STANDARDS
FOR THE CERTIFICATION OF
AVIATION MAINTENANCE TECHNICIANS
USING A STRUCTURED-EXPERIENCE
PROGRAM

FINAL REPORT

Acknowledgements

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Executive Summary

The aviation industry is expecting to face a shortage of aviation maintenance technicians in the near future. Certain segments of the industry face greater challenges in recruiting and retaining maintenance technicians (AMT's). One possible solution to the imposing problem is to develop new and focused standards for the evaluation of work experience for the purpose of AMT certification. This will allow many aviation businesses to hire non-certificated trainees, put them through an on-the-job structured-experience (apprenticeship) program, and through this program have them become certificated FAA certificated aviation maintenance technicians. (Note: For the purposes of this report the terms structured experience and apprenticeship may be used interchangeably.)

Programs that develop technicians through a structured-experience program have particular benefits that differ from a formal education in FAA Part 147 Aviation Maintenance Technician Schools. Structured-experience programs have the potential to provide aviation businesses with the required labor that will help fill the gap created AMT shortages. Smaller companies experience difficulty competing with the higher wages offered by large airlines. As a result small FBO often lose AMT's to airlines. Apprenticeship programs provide these companies with the means to replenish their lost technicians. These technicians will develop skills over time that are unique to the business in which they operate. One of the benefits of an apprenticeship program is the increased loyalty that the technician feels toward the company that trained them. It is also anticipated that structured experience programs would attract additional individuals into careers as AMT's that presently for economic or family reasons are not able to attend a FAA Part 147 Aviation Maintenance Technician School. A structured experience program provides the opportunity to "earn while you learn".

Existing regulations (14 CFR 65.77 Mechanics Experience Requirements) provide the means for AMT certification through work experience, however these regulations lack structure. Current regulations do not indicate what work experience qualifies for certification. As a result, different FAA offices often interpret these regulations differently.

A structured-experience program would provide a consistent learning experience to the applicant as well as a consistent method of evaluation by the FAA (Federal Aviation Administration). The trainee would be exposed to all areas within the scope and privileges of a maintenance technician under 14 CFR 65.77 which could permit for the experiential work period to be shortened from the current 30-month requirement.

To assess the feasibility of this solution, surveys were conducted to access the current industry beliefs and practices as pertaining to apprenticeship programs. Two surveys were developed. One survey was targeted to aviation employers in the various segments of the industry. The other survey was conducted of AMT technicians who qualified for their AMT certification based on civilian experience.

The industry survey was distributed to the major aviation organizations of ATA, RAA, HAI, and ARSA. These organizations forwarded the surveys to all their members via computer or mail. To include the smaller general aviation community, a random sample of FBOs was created using the AOPA online directory. The AOPA directory was used to sort out FBOs that offer airframe maintenance. 200 FBOs were selected from this list using a random number generator. Surveys were mailed to the selected FBOs.

The industry survey was developed to answer the following questions:

- Would the aviation industry use a structured-experience program; if so, what parts?
- What is the industry perception of AMT technician quality when certificated through on-the-job training (OJT)?
- Does the industry perceive the current regulations governing the certification of AMT through OJT as having enough structure?

The results of these surveys provided significant support from the aviation industry community for the development of a structured-experience program as a track for technician certification. While this process will not be used by all, certain groups strongly believe that this may be the only way in which they will be able to obtain the number of qualified technicians needed to support their operations in a competitive business environment. Descriptive statistics were generated to show the attitudes reveled by the different parts of the aviation industry.

For people within the aviation industry there are many anecdotal reports on the certification process and experience of individuals testing for the A&P based on civilian experience. Thus it was important to determine what the typical experience level was for AMT's qualifying with civilian experience. The second survey was conducted of AMT technicians who qualified for their AMT certification based on civilian experience. The survey was designed to research the background and experience of those individuals as they related to preparation for the FAA examining process and also their entry into the workforce. The fundamental research question being asked was:

- What areas of weakness were encountered by AMT's (Aircraft Maintenance Technicians) who qualified through OJT experience during the FAA technician examination process?

The survey was administered at various aviation maintenance operations that were selected due to their history of qualifying technicians based on experience. An effort was made to include maintenance operations that represented the full spectrum of the aviation industry. Surveys were distributed in person and by mail. A total of 250 surveys were distributed with 105 surveys returned for a 42% response rate.

Given the present diversity in accepted levels and exposure for civilian-experience certification, the results from the civilian experience (65.77) AMT's surveyed strongly supported the general industry perception that many technicians are not exposed to the full range of maintenance skills that are necessary for AMT certification.

An Aviation Maintenance Technician, Job-Task-Analysis was completed in 1989 by The Transportation Center of Northwestern University. This study provided a comprehensive review of the job tasks currently performed by today's aviation maintenance technician. The JTA results have been correlated with the findings of this project and provide a useful resource in the design of an AMT structured experience program.

This proposed structured program differs from the present requirements of 14CFR FAR65.77 (Mechanics Experience Requirements) in that the Aviation Maintenance Organization (AMO) seeking relief from the existing 30 month experience requirement would have to submit for approval to their local FSDO a description of their program including a student syllabus detailing the specific requirement of material to be learned and practical tasks to be completed during the program. Through the utilization of a structured-experience program as described in this report, it should be possible for a successful applicant to meet the FAA requirements for AMT certification within a 24-month calendar period. However, any program less than 30 months in length must include a request for exemption from rule 14CFR FAR 65.77 submitted in accordance with 114CFR FAR 11.25. The program submission once approved, will be come an operational document that would be adhered to in a similar manner to other FAA approved documents.

Structured-experience programs would provide a viable alternative to assist selected segments of the aviation industry in meeting critical maintenance manpower requirements. The present regulatory language does not insure that AMT qualification through civilian-work experience is equal to other methods of compliance. This proposed program could also provide additional guidance for review of civilian experience.

1.0 Introduction

"Statistics compiled by the U.S. Labor Dept. indicate that at least 12,000 new aviation maintenance technicians (AMT's) will be needed in the years ahead to keep pace with forecast expansion and to compensate for the retirement of experienced technicians, creating a projected annual deficit of about 4,000 technicians. By 2006, the industry will require about 155,000 technicians, up 13% from the current workforce (Phillips, 2000)."

The aviation industry is diverse, and includes scheduled and non-scheduled airlines, regional carriers and air taxi operators, certified repair stations, general aviation, and ag operators. This industry employs over one-half million people from technicians and pilots to reservation clerks. The industry is closely tied to the nation's economic cycles, which contributes to the cyclic labor demands varying from excess supply to critical shortages. A strong national economy in recent years has lead to continued expansion that has contributed to a shortage of aircraft technicians. Other factors stem from a dwindling supply of new technicians from AMT schools. The University Aviation Association reported 2,414 students enrolled in maintenance courses in 1998 compared to 8,359 in 1993 (Phillips, 2000)

A review of current literature indicated many industry experts forecast a shortage of aircraft technicians. The Pilot and Aviation Maintenance Technician Blue Ribbon Panel was established in the early 90's to investigate the future of pilot supply. As a result of similar shortage factors existing for aircraft technicians, the panel's mission was expanded to include the study of aviation maintenance personnel. The panel released its report in August of 1993. The reported assessment of the aviation industry forecasted an impending shortage of pilots and AMT's who have the necessary qualifications to meet the needs of the industry. The report indicated a high probability that there would be a numerical shortage by 1995. By the year 2004, the panel estimated the airlines would require 16,000 new hire AMT's, a 33% increase from 1993. The general aviation industry was estimated to increase new hires by 10% to 17%. This concern regarding a future shortage of AMT's has resulted in the General Accounting Office (GAO) to initiate a comprehensive national study on this potential problem. This study was begun in spring of 2002 and no results are yet available.

