 Adjust automatic condensate drains
- H0581 Examine pressure-reducing valve settings
- H0582 Inspect air compressor safety relief valves
- H0583 Inspect air compressor switches
- H0584 Inspect air dryers
- H0585 Inspect automatic condensate drains
- H0586 Inspect automatic drain valves
- H0587 Inspect pneumatic filter dryer assemblies
- H0588 Inspect pneumatic pressure regulators
- H0589 Inspect pneumatic relief valves
- H0590 Inspect or oil air compressor motors
- H0591 Install refrigerated air dryers
- H0592 Perform preoperational or operational tests on multistage air compressors
- H0593 Perform preoperational or operational tests on single-stage air compressors
- H0597 Remove or install air compressors
- H0598 Remove or replace air compressor components, such as pressure switches, regulators, or motors
- H0599 Remove or replace air filters on air compressors or vacuum systems
- H0600 Remove or replace automatic condensate drains
- H0603 Troubleshoot reciprocating-type air compressor systems

TM09 - TROUBLESHOOT REFRIGERATION CONTROLS

- B0129 Perform recurring work program (RWP) inspections on air wash-type evaporative coolers
- B0130 Perform RWP inspections on drip-type evaporative coolers
- B0132 Perform RWP inspections on rotary drum-type evaporative coolers
- B0138 Remove or install air wash-type evaporative coolers
- B0141 Remove or install drip-type evaporative coolers
- B0159 Remove or replace air wash-type evaporative cooler components
- B0193 Troubleshoot evaporative coolers, other than expansion evaporators
- G0473 Adjust automatic expansion valves (AEVs)
- G0476 Adjust defrost cycles on refrigeration systems
- G0485 Change oil, other than in centrifugal systems
- G0492 Install ice cream machines
- G0493 Install ice machines
- G0511 Remove or replace automatic defrost system components on refrigeration systems
- G0521 Remove or replace direct expansion coils

- G0526 Remove or replace ice machine components
- G0532 Remove or replace refrigerant pressure or temperature flow controls, other than AEVs or TEVs
- G0533 Remove or replace refrigerant receivers
- G0534 Remove or replace refrigeration system components, other than ice or ice cream machine components
- G0542 Service circulating water sumps
- G0544 Service evaporative condensers
- G0546 Service indirect expansion evaporators
- G0551 Service refrigerated air dryers
- G0552 Service refrigerated drinking fountains
- G0557 Test oil, other than in centrifugal systems
- G0564 Troubleshoot hot gas bypass systems
- G0565 Troubleshoot indirect expansion evaporators
- G0567 Troubleshoot refrigeration defrost systems
- H0571 Add or change coolant in multistage air compressors
- H0574 Add or change oil in vacuum systems
- H0594 Perform preoperational or operational tests on single-stage vacuum systems
- H0596 Perform RWP inspections on vacuum systems
- H0602 Remove or replace vacuum pumps

TM10 - TROUBLESHOOT WARM AIR HEATING SYSTEMS

- I0606 Clean heat exchangers
- I0607 Connect exhaust outlets to flues or stacks
- I0608 Connect heating outlets to ducts
- I0609 Inspect heat exchangers
- I0610 Inspect radiant heaters
- I0611 Install furnaces
- I0612 Install radiant heaters
- I0613 Perform operational tests on radiant heaters
- I0614 Perform operational tests on warm air heating equipment
- I0615 Perform preoperational inspections on warm air heating equipment
- I0616 Perform preoperational tests on radiant heaters
- I0617 Perform recurring maintenance on radiant heaters
- I0618 Perform recurring maintenance on warm air heating systems
- I0619 Remove or install heat exchangers
- I0620 Troubleshoot radiant heaters
- I0621 Troubleshoot warm air heating equipment

TM11 - ADJUST STEAM HEATING VALVE

- B0040 Adjust balancing valves
- B0041 Adjust centrifugal water pump flow
- B0042 Adjust chilled water valves
- B0056 Adjust safety relief valves
- B0057 Adjust steam heating system regulating valves

