

Air Education and Training Command

Sustaining the Combat Capability of America's Air Force

Occupational Survey Report

AFSC 4A2X1 BIOMEDICAL EQUIPMENT



U.S. AIR FORCE

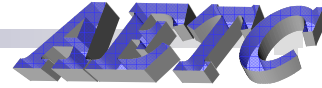
Mr. James Earles
May 04

Integrity - Service - Excellence

Report Documentation Page			Form Approved OMB No. 0704-0188		
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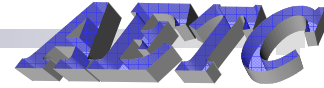
Overview



- Survey background
- Survey results
- Implications and way ahead



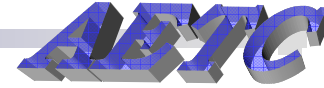
Work Performed



- Supervise and perform biomedical equipment maintenance and facilities management functions and activities
- Receive, accept, install, inspect, service, calibrate, repair, and modify biomedical equipment and support systems
- Manage safety, resource protection, security, energy conservation, fire protection, communications, housekeeping, and facility maintenance program.



Current Training Program

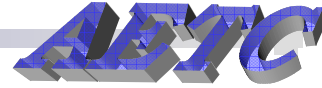


- AFSC-awarding course
 - 382 TRS Sheppard AFB, TX
 - J3ABR4A231-005, DoD Biomedical Equipment Maintenance Technician Course, 105 days
 - Programmed TPR

FY03: 122 students	FY03: 27%
FY04: 151 students	FY04: 23%



Survey Background

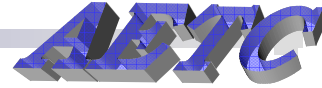


- Last Occupational Survey Report (OSR) - May 2002
- Current survey developed - Mar-May 2003
 - Sheppard AFB TX (Tech School) (7)
 - Lackland AFB TX (5)
 - Travis AFB CA (4)
 - Keesler AFB MS (4)





Survey Background

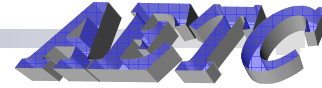


- Survey initiated to obtain data to:
 - Evaluate current classification and training documents
 - Support promotion test development
- Current survey data collected - Aug-Nov 2003
- Active Duty Surveyed:
 - 5-, 7-, & 9- Skill Levels





Survey Sample Characteristics



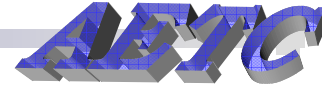
	<u>AD</u>
Assigned*	472
Mailed Out	385
Sample	262
Usable Returns	68%

- Average time in career field for AD: 7 yrs 11 months
- Average TAFMS for AD: 10 yrs 1 month
- Percent in first enlistment: 29%

* Assigned as of Aug 03



Skill & Paygrade Characteristics



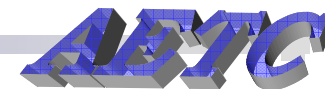
Paygrade Distribution

		Assigned*	Sample
E-1-3	-	19%	13%
E-4	-	18%	21%
E-5	-	29%	30%
E-6	-	18%	21%
E-7	-	12%	13%
E-8	-	3%	2%
E-9	-	1%	0%

* Assigned as of Aug 03



Command Representation



Command	Assigned %*	Sample %
AETC	36	31
AMC	17	17
ACC	10	11
USAFE	10	14
PACAF	12	15
AFMC	9	9
AFSPC	2	1
OTHER	4	2