The president of the Professional Aviation Maintenance Association (PAMA) expressed his concerns in a letter to the President of the United States. "For many years industry and the flying public have misunderstood the complexities of aviation maintenance and held a general disregard for the skills of the individual aviation maintenance professional. Now, a devastating shortage of certificated and experienced maintenance technicians is looming (Finnegan, 2001)."

Aviation Week & Space Technology ran an article discussing the forecasted shortage of aircraft technicians. This article contained discussion on the views of the Aviation Technical Education Council (ATEC). According to ATEC, the number of students enrolled in AMT schools peaked in 1991 at 27,000. 11,500 graduated and of these students only 5,700 found jobs in aviation. In recent years the number of AMT student enrollments dropped by 58% until 1996 when only 3,250 received a license. In the late

1990s, the number of enrollments increased slightly but does not reflect the growth experienced by the aviation industry (Phillips, 2000).

The FAA Statistical Handbook of Aviation (available online) shows the number of original technician certificates issues in the 10-year period from 1987 to 1996 fell from 15,089 to 8,024, a 43% decrease. In the late 80's, the number of certificates issued remained around 15,000 peaking in the early 90's at 24,299, then rapidly declining until 1996. In the same time period, the number of aircraft operated by air carriers increased from 5,250 to 7,478 and domestic passenger enplanements of the large certificated air carriers increased from 417,264 to 530,649.

2.0 Technician Certification

The Federal Aviation Administration is the governmental agency tasked with the regulation of AMT certification. Currently the majority of new-hire technicians come from certified Part 147 AMTS. The Airframe and Powerplant (A&P) are the FAA certificates obtained by individuals seeking FAA licensure for the performance of aircraft maintenance. The Federal Aviation Regulations (FARs) provide an alternate means of obtaining an Airframe & Powerplant certificates (A&P) through military or civil experience with on the job training.

Current regulations define how an individual can fulfill the experience requirement necessary to qualify for the A&P (14CFR Part 65.77). This regulation states that 30 months experience performing the duties of an AMT will fulfill this requirement. This regulation is open to a great deal of interpretation allowing tremendous variance in what an FAA representative will except as valid experience. The following is an excerpt from Part 65:

> Sec. 65.77 Experience requirements.
> Each applicant for a technician certificate or rating must present either an appropriate graduation certificate or certificate of completion from a certificated aviation maintenance technician school or documentary evidence, satisfactory to the Administrator, of--
> (a) At least 18 months of practical experience with the procedures, practices, materials, tools, machine tools, and equipment generally used in constructing, maintaining, or altering airframes, or powerplants appropriate to the rating sought; or
> (b) At least 30 months of practical experience concurrently performing the duties appropriate to both the airframe and powerplant ratings.

3.0 Design of the Industry and Technician Survey

For people within the aviation industry there is a general consensus that additional FAA regulations are not something that is desired. Thus it was important to determine whether the industry would support an additional AMT certification track. It was also important

to determine if aviation maintenance organizations (AMO's) had developed employee-training programs that provide for a broad range of maintenance experiences for non-certified maintenance personnel.

Certified AMT's that did not attend a 14CFR Part 147 certified Aviation Maintenance Technician School were surveyed to determine if they felt they had an adequate preparation in all areas of AMT certification testing.

Prior to conducting the survey a literature review was performed to determine an acceptable attitude measure to employ in the survey design. Questionnaires are efficient methods of data collection when the researcher knows what they want and what the variables are of the attitude object.

For these studies, a sample of convenience was used. It was assumed for the project's purpose, the sample used reflects the perceptions of the aviation industry.

It was assumed that the organizations and individuals utilized for these surveys did not select businesses or individuals with specific goals or agendas to manipulate the survey results. The surveys are presented as a scientific attitude assessment and not a tool developed with a goal in mind.

It is assumed that the fundamental questions asked by these surveys provide an indication of the need for standards for the purpose of evaluation of work experience when certifying an AMT. A high score on the surveys is assumed to reflect support of the development of standards.

For this study, a sample was used to assess the attitudes held in the aviation industry. Time and budget limitations prevented including the participation of the entire population. The surveys have been used to develop descriptive statistics, therefore not requiring an accurate probability sample.

The survey was developed without the use of a pilot test in the aviation industry. Rather, students from Purdue University were used to pilot test the survey. The data gathered was used to determine the readability of the questions.

A review of literature was performed to determine which attitude assessment method was appropriate for this study. Additionally, literature review was performed to substantiate claims of an impending AMT shortage. This survey required an attitude scale that could be easily constructed, that had proven reliability, and that could provide insight on a broad topic. For this survey, a Likert Scale was selected based on its ease of construction, proven reliability, and popularity.

The industry survey was distributed to the major aviation organizations of ATA, RAA, HAI, and ARSA. These organizations forwarded the surveys to all their members via computer or mail. To include the smaller general aviation community, a random sample of FBOs was created using the AOPA online directory. The AOPA directory was used to sort out FBOs that offer airframe maintenance. 200 FBOs were selected from this list using a random number generator. Surveys were mailed to the selected FBOs.

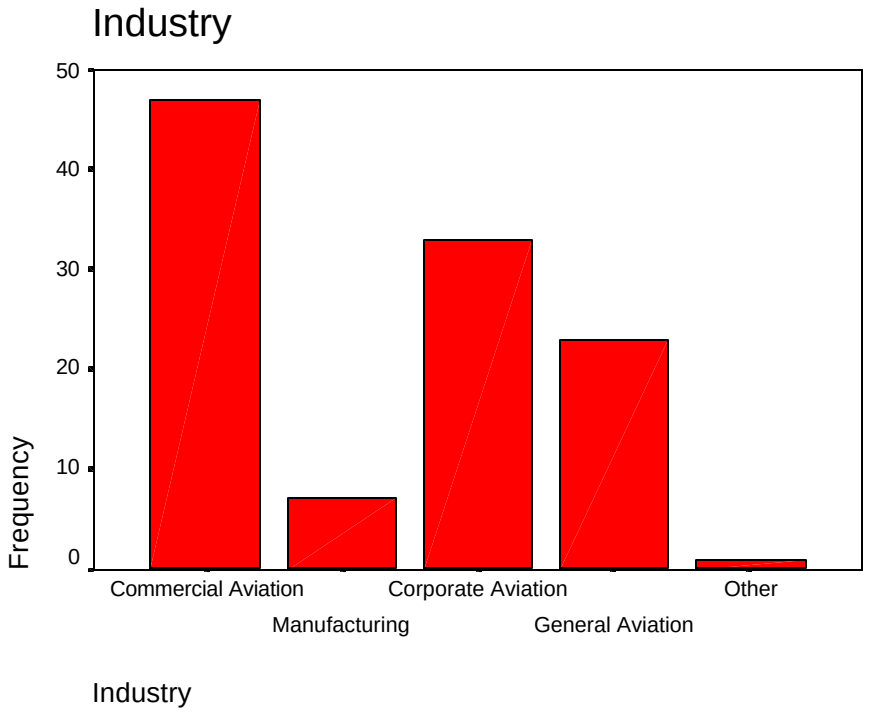
The survey was entered into statistical software program (***SPSS***) for analysis. Questions were coded in the following manner. Strongly agree is coded 2, agree is coded 1, no opinion is coded 0, disagree is coded –1, strongly disagree is coded with –2. This is the most intuitive method of coding a Likert scale, neutral is 0, agree is positive, disagree is negative.

Descriptive statistics were generated to show the attitudes reveled by the different parts of the aviation industry. Means and standard deviations for all questions were calculated. This information was cross-tabulated to determine how the different demographic variables affected the survey results.