TM12 - TROUBLESHOOT OIL BURNERS

- E0367 Adjust oil burner fuel-air ratios
- E0372 Inspect oil burners
- E0373 Inspect oil tanks
- E0377 Install oil burners
- E0380 Monitor oil preheaters
- E0383 Perform preoperational or operational checks on oil burners
- E0384 Perform preventive maintenance on oil storage tanks
- E0385 Perform recurring maintenance on HVAC/R fuel systems or burners
- E0387 Troubleshoot fuel systems or burners
- E0388 Verify quantity of fuel oil in tanks

TM13 - LOW WATER SAFETY INSPECTIONS

- F0390 Blow down steam heating system boiler or water columns
- F0391 Check steam boiler water levels
- F0446 Perform RWP inspections on hot water boilers
- F0447 Perform RWP inspections on steam boilers

TM14 - BOILER SEASONAL MAINTENANCE

- B0049 Adjust heat reclaim systems
- B0060 Align high-temperature water heating system expansion joints
- B0063 Calibrate heat reclaim systems

- B0075 Clean temperature recording equipment
- B0112 Install fusible plugs
- B0118 Install steam or temperature recording equipment
- B0126 Pack or lubricate high-temperature water heating system expansion joints
- B0136 Rebuild steam traps
- B0153 Remove or install steam injector pumps
- D0302 Clean or service central heating plant control panels
- F0392 Check steam heating system boiler tricocks
- F0394 Clean feed-water controls
- F0395 Clean mud drums
- F0397 Clean steam drums
- F0398 Clean steam heating system boiler airflow switches
- F0399 Clean steam heating system boiler gauge glasses
- F0400 Clean steam heating system boiler tubes
- F0401 Clean or inspect fireside of steam heating system boilers
- F0402 Clean or inspect steam heating system combustion chambers
- F0403 Clean or lubricate steam heating system or steam indicating and recording equipment
- F0405 Drain steam heating system boilers
- F0406 Drain steam heating systems, other than boilers
- F0407 Fill steam heating system boilers
- F0408 Fill water heating systems with water and bleed air from systems
- F0409 Inspect boiler refractories
- F0410 Inspect feed-water controls
- F0411 Inspect fire tubes for leaks or soot buildup
- F0412 Inspect high- or low-temperature water heating system boilers for leaks
- F0413 Inspect high- or low-temperature water heating system pressure relief valves
- F0414 Inspect or clean steam combustion chambers
- F0415 Inspect or clean steam heating system smokestacks
- F0416 Inspect or wash down steam heating system boiler water sides
- F0417 Inspect pressurization systems
- F0418 Inspect steam boiler fusible plugs
- F0419 Inspect steam boilers
- F0420 Inspect steam deaerators or aerators
- F0421 Inspect steam heating system boiler feed and condensate pumps
- F0422 Inspect steam heating system boiler manhole or handhole covers
- F0423 Inspect steam heating system boiler safety valves
- F0424 Inspect steam heating system steam indicating and recording equipment
- F0425 Install boilers
- F0426 Insulate low-pressure steam heating system combustion chamber doors
- F0427 Isolate high-temperature water heating system boiler flame control malfunctions
- F0428 Isolate low-temperature water heating system boiler flame control malfunctions
- F0429 Isolate steam heating system boiler flame control functions
- F0430 Lay up high-temperature water heating system boilers

- F0431 Lay up low-temperature water heating system boilers
- F0432 Lay up steam boilers dry
- F0433 Lay up steam boilers wet
- F0435 Light-off low-temperature water heating systems
- F0436 Light-off steam heating system boilers
- F0437 Perform boiler safety shutdown procedures
- F0438 Perform operational checks on automatic boiler controls
- F0440 Perform operational checks on low-temperature water heating system control valves
- F0441 Perform operational checks on steam heating system boiler draft controls
- F0442 Perform preoperational checks on steam heating system boilers
- F0444 Perform steam heating system combustion efficiency analyses
- F0445 Perform steam heating system refractory repairs
- F0448 Prepare boilers for inspections
- F0449 Prepare high-temperature water heating system boilers or expansion tanks for hydrostatic tests
- F0450 Prepare steam boilers or expansion tanks for hydrostatic tests
- F0451 Rebuild feed-water controls
- F0452 Rebuild feed-water regulators
- F0455 Regulate steam output of boilers
- F0456 Remove access covers to combustion chambers or tube sheets
- F0457 Remove or install boiler safety valves
- F0459 Remove or replace boiler fusible plugs
- F0460 Remove or replace boiler refractories
- F0461 Remove or replace feed-water controls
- F0462 Remove or replace fireside door gaskets
- F0463 Remove or replace low-pressure steam heating system combustion chamber doors
- F0464 Remove or replace primary components for domestic hot water heating systems
- F0465 Remove or replace sectional boiler sections
- F0466 Remove or replace steam boiler feed and condensate pumps
- F0467 Remove or replace steam heating system boiler gauge glasses
- F0468 Remove or replace steam heating system boiler manhole or handhole cover gaskets
- F0469 Remove or replace steam valves or fittings, other than safety or pressure relief valves or fittings
- J0635 Remove or install water softeners
- J0637 Test glycol pH
- P0865 Annotate in gas meter logs
- P0869 Annotate water treatment logs