* Assigned as of Aug 03



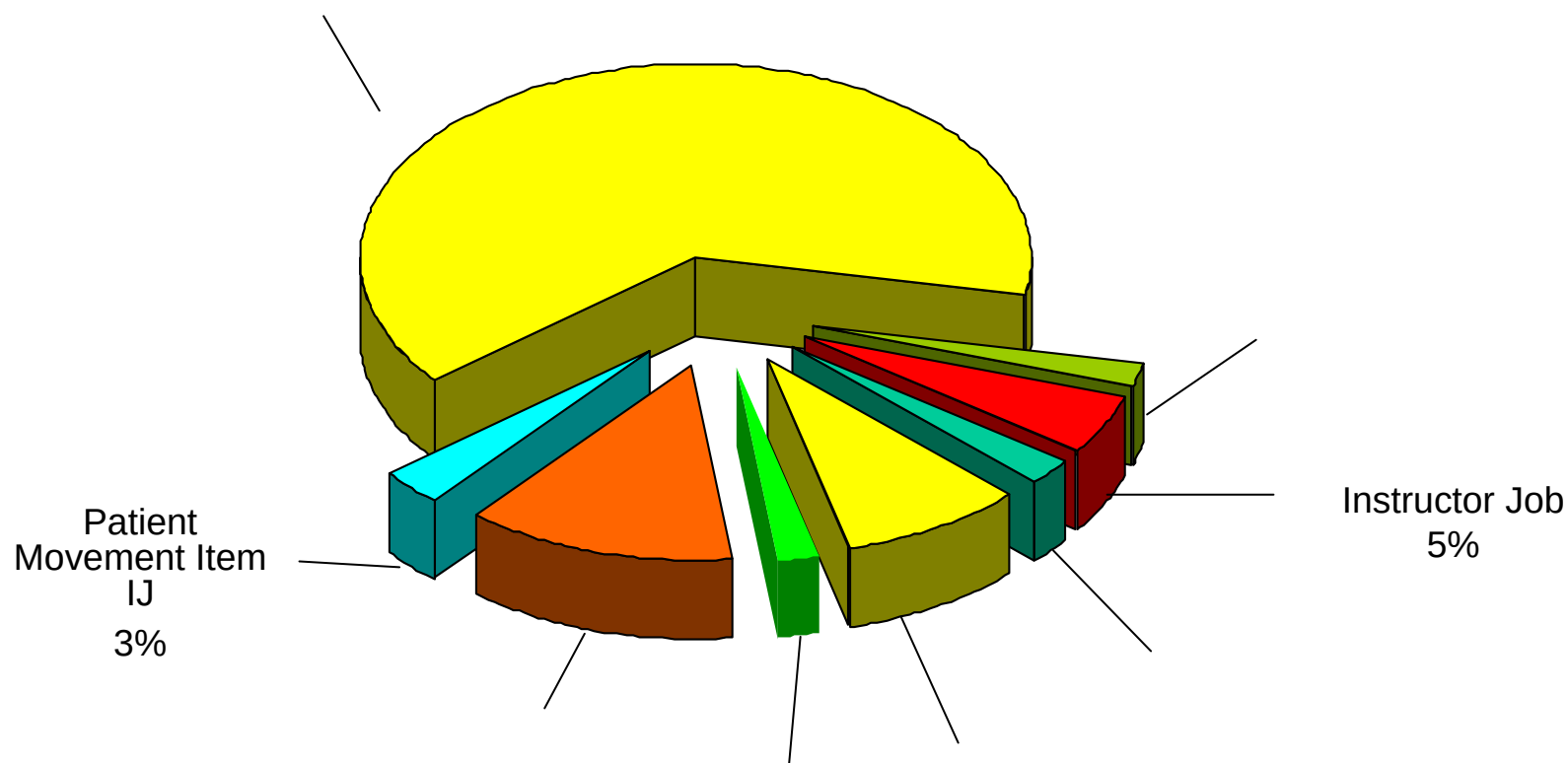


Job Structure



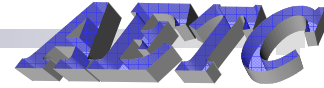
AETC

Sample size: 262





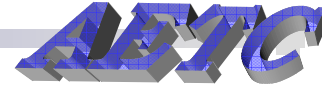
Independent Jobs



- **Biomedical Equipment Maintenance IJ (N=168)**
 - Calibrate or verify calibration of defibrillators
 - Perform operational inspections on defibrillators
 - Perform preventive maintenance on defibrillators
 - Perform preventive maintenance on vital sign monitors
 - Perform preventive maintenance on pulse oximeters
 - Perform electrical safety tests on medical equipment
 - Calibrate or verify calibration of blood pressure monitors
 - Calibrate or verify calibration of vital sign monitors
 - Perform preventive maintenance on blood pressure monitors
 - Perform operational inspections on blood pressure monitors
 - *Avg # tasks performed is 382*



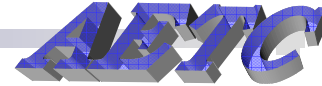
Independent Jobs



- **Patient Movement Item Equipment IJ (N=7)**
 - Complete medical maintenance work orders
 - Calibrate or verify calibration of infusion devices
 - Perform preventive maintenance on infusion devices
 - Calibrate or verify calibration of defibrillators
 - Perform operational inspections on defibrillators
 - Perform preventive maintenance on defibrillators
 - Perform operational inspections on infusion devices
 - Calibrate or verify calibration of pulse oximeters
 - Perform preventive maintenance on pulse oximeters
 - Perform preventive maintenance on ventilators, other than high-frequency
 - Calibrate or verify calibration of ventilators, other than high-frequency
 - Perform operational inspections on pulse oximeters
 - Perform preventive maintenance on blood pressure monitors
 - ***Avg # tasks performed is 49***