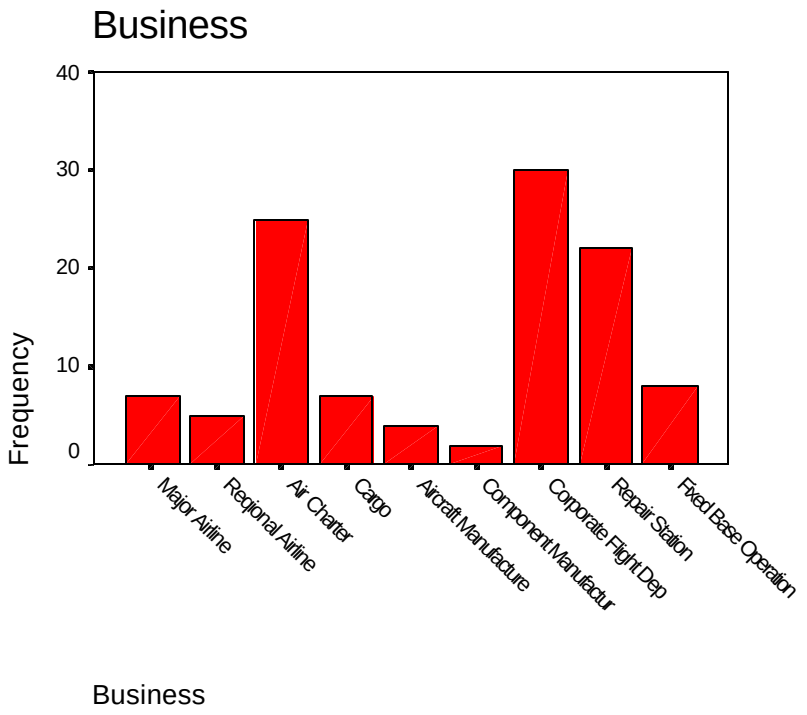
4.0 Industry Survey Results

4.1 Demographic Information

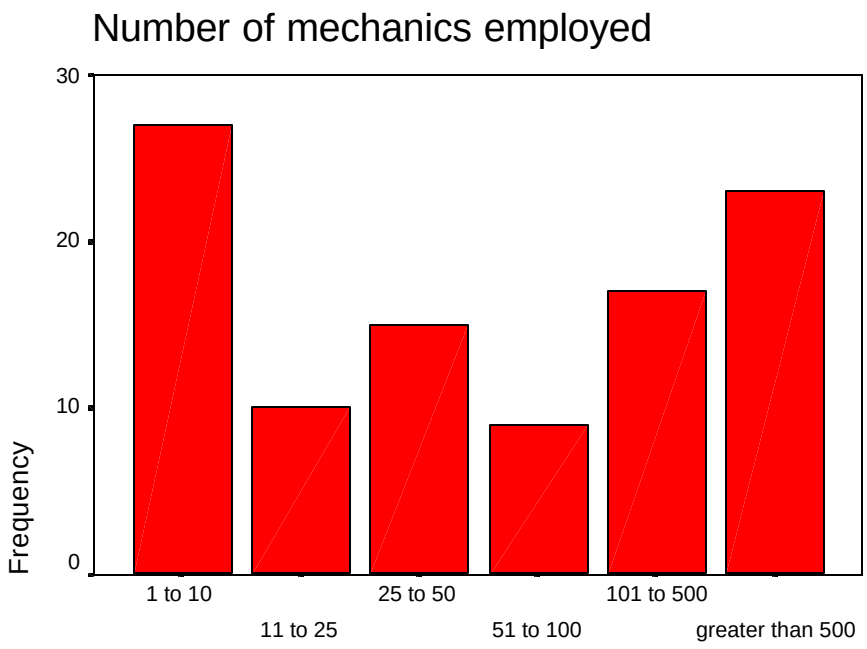
The first part of this section covers the demographic information. Five questions in the survey cover demographic information. The questions cover industry, business, number of technicians employed, and the technical background of the respondents. This information was used to determine if different groups within the population held different opinions. Survey questions were cross-tabulated with demographic questions to reveal the frequency distribution of the individual groups illustrated by the demographic questions. This knowledge reveals how opinions differ among these different groups to allow standards to be targeted to the groups most likely to utilize them.



Within the sample, the largest group responding was the commercial aviation section with 47 responses. Unfortunately, there was not more response for the general aviation community, an area of concern. Apprenticeship-type training may benefit the general aviation community the most. Similarly the manufacturing group was not well represented. Cross-tabulations for this variable can only consider differences between commercial aviation, corporate aviation, and general aviation. Data from manufacturing cannot be considered in a cross-tabulation with a question because only two manufacturers responded, making the data unreliable. This group may have the most to gain from an apprenticeship program. A manufacturing environment is well scripted and usually most jobs cover a limited set of skills such as sheet metal, or hydraulics for example. This environment would lend itself well to apprenticeship training because the jobs are repetitive in nature and require little troubleshooting skills. The purpose of identifying this characteristic was to allow the survey analysis to identify what groups held different opinions. It was anticipated that there may be divisions based on what industry the business operated in.

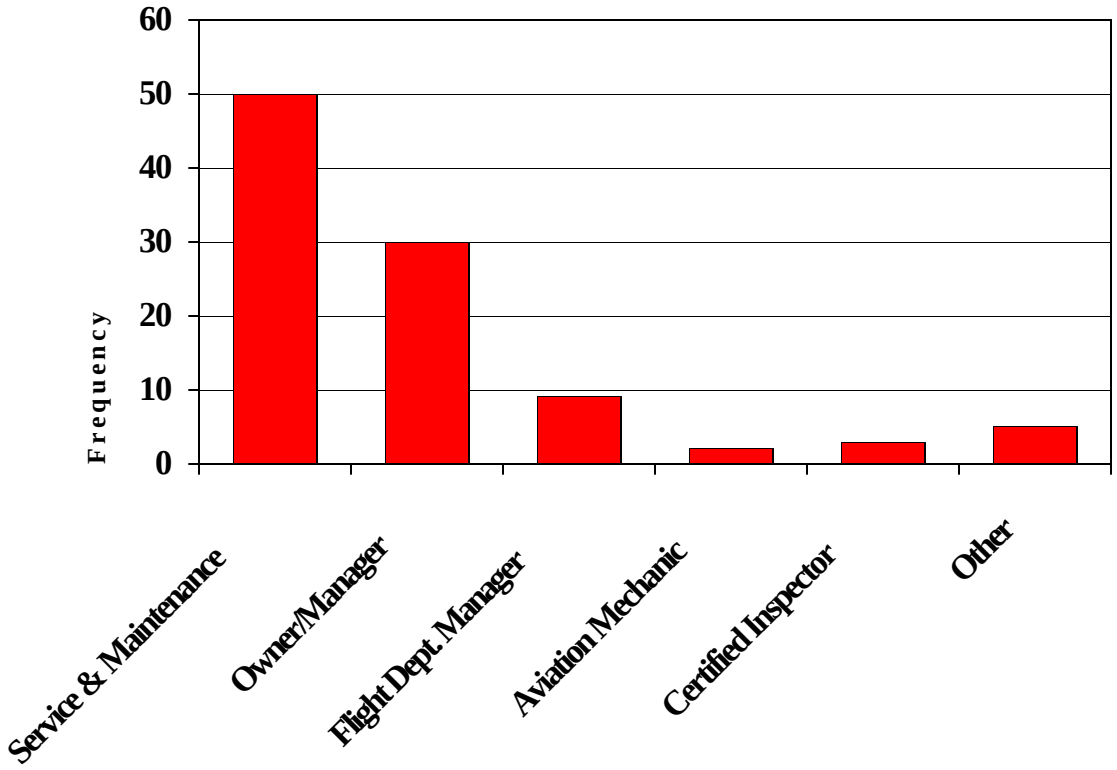


The three largest groups to respond to this survey were Air Charter, Corporate Flight Departments, and Repair Stations. The nature of the business influences the complexity of the job. For example, a major airline technician will be required to work on state of the art multi-million dollar aircraft. A technician at an FBO will generally work on older, privately owned, general aviation aircraft. Aircraft or component manufacturing may be the simplest of all (for a technician) because the job is well scripted and requires no troubleshooting. This factor is likely to influence one's opinion of apprenticeship training in their company.