TM15 - PREOPERATIONAL CHECK GAS BURNERS

- E0366 Adjust gas burner fuel-air ratios

- E0374 Install gas burners
- E0381 Perform preoperational or operational checks on gas burners
- E0382 Perform preoperational or operational checks on gas pressure regulators

TM16 - INSPECT NATURAL GAS LINES

- E0370 Inspect gas distribution systems for pressure drops
- E0375 Install gas service regulators
- E0376 Install interior gas service lines
- E0378 Lubricate gas burners
- E0386 Remove or install exterior gas service lines

TM17 - PREOPERATINAL INSPECT FEED WATER SYSTEMS

- B0092 Inspect high-temperature water heating distribution systems
- B0099 Inspect reheating systems
- B0102 Inspect steam heating system expansion joints
- B0111 Install feed-water regulators

TM18 - SETTLEMENT BLOWDOWNS

- B0147 Remove or install oil separators
- B0158 Remove or replace accumulators
- B0168 Remove or replace high-temperature water heating system air-bleed valves
- B0169 Remove or replace high-temperature water heating system centrifugal water pumps

TM19 - SERVICE HUMIDIFIERS

- B0045 Adjust dehumidifiers
- B0051 Adjust humidifiers
- B0064 Calibrate mixed air systems

B0065 Calibrate VAV reheat terminal devices
B0066 Calibrate VAV terminal devices, other than reheat terminal devices
B0087 Inspect dehumidifiers
B0094 Inspect humidity equipment
B0095 Inspect induction terminal devices
B0140 Remove or install dehumidifier systems
B0144 Remove or install humidifier systems
B0156 Remove or install VAV reheat terminal devices
B0165 Remove or replace dehumidifier system components
B0171 Remove or replace humidifier system components
B0182 Remove or replace VAV terminal devices, other than reheat terminal devices
B0184 Service dehumidifiers
B0187 Service humidifiers
B0195 Troubleshoot humidifiers

TM20 - SERVICE VARIABLE AIR VOLUME (VAV) EQUIPMENT

B0058 Adjust variable air volume (VAV) reheat terminal devices
B0059 Adjust VAV terminal devices, other than reheat terminal devices
B0104 Inspect VAV reheat terminal devices
B0105 Inspect VAV terminal devices, other than reheat terminal devices

TM21 - INSTALL & CALIBRATE ELECTRONIC & PNEUMATIC CONTROLS

D0270 Adjust electric actuator motors
D0271 Adjust electric system resets
D0272 Adjust electronic actuator motors
D0273 Adjust electronic system resets
D0277 Adjust pneumatic damper operators
D0278 Adjust pneumatic pressure regulators or switches
D0279 Adjust pneumatic relays
D0280 Adjust relative humidity controls
D0281 Adjust static pressure controls
D0284 Calibrate electric motor-driven valves
D0285 Calibrate electric-pneumatic switches or servos
D0286 Calibrate electrical controllers, other than two-position
D0287 Calibrate electronic dual-input controllers