Independent Jobs

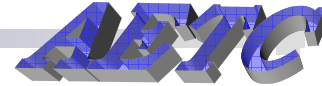


Imaging Systems Maintenance IJ (N=5)

- Isolate & repair malfunctions within fixed radiographic systems, x-ray tables, generators, beam limiting devices, film processors, mobile systems, portable fluoroscopic C-Arm systems, mammography systems, spot film & other recording devices, & silver recovery units
- Calibrate or verify calibration of fixed radiographic, portable fluoroscopic C-Arm, & mobile radiographic x-ray systems, mammography systems, fluoroscopic systems, & film processors
- Perform operational inspections on fixed, mobile, & portable fluoroscopic C-Arm radiographic x-ray, mammography, fluoroscopic imaging systems, film processors & silver recovery units
- Perform operational inspections on fixed, mobile, & portable fluoroscopic C-Arm radiographic x-ray, mammography & fluoroscopic imaging systems, film processors, & silver recovery units
- *Avg # tasks performed is 158*



Independent Jobs

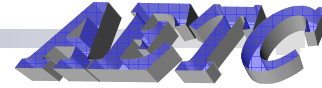


- **Medical Readiness IJ (N=5)**

- Input maintenance data into maintenance databases
- Assemble or disassemble field medical equipment
- Inspect field medical equipment
- Set up & perform operational inspections on environmental control units (ECUs)
- Set up & perform operational inspections on field power distribution systems
- Set up & perform operational inspections on field power production systems
- Perform operational inspections on field power production systems
- Set up and perform preventive maintenance on field mobile x-ray systems
- Palletize medical readiness assets
- Isolate and repair malfunctions within field power production systems
- Perform operational inspections on field sterilizers
- ***Avg # tasks performed is 22***



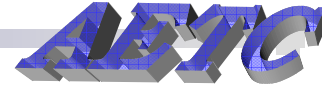
Independent Jobs



- **Manager IJ (N=22)**
 - Conduct general meetings, such as staff meetings, briefings, conferences, or workshops
 - Write or indorse military performance reports
 - Inspect personnel for compliance with military standards
 - Establish performance standards for subordinates
 - Establish organizational policies, such as operating instructions (OIs) or standard operating procedures (SOPs)
 - Prepare routine correspondence
 - Write recommendations for awards or decorations
 - Interpret policies, directives, or procedures for subordinates
 - Evaluate personnel for compliance with performance standards
 - Schedule personnel for TDY assignments, leaves, or passes
 - Determine training requirements
 - Conduct supervisory performance feedback sessions
 - Counsel subordinates concerning personal matters
 - Write job or position descriptions
- ***Avg # tasks performed is 135***



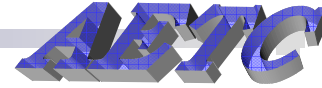
Independent Jobs



- **Instructor IJ (N=14)**
 - Evaluate progress of trainees
 - Administer or score tests
 - Counsel trainees on training progress
 - Complete student records
 - Maintain training records or files
 - Conduct formal course classroom training
 - Maintain training equipment
 - Personalize lesson plans
 - Conduct applications training
 - Inspect training materials or aids for operation or suitability
 - Brief personnel concerning training programs or matters
 - Develop training programs, plans, or procedures
 - Develop or procure training materials or aids
 - ***Avg # tasks performed is 54***



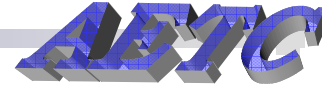
Independent Jobs



- **Facilities Manager IJ (N=5)**
 - Submit work order requests to BCEs or DPWs
 - Evaluate facility maintenance or repair requests
 - Maintain work request status logs
 - Monitor real property installed equipment (RPIE) maintenance programs
 - Maintain service or minor construction request logs
 - Maintain Defense Medical Logistics Standard Support (DMLSS) systems
 - Review facility project drawings or specifications
 - Transmit service calls to BCEs or DPWs
 - Inspect facilities for environmental or safety hazards
 - Direct maintenance of medical facility grounds
 - Inspect medical treatment facilities with BCE or DPW personnel
 - Review medical logistics publications, such as Air Force Medical Logistics Letter (AFMLL) and Health Devices
 - Evaluate construction requirements
 - ***Avg # tasks performed is 49***