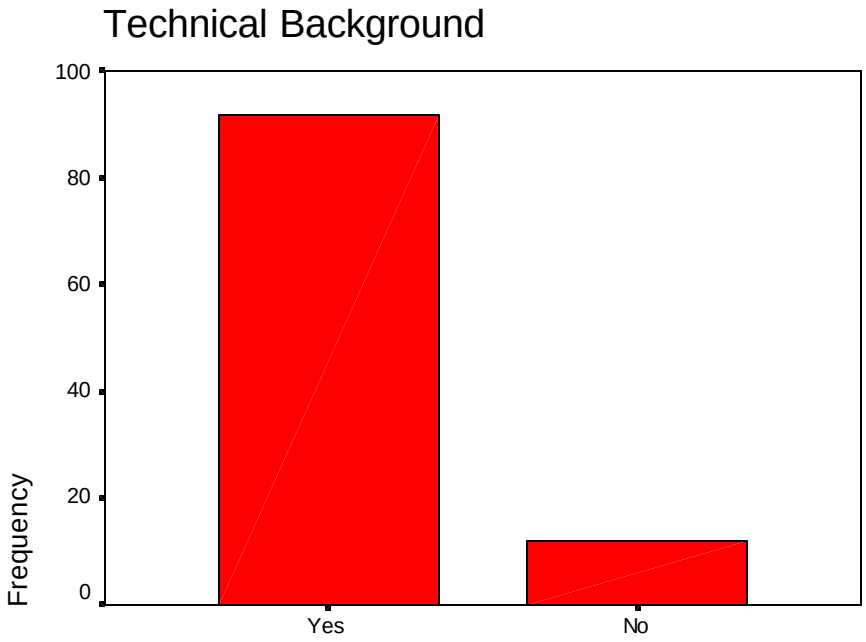
The size of a company is likely to influence the amount of capital available. Smaller companies generally have lower wages, less training, and fewer benefits. Larger companies are the opposite with the best wages, usually continuous training, and good benefits. This difference may affect a company's willingness to engage in apprenticeship type training. One benefit of apprenticeship training is that students are working while they train so they generate revenue. Traditional training usually requires an investment of manpower and capital. This perspective illustrates a benefit of apprenticeship training to smaller business where the investment in this form of training does not require as much manpower or capital because company business is the training utilized (on-the-job training). The survey responses are favorable for this category as we have good representation from both large and small companies.

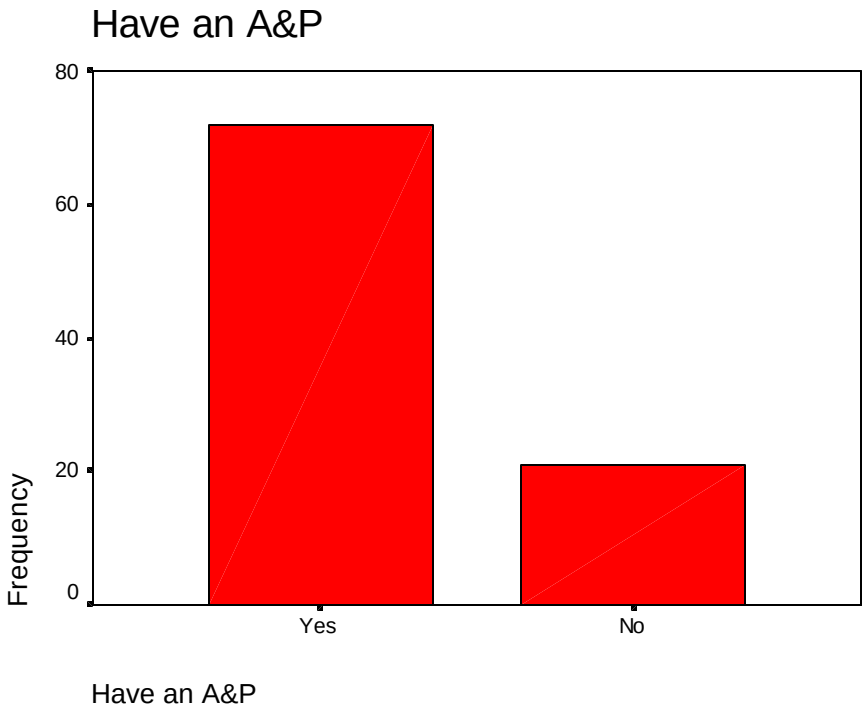
Position held in company

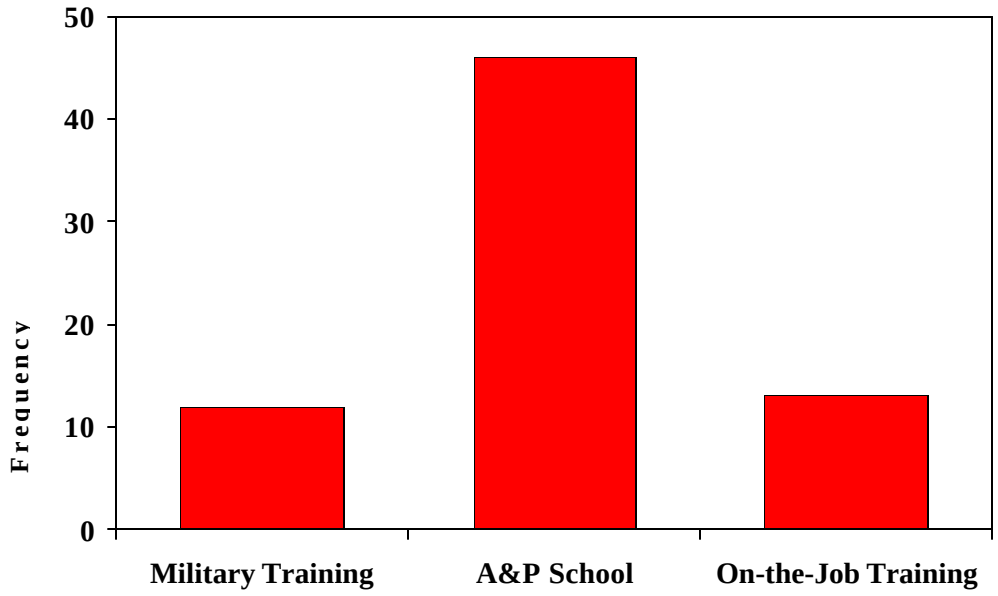


Position held in company

The position held in a company should affect a respondent's opinion. A technician may hold different opinions than management. Technicians may not want the responsibility of training new hires. It is difficult to speculate on this factor, as it will have much to do with the company culture and the personality of the individual technicians. Management will view the matter as a business decision, weighing the cost versus benefit. Unfortunately our survey responses were very one sided, mostly management and owners. However, management and owners are the group with the power to effect change. This is the group that could implement apprenticeship training, making their opinion very important.


Technical Background
100
80
60
40
20
0
Frequency
Yes
No
Technical Background


Have an A&P
80
60
40
20
0
Frequency
Yes
No
Have an A&P



The last three graphs illustrate what type of technical background the respondents have. This has an obvious impact on the opinion held. If an individual has an AMT, it is possible they may be loyal to the type of training they received. This in turn may bias the survey in favor of their background. If an individual does not have a technical background, their opinion is likely to be more neutral. The responses received are mostly from technical backgrounds, with AMTs who received training from AMT schools. The surveys are cross-tabulated to determine if training biased the results. This will be discussed in the next section.