- D0288 Calibrate electronic single-input controllers
- D0289 Calibrate electronic temperature sensors
- D0292 Calibrate pneumatic dual-input receiver controllers
- D0293 Calibrate pneumatic single-input receiver controllers
- D0294 Calibrate pneumatic system resets
- D0295 Calibrate pneumatic thermostats
- D0296 Calibrate pneumatic transducers
- D0297 Calibrate relative humidity controls
- D0298 Calibrate sensor inputs
- D0299 Calibrate static pressure controls
- D0300 Calibrate two-position electrical controllers
- D0305 Inspect pneumatic actuators
- D0309 Install electric-pneumatic switches
- D0310 Install electrical controllers, other than two-position
- D0314 Install humidistats
- D0316 Install pneumatic actuators
- D0317 Install pneumatic controls
- D0318 Install pneumatic damper operators
- D0319 Install pneumatic dual-input receiver controllers
- D0320 Install pneumatic relays
- D0321 Install pneumatic single-input receiver controllers
- D0322 Install pneumatic switches
- D0323 Install pneumatic thermostats
- D0324 Install pneumatic transducers
- D0326 Install relative humidity sensors
- D0335 Perform operational tests on electric-pneumatic switches
- D0336 Perform operational tests on electric system resets
- D0337 Perform operational tests on electric actuator motors
- D0338 Perform operational tests on electronic actuator motors
- D0339 Perform operational tests on electronic dual-input controllers
- D0340 Perform operational tests on electronic pneumatic switches
- D0341 Perform operational tests on electronic single-input controllers
- D0343 Perform operational tests on two-position electrical controllers
- D0351 Remove or install electronic dual-input controllers
- D0352 Remove or install electronic single-input controllers
- D0363 Troubleshoot pneumatic control systems
- F0471 Test pneumatic lines for cracks or leaks

TM22 - TROUBLESHOOT ELECTRONIC & ELECTRICAL EQUIPMENT

B0181 Remove or replace unloading mechanisms

C0221 Install electronic transformer-reduced voltage starters
C0225 Install pushbutton stations
C0226 Install solid-state controllers
C0254 Remove or replace phase failure switches
D0269 Adjust air compressor unloading mechanisms
D0282 Adjust unloading mechanisms
D0307 Install aquastats
D0311 Install electrical- or electronic-controlled devices
D0312 Install electrical temperature sensors
D0313 Install electronic temperature sensors
D0315 Install oil safety switches
D0329 Install two-position electrical controllers
D0346 Remove or install electric system resets
D0347 Remove or install electric actuator motors
D0353 Remove or install low-ambient temperature controls
D0357 Service unloading mechanisms

TM23 - CALIBRATE EMCS CONTROLS

D0274 Adjust energy monitoring control systems (EMCSs)
D0290 Calibrate EMCS controls
D0308 Install direct digital control (DDC) systems
D0331 Load updated software programs
D0333 Operate DDC systems
D0334 Operate field controls using computers
D0356 Remove or replace DDC sensors

TM24 - INSTALL VARIABLE SPEED CONTROLLERS

C0206 Adjust variable frequency drives
C0223 Install multispeed controllers
C0224 Install part-winding-reduced voltage starters
C0229 Install variable frequency drives
C0247 Remove or replace electronic-reduced voltage starters

TM25 - COOLING TOWER MAINTENANCE

- A0028 Plug leaks in tube and barrel heat exchangers
- A0034 Resurface valve seats or discs, such as on hand-operated or check valves
- B0134 Perform water balancing
- B0183 Rod out tube and barrel-type heat exchangers
- G0488 Clean or service cooling towers
- G0499 Perform operational tests on cooling tower system components, such as fan cycling controls or immersion heaters
- G0503 Perform preoperational or postoperational checks on cooling tower systems
- G0506 Perform seasonal maintenance on cooling towers
- G0515 Remove or replace condenser water system components
- G0517 Remove or replace cooling tower system components, such as air grills, gear boxes, or automatic air bleeders
- G0518 Remove or replace cooling towers
- G0540 Rod out water-cooled condensers
- G0554 Service water-cooled condensers
- G0560 Troubleshoot condenser water systems
- G0561 Troubleshoot cooling towers
- J0623 Adjust cooling tower float valves
- J0624 Adjust make-up water circuit regulating valves
- J0633 Perform corrosion control, such as scraping, sanding, or painting
- K0644 Brief customers on equipment discrepancies or repairs