Career Ladder Progression

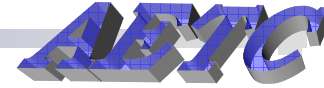


- 5-skill-level personnel
 - 77% in Biomedical Equipment IJ
 - Spend most of their time on maintenance tasks
- 7-skill-level personnel
 - Just 55% in Biomedical Equipment IJ
 - Spend 55% of their time on maintenance tasks
- 9-skill-level personnel
 - Write, review, initiate, develop, evaluate, conduct, interpret, schedule, assign, coordinate, establish, inspect, investigate, recommend, and prepare



Percent Across Specialty Jobs

DAFSC

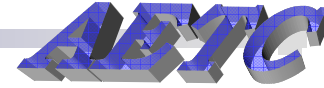


JOBS	DAFSC 4A231 (N=63)	DAFSC 4A251 (N=73)	DAFSC 4A271 (N=120)	DAFSC 4A291 (N=5)
PMI Maintenance Job	6	1	2	0
Biomedical Equipment Maintenance Job	73	77	55	0
Imaging Systems Maintenance Job	0	4	2	0
Instructor Job	0	4	9	0
Medical Readiness Job	0	1	3	0
Manager Job	0	0	13	100
Facilities Job	0	4	2	0
Not Grouped	21	9	14	0



Career Ladder Progression

Percent Time Spent on Duties

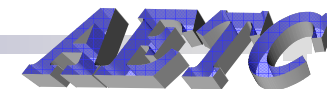


Duty Titles	DAFSC	DAFSC	DAFSC	DAFSC
	4A231	4A251	4A271	4A291
	(N=63)	(N=73)	(N=120)	(N=5)
PERFORMING GENERAL MAINTENANCE ACTIVITIES	6	5	4	2
MAINTAINING DIAGNOSTIC EQUIPMENT	31	27	20	3
MAINTAINING DIAGNOSTIC SUPPORT EQUIPMENT	12	11	9	1
MAINTAINING THERAPEUTIC OR TREATMENT EQUIPMENT	16	13	9	1
MAINTAINING THERAPEUTIC OR TREATMENT SUPPORT EQUIPMENT	21	15	13	1
PERFORMING FACILITIES MANAGEMENT ACTIVITIES	1	6	5	12
PERFORMING GENERAL ADMINISTRATIVE ACTIVITIES	1	1	4	11
PERFORMING GENERAL SUPPLY AND EQUIPMENT ACTIVITIES	6	5	8	10
PERFORMING MEDICAL READINESS ACTIVITIES	3	6	4	1
PERFORMING TRAINING ACTIVITIES	1	5	9	6
PERFORMING MANAGEMENT AND SUPERVISORY ACTIVITIES	2	5	15	52