4.2 Likert Scale Questions

In this section, the core questions of the survey are covered. For each question, a graph illustrating the frequency distribution is shown followed by a short discussion of the results. Any significant differences in how different demographic groups answered the question, a cross-tabulation table is shown for the effected variable and the differences discussed. In this section, the frequency distributions are be shown in terms of percentages as this allows easier interpretation. The frequency distributions contained in appendix 1 show the actual number of responses for each question.

Before individual questions are discussed, the scale reliability is illustrated. A reliability analysis was performed to reveal how will individual questions predicted the overall score on the Likert scale. Reliability analysis provides a means to simplify the analysis and reporting of survey data by showing that a group of variables all form a scale that is a reliable measure of some general concept. For the reliability analysis, this report used Cronbach's Alpha. This is derived from the average correlations of all of the items on the scale. One interpretation that is often preferred considers alpha to represent the correlation between the items on this scale and all of the other possible scales containing the same number of items, constructed from the universe of potential questions that measure the underlying factor or concept. Cronbach's Alpha can be treated as a correlation coefficient; it ranges in value from 0 to 1, with higher scores indicating greater reliability (Rodeghier, 1996).

Alpha for this scale was calculated after recoding all negatively coded questions. Half the questions on this survey were asked in a negative manner, to help increase reliability by eliminating the potential for negative or positive bias introduced by the respondent. Recoding was performed by reciprocating all scores for negative questions, for example – 2s are recoded to 2. The following table illustrates the data generated with a statistical software analysis (SPSS) of each item's correlation to the survey results and the resultant alpha if the item was deleted. The column to the far left indicates the item or question number. Items with the suffix NEG are negatively coded questions.

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
Q1	11.7857	85.6113	.6380	.8462
Q2NEG	11.6607	90.1361	.4440	.8541
Q3NEG	12.0357	86.7915	.5428	.8499
Q4	11.6339	87.9819	.5089	.8515
Q5NEG	12.0804	84.9935	.6503	.8454
Q6	11.4821	96.3781	.0472	.8682
Q7NEG	12.1964	87.9070	.4770	.8527
Q8	12.1161	96.7342	.0048	.8731
Q9	11.9732	84.9092	.6542	.8452
Q10	12.1161	87.8693	.5622	.8497
Q11NEG	12.0179	85.6573	.7358	.8436
Q12	11.8036	86.5557	.6530	.8464
Q13	11.6607	86.4604	.6853	.8455

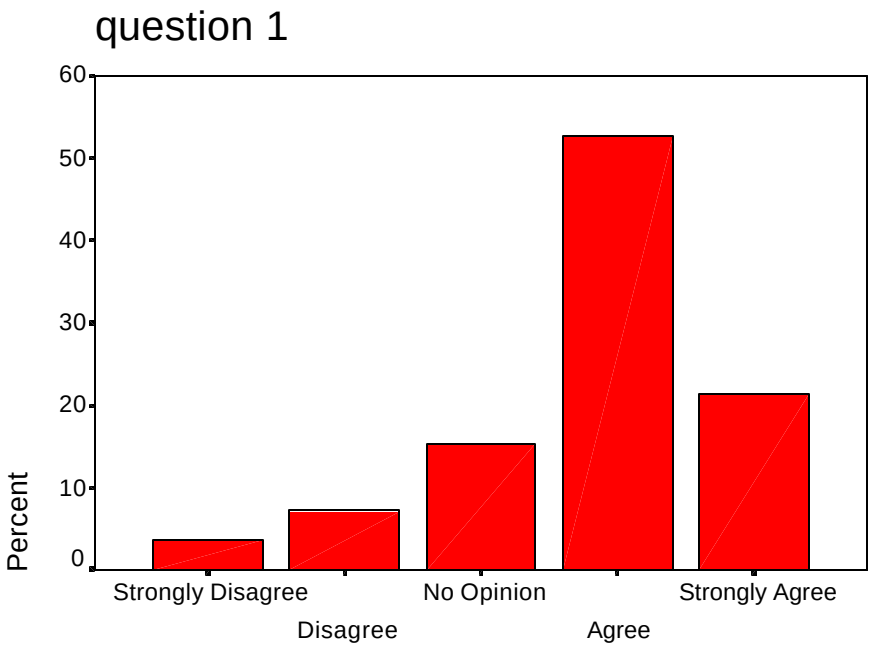
Q14	12.2232	88.2470	.5235	.8510
Q15NEG	11.8929	87.4299	.5431	.8501
Q16NEG	12.2321	98.1438	-.0593	.8753
Q17	12.0000	96.7568	.0448	.8665
Q18NEG	12.1875	85.0546	.7106	.8437
Q19NEQ	12.0714	86.7156	.5404	.8500
Q20NEG	12.1964	92.3935	.2861	.8597

Reliability Coefficients

N of Cases = 112.0 N of Items = 20

Alpha = .8601

The alpha for this survey is .8601, an excellent score. This alpha indicates that this scale is highly reliable, and that most questions measure a similar underlying concept. Only four questions have a weak correlation to the scale, question 6, 8, 16, and 17. If any of these questions is deleted the resultant score can be seen in the column to the far right. Question 6 produced the strongest results of the entire survey even though it does not contribute to the overall scale. Question 17 had a low standard deviation of .776 and a mean of .6 yet it did not contribute positively to the alpha. Questions 8 and 16 were both weak questions with high standard deviations, thus poor predictors by any standard. Even though 6 and 17 produce strong results they are poor predictors of the scale as a whole. It could be argued that 6 and 17 are measuring a different underlying concept than the rest of the scale, and that 8 and 16 are measuring nothing.



question 1

1. Our company would use a universal AMT apprentice program developed for the industry.

Mean = .81 Standard Deviation = .973 Alpha if item deleted = .8462

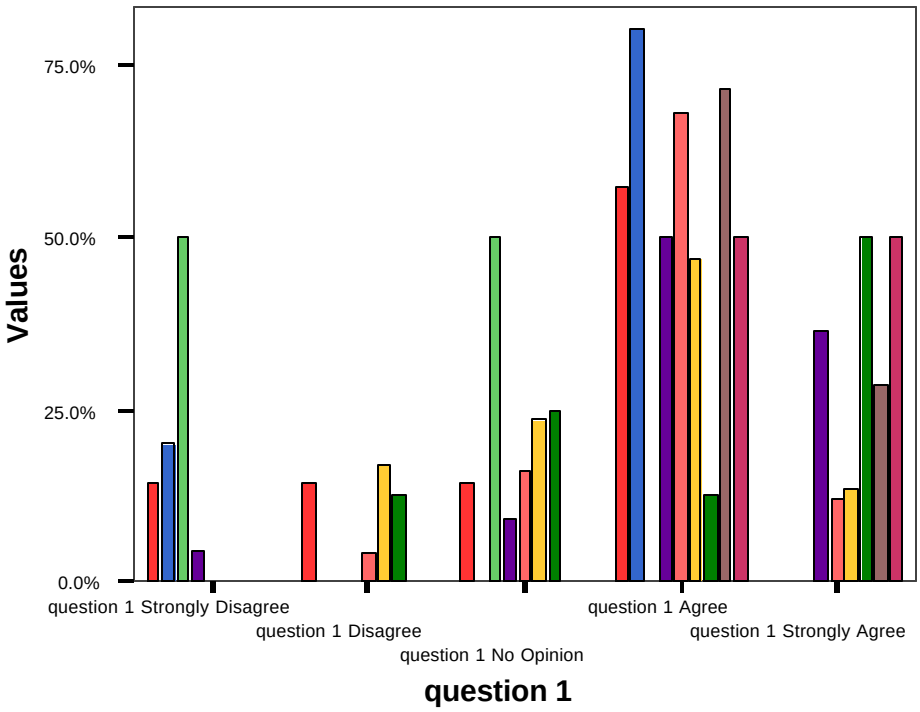
This question had good results. 74.1% of the respondents agreed or strongly agreed with this statement. 15. 2% had no opinion, and only 10.7 percent disagreed. The alpha score if deleted is lower than the scale's alpha score, indicating that this question correlates with the rest of the survey. This is strong evidence that a universal program may be accepted by the aviation industry as a whole.