TM26 - ADJUST REFRIGERATION COMPONENTS

- G0475 Adjust defrost cycles on heat pumps
- G0477 Adjust hot gas bypass systems
- G0479 Adjust refrigerant flow controls, other than AEVs or thermostatic expansion valves (TEVs)
- G0480 Adjust refrigeration unit doors
- G0481 Adjust TEVs
- G0483 Assemble or disassemble refrigeration boxes or cases, such as display, sectional, walk-in, or portable
- G0525 Remove or replace hot gas bypass systems
- G0528 Remove or replace reciprocating refrigerant compressor internal components
- G0529 Remove or replace refrigerant compressor valve assemblies
- G0535 Remove or replace refrigeration system door seals

- G0537 Remove or replace rotary-type air-conditioning system components
- G0538 Remove or replace screw-type air-conditioning system components
- G0539 Remove or replace scroll-type air-conditioning system components
- G0568 Troubleshoot rotary-type refrigerant compressors
- G0569 Troubleshoot screw-type refrigerant compressors
- G0570 Troubleshoot scroll-type refrigerant compressors
- H0573 Add or change oil in screw-type air compressors
- H0604 Troubleshoot rotary-type air compressor systems
- H0605 Troubleshoot screw-type air compressor systems

TM27 - SERVICE AIR COMPRESSORS

- G0478 Adjust purge units
- G0484 Change oil in centrifugal systems
- G0487 Charge centrifugal systems with refrigerant
- G0500 Perform periodic inspections on purge units
- G0512 Remove or replace centrifugal air-conditioning system components
- G0520 Remove or replace crankcase oil level regulators, other than on air compressors
- G0547 Service oil separators, other than on air compressors
- G0548 Service purge units
- G0556 Test oil in centrifugal systems
- G0558 Troubleshoot centrifugal-type refrigerant compressors
- H0601 Remove or replace reciprocating air compressor internal components

TM28 - BALANCE WATER FLOW

- G0474 Adjust cooling tower actuator shaft linkages
- G0482 Adjust water flow rate over distributors
- G0490 Epoxy refrigerant lines, fittings, or evaporators
- G0513 Remove or replace cold storage plant components

TM29 - MEASURE AIR PROPERTIES

- B0123 Measure efficiency of air-conditioning systems using psychrometric charts
- B0124 Measure flow rates
- B0125 Measure wet and dry bulb temperatures using psychrometers

- B0127 Perform air balancing
- D0275 Adjust enthalpy controls
- D0283 Adjust velocity pressure controls
- D0291 Calibrate enthalpy controls
- D0301 Calibrate velocity pressure controls
- G0497 Measure air-conditioning or refrigeration unit efficiency using pressure-enthalpy charts
- G0498 Measure air-conditioning or refrigeration unit efficiency using pressure-temperature charts

TM30 - BOILER CHEMICAL TREATMENT

- J0622 Adjust bleed-off rates
- J0625 Calibrate water test equipment
- J0626 Clean steam deaeration or aeration equipment
- J0628 Draw condensate return water samples
- J0629 Inspect anode rods
- J0630 Inspect chemical reagents and test equipment
- J0631 Maintain boiler chemical storage areas
- J0632 Perform chemical feeding
- J0634 Perform tests of cooling water, such as pH, algae, corrosion inhibitors, or antifreeze
- J0636 Test boiler water
- J0638 Test pH of condensate returns
- J0639 Test pH of solutions, other than condensate returns
- J0640 Test raw water for hardness
- J0641 Test transfer fluid specific gravity

TM31 - INSTALL AND REMOVE PUMPS

- B0142 Remove or install dual duct terminal devices
- B0143 Remove or install heat reclaim systems
- B0145 Remove or install induction terminal devices
- B0149 Remove or install rotary drum-type evaporative coolers
- B0150 Remove or install rotary positive displacement pumps
- B0166 Remove or replace drip-type evaporative cooler components
- B0177 Remove or replace rotary drum-type evaporative cooler components

TM32 - FILTER MAINTENANCE

- F0393 Clean electrostatic precipitators
- F0453 Rebuild oil preheaters
- F0458 Remove or install electrostatic precipitators
- F0470 Service mechanical pollution collectors