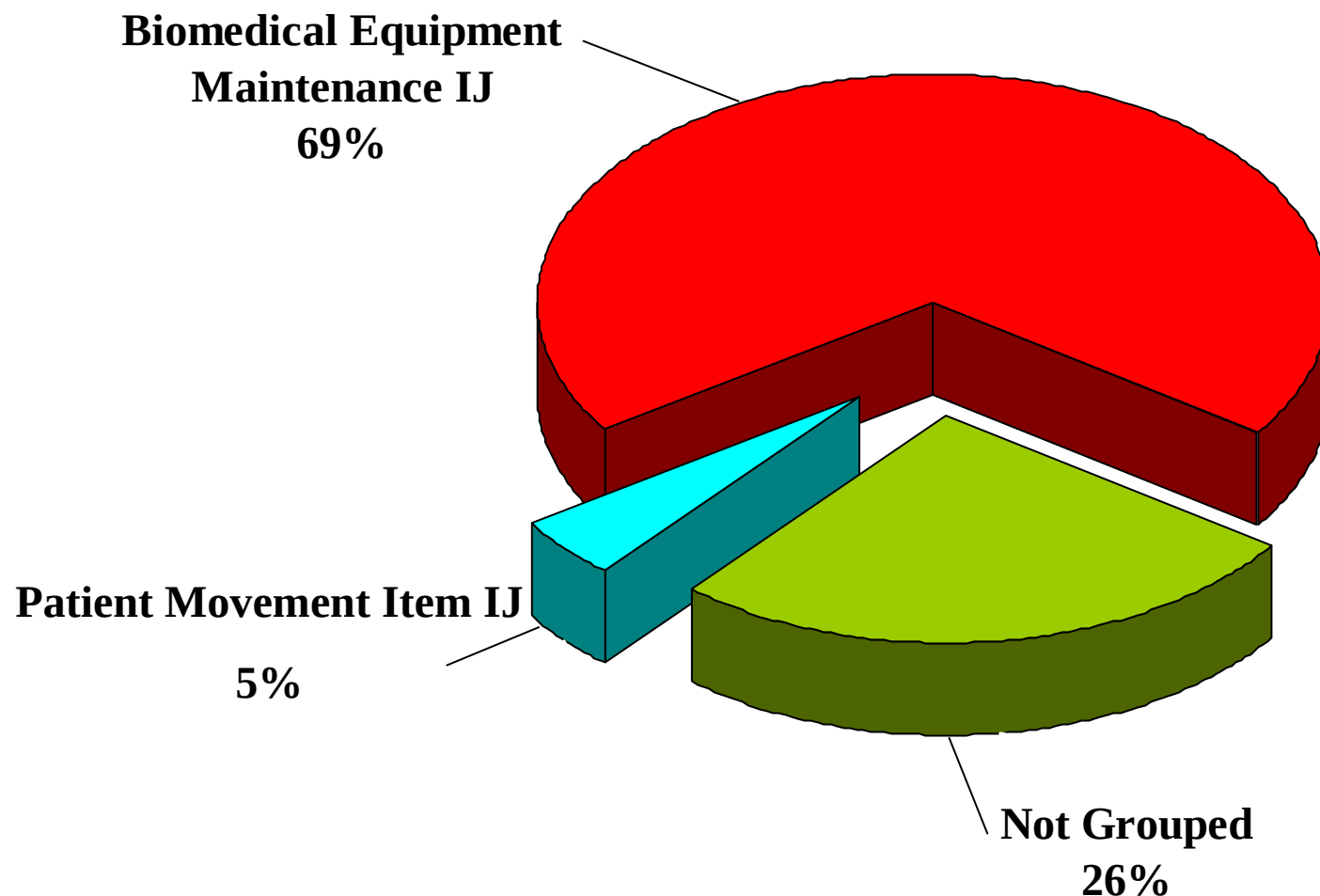
NOTE: Columns may not add to 100% due to rounding.



First-Enlistment Job Structure



Sample size: 76





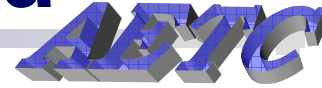
First-Enlistment Personnel Representative Tasks



Tasks	Percent Members Performing (N=76)
Perform electrical safety tests on medical equipment	93
Perform operational inspections on defibrillators	89
Calibrate or verify calibration of defibrillators	89
Perform preventive maintenance on defibrillators	89
Perform preventive maintenance on pulse oximeters	88
Solder electrical connections	87
Perform preventive maintenance on vital sign monitors	87
Perform preventive maintenance on blood pressure monitors	87
Calibrate or verify calibration of blood pressure monitors	86
Perform operational inspections on blood pressure monitors	86
Calibrate or verify calibration of pulse oximeters	84
Calibrate or verify calibration of vital sign monitors	83
Perform operational inspections on vital sign monitors	82
Perform operational inspections on pulse oximeters	82
Calibrate or verify calibration of ECG monitors	82
Perform preventive maintenance on ECG monitors	82
Perform operational inspections on patient thermometers	80



First-Enlistment Personnel Test/Calibration Equipment Used



EQUIPMENT USED/OPERATED	Percent Members
	Using (N=76)
Defibrillator Analyzers	97
Electrosurgical Analyzers	93
Multimeters	92
Patient Simulators	91
ECG Analyzers	91
Blood Pressure Analyzers	89
Calibrators, Thermometer	88
Safety Analyzers	88
SPO2 Simulators	88
Pressure Gauges/Meters	86
Infusion Pump Analyzers	84
Oscilloscopes	83
Tachometers	82
Battery Analyzers	79
Decade Resistor Boxes	79



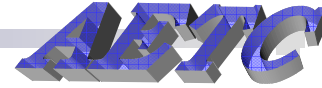
First-Enlistment Personnel Medical Equipment Maintained