Demographic variables are cross-tabulated with questions to illustrate significant differences in how different groups answered the questions. Bar graphs will be used to show these differences only when a significant difference is detected. Responses will be shown in terms of percentages. All other cross-tabulation data is contained in appendix C.

Cross-tabulations with question one did not reveal significant differences in how demographic variables affect responses. However one graph will be shown to show an important evaluation criterion.

question 1 * Business Crosstabulation

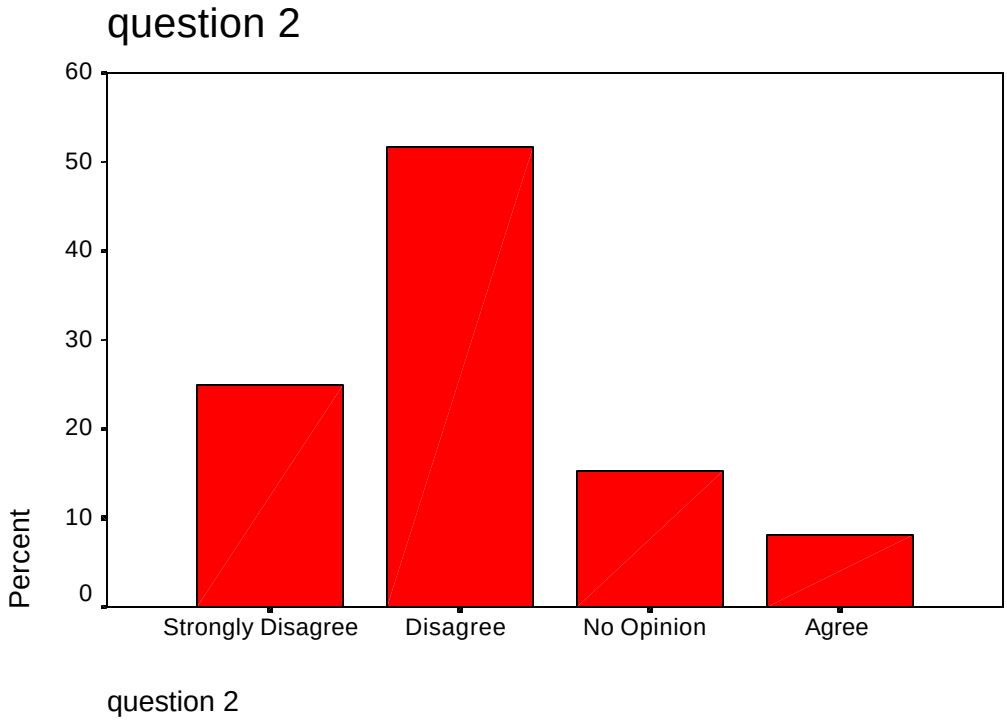
Statistics : % within Business



	Frequency
Major Airline	7
Regional Airline	5
Air Charter	25
Cargo	7
Aircraft Manufacturer	4
Component Manufacturer	2
Corporate Flight Department	30
Repair Station	22

	Fixed Base Operation	8
	Total	110
Missing	no response	2
Total		112

This cross-tabulation graph reveals a difference in how aviation businesses answered this question. Most business agreed with question 1, however 50% of the component manufacturers who responded to the survey strongly disagreed and the other 50% had no opinion. This is most likely an artifact since only two component manufacturers responded to the survey, as is illustrated in the table above the graph.



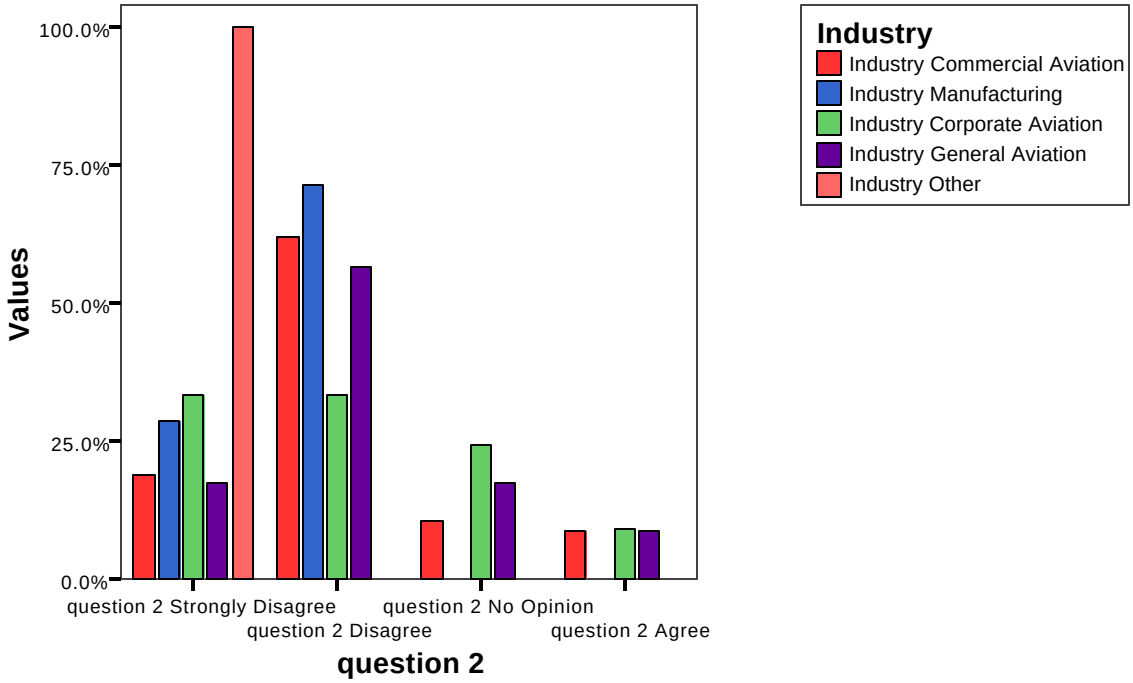
2. Apprenticeship programs do not create good technicians.

Mean = -.94 Standard Deviation = .852 Alpha if item deleted = .8541

76.8% of the sample disagreed or strongly disagreed with this question, nobody strongly agreed. This question was asked as a negative question, meaning that to disagree with this question reflects positively on the perceived quality of a technician trained in an apprenticeship program. This question contributed to the reliability of this survey. This question provides strong data supporting positive opinions of apprenticeship-trained technicians within the sample.

question 2 * Industry Crosstabulation

Statistics : % within Industry



		Frequency
Valid	Commercial Aviation	47
	Manufacturing	7
	Corporate Aviation	33
	General Aviation	23
	Other	1
	Total	111
Missing	no response	1
Total		112

5.0 Survey Findings and Discussion

Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
Question 1	-2	2	.81	.973
Question 2	-2	1	-.94	.852
Question 3	-2	2	-.56	1.011
Question 4	-2	2	.96	.958
Question 5	-2	2	-.52	1.004
Question 6	-2	2	1.12	.908
Question 7	-2	2	-.40	1.018
Question 8	-2	2	.48	1.099
Question 9	-2	2	.63	1.006
Question 10	-2	2	.48	.890
Question 11	-2	2	-.58	.856
Question 12	-2	2	.79	.882
Question 13	-2	2	.94	.852
Question 14	-2	2	.38	.912
Question 15	-2	2	-.71	.955
Question 16	-2	2	-.37	1.082
Question 17	-2	2	.60	.776
Question 18	-2	2	-.41	.926
Question 19	-2	2	-.53	1.022
Question 20	-2	2	-.40	.885