TM33 - MANAGEMENT & SUPERVISION

- M0754 Assign personnel to work areas or duty positions, other than for mobilities or contingencies
- M0755 Assign sponsors for newly assigned personnel
- M0756 Conduct general meetings, such as staff meetings, briefings, conferences, or workshops
- M0757 Conduct safety inspections of equipment or facilities
- M0758 Conduct self-inspections or self-assessments
- M0760 Conduct supervisory performance feedback sessions
- M0761 Conduct supervisory orientations for newly assigned personnel
- M0762 Counsel subordinates concerning personal matters
- M0763 Determine completion time estimates for fabrications or repairs
- M0764 Determine cost estimates for fabrications or repairs
- M0765 Determine or establish logistics requirements, such as personnel, equipment, tools, parts, supplies, or workspace
- M0766 Determine or establish work assignments or priorities
- M0768 Develop or establish work methods or procedures
- M0769 Develop or establish work schedules
- M0772 Develop RWP inspection procedures
- M0780 Establish performance standards for subordinates
- M0781 Establish procedures for accountability of equipment, tools, parts, or supplies
- M0783 Evaluate individuals for specialized training
- M0785 Evaluate job hazards or compliance with Air Force Occupational Safety and Health (AFOSH) program
- M0786 Evaluate utilization of equipment, tools, parts, supplies, or workspace
- M0787 Evaluate personnel for compliance with performance standards
- M0788 Evaluate personnel for promotion, demotion, reclassification, or special awards
- M0789 Implement safety or security programs
- M0790 Initiate actions required due to substandard performance of personnel
- M0791 Initiate personnel action requests
- M0792 Inspect HVAC/R repair operations

- M0793 Interpret policies, directives, or procedures for subordinates
- M0796 Participate in general meetings, such as staff meetings, briefings, conferences, or workshops, other than conducting
- M0810 Write or indorse military performance reports
- M0811 Write recommendations for awards or decorations
- N0814 Assign on-the-job training (OJT) trainers
- N0816 Brief personnel concerning training programs or matters
- N0817 Certify trainees on task knowledge for specialty training standards (STSs)
- N0821 Conduct OJT
- N0822 Counsel trainees on training progress
- N0823 Determine training requirements
- N0832 Evaluate progress of trainees
- N0837 Maintain training records or files
- N0841 Verify CDC course completions

TM34 - CLASSROOM TEACHING

- N0815 Assign resident course instructors
- N0819 Complete student entry or withdrawal forms
- N0820 Conduct formal course classroom training
- N0824 Develop formal course curricula, plans of instruction (POIs), or STSs
- N0826 Develop resident course or career development course (CDC) curriculum materials
- N0827 Develop supplemental courses, such as advanced courses
- N0829 Develop written tests
- N0833 Evaluate training methods or techniques of instructors
- N0834 Evaluate USAF technical training postgraduate performance
- N0838 Personalize lesson plans
- N0842 Write justifications for training facilities, equipment, publications, or materials
- N0843 Write training reports
- O0850 Identify and report suspected security compromises
- P0866 Annotate in manhour accounting records
- P0870 Coordinate calibrations of special tools with precision measurement equipment laboratory (PMEL)
- P0871 Coordinate maintenance of equipment with appropriate agencies

TM35 - RECURRING CONTROLS MAINTENANCE

- A0035 Retrofit equipment for environmentally friendly refrigerants
- B0122 Measure air handler fan bearing temperatures
- C0199 Adjust electronic-reduced voltage starters
- C0203 Adjust primary resistor-reduced voltage starters
- C0206 Adjust variable frequency drives
- C0209 Check stator windings of motors with megohmmeters
- C0232 Measure motor operating temperatures with thermometers
- C0237 Perform electronic troubleshooting on refrigeration systems, other than controls
- D0345 Rebuild electrical control components

TM36 - PNEUMATIC CONTROLS MAINTENANCE

- A0003 Calibrate gauges
- B0067 Clean air dryer condenser coils
- B0074 Clean spray heads or nozzles
- B0108 Inspect or clean ducts
- C0208 Calibrate limit switches
- C0211 Inspect contacts, potentiometers, or terminal connections
- C0217 Inspect motor armatures or reset arms
- D0344 Perform RWP inspections on HVAC/R control systems
- E0371 Inspect or read meters