EQUIPMENT OR SYSTEMS	Percent Members
	Maintaining (N=76)
Defibrillators	82
Infusion Pumps	78
Pulse Oximeters	78
Dental Chairs	76
Blood Pressure Monitors, Automatic	74
Examination Lamps	72
Examination Tables	72
Blood Pressure Cuffs	71
Electrocardiograms	70
Hospital Beds, Electric	67
Surgical Lamps	67
Hospital Beds, Manual	66
Audiometers	64
Dental Curing Units	63
Dental Handpieces	63
Exercise Bicycles	63
Dental Amalgamators	62
Scales or Balances, other than Pediatric	62
Scales or Balances, Pediatric	61



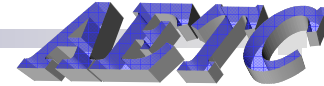
Specialty Training Standard (STS) Analysis



- STS is reasonably well supported by survey data
 - Several 2b STS items were unsupported
- Several STS items require proficiency code review
 - These should be reviewed for possible proficiency code inclusion
- A few technical tasks performed by 20 percent or more of members were not referenced to STS
 - These tasks should be reviewed for possible inclusion in STS



Unsupported STS Elements



Examples

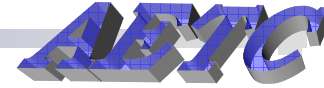
UNIT	LEARNING OBJECTIVE	PROF CODE	PERCENT MEMBERS PERFORMING		TNG EMP	TSK DIF	ATI
			1ST JOB (N=26)	1ST ENL (N=76)			
13.5.2-4	Medical Readiness Refrigeration Units	2b					
Task	I907. Set up & preventive maintenance		8	13	3.46	4.79	7
Task	I908. Operational inspection		12	17	3.86	4.68	11
13.6.2-4	Medical Readiness Steam Generators	2b					
Task	I897. Set up		4	8	4.46	5.08	11
Task	I898. Operational inspection		8	12	4.50	4.86	11
Task	I897. Preventive maintenance		12	14	4.46	4.99	11
17.12.2-5	Electrolyte Analyzer	2b					
Task	C424. Operational inspection		15	18	0.93	4.83	2
Task	C425. Calibrate or verify calibration		12	14	1.11	5.36	2
Task	C426. Preventive maintenance		15	14	1.11	4.86	2
Task	C427. Preventive maintenance		8	12	0.75	5.50	2

Mean TE Rating is 2.14, Standard Deviation is 1.51 (HIGH TE= 3.65)

Mean TD Rating is 5.00, Standard Deviation is 1.00 (HIGH TD= 6.00)



STS Proficiency Codes Requiring Review



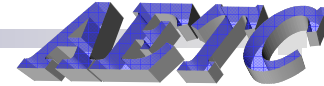
Examples

UNIT	LEARNING OBJECTIVE	PROF CODE	PERCENT MEMBERS PERFORMING		TNG EMP	TSK DIF	ATI
			1ST JOB (N=26)	1ST ENL (N=76)			
16.1.4.1.2-5	Dental X-Ray Stems, Intraoral Tasks	-					
	B040. Operational inspection		38	51	5.39	4.78	18
	B042. Preventive maintenance		35	51	5.46	4.76	18
	B041. Calibrate or verify calibration		27	46	4.86	5.43	12
	B043. Isolate & repair malfunctions		31	46	4.96	5.73	12
16.5.2.2-5	Blood Pressure Monitors (Invasive) Tasks	-					
	B108. Operational inspection		81	86	5.54	4.03	18
	B110. Preventive maintenance		81	87	5.82	4.26	18
	B109. Calibrate or verify calibration		81	86	5.86	4.60	18
	B111. Isolate & repair malfunctions		73	79	5.71	4.76	18

Mean TE Rating is 2.14, Standard Deviation is 1.51 (HIGH TE= 3.65)
Mean TD Rating is 5.00, Standard Deviation is 1.00 (HIGH TD= 6.00)



Tasks not Referenced to STS



Examples

TASKS	PERCENT MEMBERS PERFORMING				
	1ST JOB	1ST ENL	TNG EMP	TSK DIF	ATI
B0087 Vital Sign Monitors-operational inspection	85	82	5.71	4.18	18
B0088 Vital Sign Monitors-calibrate	85	83	5.54	4.81	18
B0089 Vital Sign Monitors-preventive maintenance	85	87	5.57	4.36	18
B0090 Vital Sign Monitors-isolate malfunctions	73	86	5.32	5.26	18
B0088 Oxygen Analyzers -calibrate	50	54	4.18	4.31	18
B0089 Oxygen Analyzers -preventive maintenance	54	57	4.14	4.13	18
B0090 Oxygen Analyzers -isolate malfunctions	42	45	3.18	4.45	15