Industry

	Frequency	Percent	Valid Percent	Cumulative Percent
Commercial Aviation	47	42.0	42.3	42.3
Manufacturing	7	6.3	6.3	48.6
Corporate Aviation	33	29.5	29.7	78.4
General Aviation	23	20.5	20.7	99.1

Other	1	.9	.9	100.0
Total	111	99.1	100.0	
No response	1	.9		
	112	100.0		

Business

	Frequency	Percent	Valid Percent	Cumulative Percent
Major Airline	7	6.3	6.4	6.4
Regional Airline	5	4.5	4.5	10.9
Air Charter	25	22.3	22.7	33.6
Cargo	7	6.3	6.4	40.0
Aircraft Manufacturer	4	3.6	3.6	43.6
Component Manufacturer	2	1.8	1.8	45.5
Corporate Flight Department	30	26.8	27.3	72.7
Repair Station	22	19.6	20.0	92.7
Fixed Base Operation	8	7.1	7.3	100.0
Total	110	98.2	100.0	
No response	2	1.8		
	112	100.0		

Number of technicians employed

	Frequency	Percent	Valid Percent	Cumulative Percent
1 to 10	27	24.1	26.7	26.7
11 to 25	10	8.9	9.9	36.6
25 to 50	15	13.4	14.9	51.5
51 to 100	9	8.0	8.9	60.4
101 to 500	17	15.2	16.8	77.2
Greater than 500	23	20.5	22.8	100.0

Total	101	90.2	100.0	
No response	11	9.8		
	112	100.0		

Position held in company

	Frequency	Percent	Valid Percent	Cumulative Percent
Service & Maintenance Dep.	50	44.6	49.5	49.5
Director/Manager & Personnel				
Owner/Manager, Company Officer & Personnel	31	27.7	30.7	80.2
Flight Dept. Manager/Chief Pilot	9	8.0	8.9	89.1
Aviation Mechanic/Technician/A&P	2	1.8	2.0	91.1
Certified Inspector	3	2.7	3.0	94.1
Other	6	5.4	5.9	100.0
Total	101	90.2	100.0	
No response	11	9.8		
	112	100.0		

Technical Background

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	92	82.1	88.5	88.5
No	12	10.7	11.5	100.0
Total	104	92.9	100.0	
No response	8	7.1		
	112	100.0		

Have an A&P

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	72	64.3	77.4	77.4
No	21	18.8	22.6	100.0
Total	93	83.0	100.0	
No response	19	17.0		
	112	100.0		

How received training

	Frequency	Percent	Valid Percent	Cumulative Percent
Military Training	12	10.7	17.1	17.1
AMT School	46	41.1	65.7	82.9
On-the-Job Training	12	10.7	17.1	100.0
Total	70	62.5	100.0	
No response	42	37.5		
	112	100.0		

1. Our company would use a universal AMT apprentice program developed for the industry.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	4	3.6	3.6
Disagree	8	7.1	10.7
No Opinion	17	15.2	25.9
Agree	59	52.7	78.6
Strongly Agree	24	21.4	100.0
Total	112	100.0	

2. Apprenticeship programs do not create good technicians.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	28	25.0	25.0
Disagree	58	51.8	76.8
No Opinion	17	15.2	92.0
Agree	9	8.0	100.0
Strongly Agree	0	0	
Total	112	100.0	

3. An apprenticeship program will limit a technician's ability to perform a job that was not included in the training process.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	13	11.6	11.6
Disagree	65	58.0	69.6
No Opinion	8	7.1	76.8
Agree	24	21.4	98.2
Strongly Agree	2	1.8	100.0
Total	112	100.0	

4. The aviation industry should create universal standards for an AMT apprenticeship program.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	4	3.6	3.6
Disagree	8	7.1	10.7
No Opinion	5	4.5	15.2
Agree	66	58.9	74.1
Strongly Agree	29	25.9	100.0
Total	112	100.0	

5. An apprenticeship program will not fill this company's need for technicians.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	11	9.8	9.8
Disagree	62	55.4	65.2
No Opinion	18	16.1	81.3
Agree	16	14.3	95.5
Strongly Agree	5	4.5	100.0
Total	112	100.0	

6. Standards for the evaluation of work experience, for the purpose of AMT certification, are necessary.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	3	2.7	2.7
Disagree	7	6.3	8.9
No Opinion	1	.9	9.8
Agree	64	57.1	67.0
Strongly Agree	37	33.0	100.0
Total	112	100.0	

7. An apprenticeship program will reduce our productivity.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	11	9.8	9.8
Disagree	53	47.3	57.1
No Opinion	21	18.8	75.9
Agree	24	21.4	97.3
Strongly Agree	3	2.7	100.0
Total	112	100.0	

8. There is no uniform method to evaluate work experience for the purpose of certification for an AMT.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	4	3.6	3.6
Disagree	26	23.2	26.8
No Opinion	9	8.0	34.8
Agree	58	51.8	86.6
Strongly Agree	15	13.4	100.0
Total	112	100.0	

9. This company would benefit from an apprenticeship program.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	6	5.4	5.4
Disagree	10	8.9	14.3
No Opinion	19	17.0	31.3
Agree	62	55.4	86.6
Strongly Agree	15	13.4	100.0
Total	112	100.0	

10. An apprenticeship program would help create company loyalty.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	3	2.7	2.7
Disagree	13	11.6	14.3
No Opinion	31	27.7	42.0
Agree	57	50.9	92.9
Strongly Agree	8	7.1	100.0
Total	112	100.0	

11. Apprenticeship programs are too costly for this company.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	9	8.0	8.0
Disagree	62	55.4	63.4
No Opinion	29	25.9	89.3
Agree	9	8.0	97.3
Strongly Agree	3	2.7	100.0
Total	112	100.0	

12. An apprenticeship program will help create technicians well prepared for work in this company.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	3	2.7	2.7
Disagree	8	7.1	9.8
No Opinion	15	13.4	23.2
Agree	69	61.6	84.8
Strongly Agree	17	15.2	100.0
Total	112	100.0	

13. The aviation industry should develop a structured AMT apprenticeship program.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	4	3.6	3.6
Disagree	4	3.6	7.1
No Opinion	8	7.1	14.3
Agree	75	67.0	81.3
Strongly Agree	21	18.8	100.0
Total	112	100.0	

14. Technicians trained in an apprenticeship program are likely to stay with the company.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	.9	.9
Disagree	25	22.3	23.2
No Opinion	22	19.6	42.9
Agree	59	52.7	95.5
Strongly Agree	5	4.5	100.0
Total	112	100.0	

15. An apprenticeship program will not provide a technician with a broad base of skills.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	17	15.2	15.2
Disagree	65	58.0	73.2
No Opinion	12	10.7	83.9
Agree	16	14.3	98.2
Strongly Agree	2	1.8	100.0
Total	112	100.0	

16. Work experience, for the purpose of AMT certification, is interpreted with consistency.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	16	14.3	14.3
Disagree	42	37.5	51.8
No Opinion	24	21.4	73.2
Agree	27	24.1	97.3
Strongly Agree	3	2.7	100.0
Total	112	100.0	

17. There are no structured AMT apprenticeship programs available from the FAA.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	.9	.9
Disagree	4	3.6	4.5
No Opinion	47	42.0	46.4
Agree	47	42.0	88.4
Strongly Agree	13	11.6	100.0
Total	112	100.0	