TM37 - TROUBLESHOOT ELECTRONIC COMPONENTS

- D0342 Perform operational tests on HVAC/R electrical- or electronic-controlled power supplies
- D0360 Troubleshoot electronic circuits
- D0361 Troubleshoot electronic control systems, other than timers

TM38 - DETERMINE REQUIREMENTS FOR HVAC INSTALLATION

- A0006 Determine utility requirements for installation of HVAC/R equipment
- B0133 Perform surveys for upgrade of HVAC/R systems

TM39 - MAINTAIN FIRE ALARMS

- B0194 Troubleshoot fire-smoke removal systems

TM40 - WIMS

- M0751 Analyze production reports or records
- M0752 Analyze workload requirements
- M0753 Annotate time and attendance sheets for civilian employees
- M0759 Conduct staff assistance visits, inspections, or audits
- M0767 Develop inputs to mobility, contingency, disaster preparedness, or unit emergency or alert plans
- M0770 Develop organizational or functional charts
- M0771 Develop resource protection programs
- M0773 Develop self-inspection or self-assessment program checklists
- M0774 Draft agenda for staff meetings, conferences, workshops, or symposiums
- M0776 Draft proposals for improvement of maintenance procedures
- M0777 Draft supplements or changes to directives, such as policy directives, instructions, or manuals
- M0778 Establish facility inspection systems
- M0779 Establish quality control programs
- M0782 Evaluate budget requirements
- M0784 Evaluate inspection report findings or inspection procedures
- M0794 Investigate accidents or incidents
- M0795 Monitor Air Force warranty and guarantee program
- M0797 Plan layouts of facilities for installation of equipment, other than HVAC/R equipment
- M0798 Plan layouts of facilities for installation of HVAC/R equipment
- M0799 Plan safety or security programs
- M0800 Plan standardization programs
- M0801 Request simplified acquisition of base engineering requirements (SABER) contracts

M0802 Review civilian employee injury and claim forms
 M0803 Review drafts of supplements or changes to directives, such as policy directives, instructions, or manuals
 M0804 Review mobility, contingency, disaster preparedness, or unit emergency or alert plans
 M0805 Schedule personnel for temporary duty (TDY) assignments, leaves, or passes
 M0806 Write inspection reports
 M0807 Write job or position descriptions
 M0808 Write staff studies, surveys, or routine reports, other than training or inspection reports
 M0809 Write or indorse civilian performance appraisals
 M0812 Write replies to inspection reports
 N0813 Administer or score tests
 N0818 Complete competency training on shop recycle or recovery equipment
 N0825 Develop or procure training materials or aids
 N0828 Develop training programs, plans, or procedures
 N0830 Establish or maintain study reference files
 N0831 Evaluate effectiveness of training programs, plans, or procedures
 N0835 Inspect training materials or aids for operation or suitability
 N0836 Maintain training equipment
 N0839 Prepare job qualification standards (JQSs)
 N0840 Prepare training schedules
 O0844 Compile data for records, reports, logs, or trend analyses
 O0845 Complete accident or incident reports
 O0849 Evaluate maintenance reports or procedures
 O0852 Initiate or maintain standby rosters or workcenter pyramid recall rosters
 O0853 Initiate requests for TDY orders
 O0855 Maintain administrative files
 O0856 Maintain or update status indicators, such as boards, graphs, or charts
 O0863 Update seasonal or recurring maintenance forms
 O0864 Write minutes of briefings, conferences, or meetings
 P0867 Annotate operator logs on HVAC/R equipment
 P0868 Annotate shop-level daily log books
 P0872 Coordinate material or work order status with material control
 P0873 Develop equipment checklists
 P0878 Maintain documentation on items requiring periodic inspections or calibrations
 P0879 Maintain maintenance record files
 P0880 Maintain organizational equipment or supply records
 P0881 Maintain work order files
 P0882 Perform work information management system (WIMS) inquiries
 P0884 Record status of serviceable, repairable, condemned, or special items of equipment
 P0885 Research supply indices to determine catalog number or class
 P0887 Review operator logs on HVAC/R equipment
 P0888 Review shop-level daily log books
 P0889 Review WIMS outputs
 P0890 Update WIMS data

THIS PAGE INTENTIONALLY LEFT BLANK