Mean TE Rating is 2.14, Standard Deviation is 1.51 (HIGH TE= 3.65)
Mean TD Rating is 5.00, Standard Deviation is 1.00 (HIGH TD= 6.00)



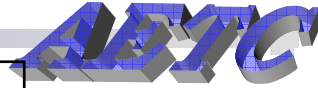
Job Satisfaction Indicators (Current vs. Previous study)



	1-48 Months		49-96 Months		97+ Months	
	<u>2004 (N=76)</u>	<u>1996 (N=67)</u>	<u>2004 (N=46)</u>	<u>1996 (N=94)</u>	<u>2004 (N=140)</u>	<u>1996 (N=267)</u>
Job interesting	88	87	85	86	88	87
Talents well utilized	88	80	95	90	92	88
Training well utilized	90	90	96	91	92	78
Sense of accomplishment	89	84	98	88	89	85
Plan to reenlist	67	49	80	50	63	66



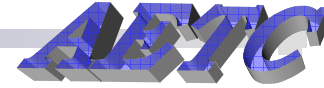
Job Satisfaction Indicators (AD) (Across Specialty Jobs)



	Biomedical Equip Maint IJ (N=168)	Patient Movement Item IJ (N=7)	Imaging Systems Maint IJ (N=5)	Medical Readiness IJ (N=5)
Job interesting	90	86	100	100
Talents well utilized	96	86	100	100
Training well utilized	96	86	100	100
Sense of accomplishment	83	72	100	100
Plan to reenlist	70	443	80	60



Job Satisfaction Indicators (AD) (Across Specialty Jobs) cont.

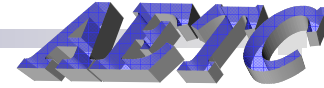


	Facilities Manager IJ (N=5)	Manager IJ (N=22)	Instructor IJ (N=14)
Job interesting	40	82	86
Talents well utilized	40	82	93
Training well utilized	40	91	93
Sense of accomplishment	60	86	86
Plan to reenlist	60	64	57



Retention Dimensions

First-Term Airmen (N=76)



	Percent Responding	Average
Planning to Reenlist (N=51)		
Off-duty education or training opportunities	75	2.71
Retirement benefits	73	2.65
Job security	69	2.54
Bonus or special pay	67	2.74
Medical or dental care for AD member	65	2.67
Planning to Separate (N=25)		
Military lifestyle	68	1.94
Civilian job opportunities	56	2.50
Location of present assignment	48	2.08
Pay and allowances	40	2.40
Promotion opportunities	36	2.44

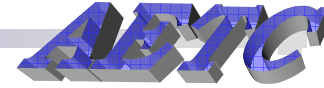
Scale: 1 = slight influence, 2 = moderate influence, 3 = strong influence





Retention Dimensions

Second-Term Airmen (N=46)



Planning to Reenlist (N=37)	Percent Responding	Average
Off-duty education and training opportunities	84	2.45
Job security	73	2.41
Medical or dental care for AD member	70	2.38
Military lifestyle	68	2.24
Retirement benefits	63	2.78

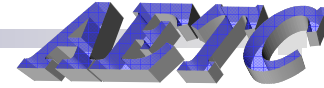
Planning to Separate (N=9)		
Pay and allowances	56	2.40
Military lifestyle	56	1.40
Off-duty education and training opportunities	44	2.50
Esprit de corps/morale	44	2.50
Retirement benefits	44	1.50

Scale: 1 = slight influence, 2 = moderate influence, 3 = strong influence





Retention Dimensions Career Airmen (N=98)



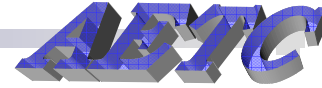
Planning to Reenlist (N=88)	Percent Responding	Average
Retirement benefits	77	2.82
Job security	67	2.59
Medical or dental care for family members	65	2.56
Military-related education & training opportunities	62	2.14
Pay and allowances	57	2.43
Planning to Separate (N=10)		
Pay and allowances	80	2.38
Military lifestyle	70	1.57
Promotion opportunities	60	3.00
Additional duties	60	2.50
Civilian job opportunities	50	3.00

Scale: 1 = slight influence, 2 = moderate influence, 3 = strong influence





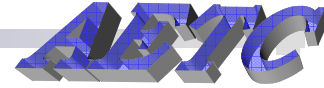
Summary of Results



- Large core in equipment maintenance job
 - Two small specialized equipment maintenance jobs
- Equipment maintenance tasks performed through the 7-skill level
- STS provides comprehensive coverage of work performed by career ladder
- Job satisfaction indicators are good



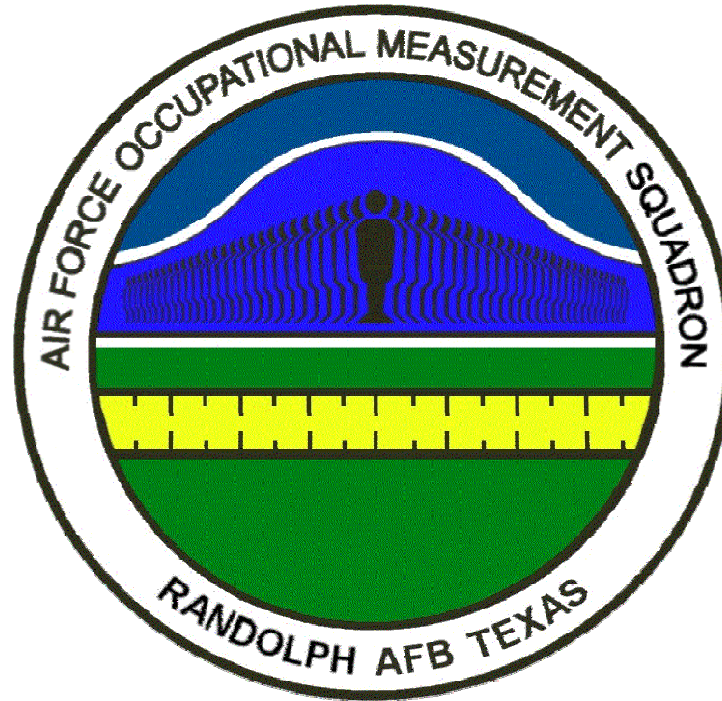
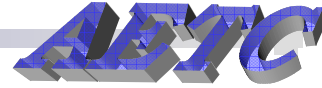
Way Ahead



- OSR Delivery Trip – Jan 04
- Utilization and Training Workshop (U&TW) – Jan 04 at Sheppard AFB
 - Provided STS portion of training extract to training manager and CFM at start of analysis
- Next SKT rewrite (ext minor) – scheduled for 3 Sep 04



Questions?



Visit our web site at:

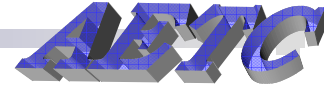
<https://www-r.omsq.af.mil/OA/oaproducts.htm>

E-Mail: james.earles@randolph.af.mil

Sustaining the Combat Capability of America's Air Force



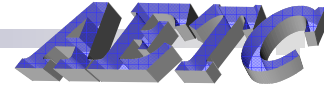
Integrity - Service - Excellence



Back-Up Slides



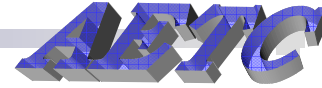
Predictive Retention Indicators



- Military lifestyle
- Pay and allowances
- Bonus or special pay
- Retirement benefits
- Military-related education/training opportunities
- Off-duty education and training opportunities
- Medical or dental care for active duty member
- Medical or dental care for family members
- Base housing
- Base services
- Childcare needs
- Spouse's career
- Civilian job opportunities
- Equal employment opportunities
- Number of PCS moves
- Location of present assignment
- Number/duration of TDYs or deployments
- Work schedule
- Additional duties
- Job security
- Enlisted Evaluation System
- Promotion opportunities
- Training/experience of unit personnel
- Unit manning
- Unit resources
- Unit readiness
- Recognition of efforts
- Esprit de corps/morale
- Leadership of immediate supervisor
- Senior Air Force leadership



AFOMS



- Specialty Knowledge Tests (SKTs)
 - Career field members develop SKTs
- Promotion Fitness Examinations (PFEs) and study guides
 - Chiefs develop PFEs
- USAF Supervisory Examinations (USAFSEs)
 - Chiefs develop USAFSEs
- Task Analyses
 - Shop of Ed & Trng Mgrs (ETMs) do this
- Occupational Analyses – Enlisted, Officer, & Civilian career fields
 - Three shops of civilians and officers do this