18. Apprenticeship programs are too labor intensive for this company.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	7	6.3	6.3
Disagree	54	48.2	54.5
No Opinion	34	30.4	84.8
Agree	12	10.7	95.5
Strongly Agree	5	4.5	100.0
Total	112	100.0	

19. A universally mandated, structured apprenticeship program is not practical.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	14	12.5	12.5
Disagree	57	50.9	63.4
No Opinion	19	17.0	80.4
Agree	18	16.1	96.4
Strongly Agree	4	3.6	100.0
Total	112	100.0	

20. FAR 65 provides sufficient guidance to develop an AMT apprenticeship program.

	Frequency	Percent	Cumulative Percent
Strongly Disagree	10	8.9	8.9
Disagree	44	39.3	48.2
No Opinion	40	35.7	83.9
Agree	17	15.2	99.1
Strongly Agree	1	.9	100.0
Total	112	100.0	

5.1 Industry Survey Summary & Discussion

Although twenty questions were utilized in this study to assess industry views regarding apprenticeship programs there are three fundamental research questions being asked. They are:

- **What is the industry perception of AMT quality when certificated through an apprenticeship program?**

- **Does the industry perceive the current regulations governing the certification of AMT through work experience as having enough structure?**

- **Would the aviation industry use an apprenticeship program?**

Multiple questions relating to the same core question were asked. Questions were posed in both a positive and negative manner and using different phraseology in an effort to validate responses. Responses to survey questions within the same core question groups were statistically analyzed for reliability. Question reliability results are given in the chart on page 17. An extremely high level of reliability and validity was established for all of the core questions.

Following is a listing of the core questions and the survey questions that pertain to them.

Core Question # 1

- **What is the industry perception of AMT quality when certificated through an apprenticeship?**

  (Note: The question number relates to the questions as they are listed in the detailed survey results on pages 26-33 of this report.)

  2. Apprenticeship programs do not create good technicians.

3. An apprenticeship program will limit a technician's ability to perform a job that was not included in the training process.

15. An apprenticeship program will not provide a technician with a broad base of skills.

The response to this group of questions indicated widespread industry satisfaction with AMT's certified through an apprenticeship program. This acceptance of the apprenticeship process existed in all industry segments. Reponses indicated a belief that practical experience certificated individuals were as qualified and successful on the job as technicians certificated through other means. Industry wide approximately 90% of individuals responding believed the structured experience process could produce a well-qualified technician.

Core Question # 2

- **Does the industry perceive the current regulations governing the certification of AMT through work experience as having enough structure?**

4. The aviation industry should create universal standards for an AMT apprenticeship program.

6. Standards for the evaluation of work experience, for the purpose of AMT certification, are necessary.

8. There is no uniform method to evaluate work experience for the purpose of certification.

13. The aviation industry should develop a structured AMT apprenticeship program.

16. Work experience, for the purpose of AMT certification, is interpreted with consistency.

17. There are no structured AMT apprenticeship programs available from the FAA.

20. FAR 65 provides sufficient guidance to develop an AMT apprenticeship program.

This group of questions also produced very homogeneous responses. Respondents indicated that current guidelines do not provide for consistent interpretation and application of an individuals practical work experience as required by CFR Part 65.77. Approximately 80% of respondents support the concept of the FAA developing a more structured experience qualification program. Companies responding to the survey expressed the belief that adding structure and definition to this process would increase the likelihood that they would utilize it.

Core Question # 3

- **Would the aviation industry use an apprenticeship program?**

    1. Our company would use a universal AMT apprentice program developed for the industry.

    5. An apprenticeship program will not fill this company's need for technicians.

    7. An apprenticeship program will reduce our productivity.

    9. This company would benefit from an apprenticeship program.

    10. An apprenticeship program would help create company loyalty.

    11. Apprenticeship programs are too costly for this company.

    12. An apprenticeship program will help create technicians well prepared for work in this company.

    18. Apprenticeship programs are too labor intensive for this company.

The overwhelming majority of survey participants indicated that a structured experience program could play a role in supplying their technician requirements. This support for a technician apprenticeship program was spread across all segments of the industry. Many respondents believe that individuals trained through an apprenticeship program would be more likely to be long term employees. The majority of companies responding also indicated that with proper guidance material they would be interested in implementing this type of program.

In summary the industry survey results indicate widespread support for the development of a structured experience guidelines and a belief that this type of program could play a pivotal role in assisting companies meet their future maintenance technician requirements.

6.0 Technician Survey Procedures

For people within the aviation industry there are many anecdotal reports on the certification process and experience of individuals testing for the A&P based on civilian experience. Thus it was important to determine what the typical experience level was for AMT's qualifying with civilian experience. This survey was conducted of AMT technicians who qualified for their AMT certification based on civilian experience. The survey was designed to research the background and experience of those individuals as they related to preparation for the FAA examining process and also their entry into the workforce. The fundamental research question being asked was:

- What areas of weakness were encountered by AMT's (Aircraft Maintenance Technicians) who qualified through OJT experience during the FAA technician examination process?

This survey was conducted of AMT technicians who qualified for their AMT certification based on civilian experience. The survey was designed to research the background and experience of those individuals as they related to preparation for the FAA examining process and entry into the workforce. For this survey, a sample of convenience was used. The survey has been used to develop descriptive statistics, therefore not requiring an accurate probability sample. Time and budget limitations prevented including the participation of the entire population.

The survey was administered at various aviation maintenance operations that were selected due to their history of qualifying technicians based on experience. An effort was made to include maintenance operations that represented the full spectrum of the aviation industry. Surveys were distributed in person and by mail. A total of 250 surveys were distributed with 105 surveys returned for a 42% response rate.

7.0 Technician Survey Results

The results for each question are tabulated under "Frequency", which is the number of individuals that indicated that particular response, and "Percent" which is the calculated percentage that the response frequency represents of those responding to that question.

1. What FAA Technicians certificate(s) do you hold? (check all that apply)

	Frequency	Percent
Airframe only	27	26
Powerplant only	13	12.5
Airframe & Powerplant	64	60.5
No Response	1	1
TOTAL	105	100

2. What type of experience did you use to satisfy the FAA requirements? (check all that apply)

	Frequency	Percent
Aircarrier	2	1.9
FBO	28	26.7
Repair Station	36	34.3
Military	27	25.7
Other	12	11.4
TOTAL	105	100

3. What category (type) aircraft did you maintain? (check all that apply)

	Frequency	Percent
Large Jet Transport	19	18.4
Regional Jet	7	6.8
Turbo prop	15	14.3
Helicopter	33	31.2
Piston powered fixed wing	31	29.3
TOTAL	105	100

4. How many <u>months</u> experience did you have prior to taking the FAA exam?

	Frequency	Percent
18-months	0	0
19-24	1	0.9
25-30	9	8.7
30-40	30	28.5
over 40	60	57.1
No response	5	4.8
TOTAL	105	100

5. Prior to taking your FAA written exams did you attend a Test Prep Course?

	Frequency	Percent
Yes	59	56.2
No	44	41.9
No response	2	1.9
TOTAL	105	100

6. My practical aviation experience prepared me well to perform my daily duties as an aircraft technician.

	Frequency	Percent
Strongly Agree	61	58.1
Agree	40	38.1
No Opinion	2	1.9
Disagree	2	1.9
Strongly Disagree	0	0
TOTAL	105	100

7. My experience prepared me well to successfully complete the FAA testing process for the A&P license.

	Frequency	Percent
Strongly Agree	6	5.7
Agree	49	46.7
No Opinion	4	3.8
Disagree	39	37.1
Strongly Disagree	7	6.7
TOTAL	105	100

THE FOLLOWING IS A LIST OF SUBJECT AREAS THAT THE FAA USES TO TEST AMT TECHNICIANS:

I. GENERAL SUBJECT AREAS

A. BASIC ELECTRICITY

	Frequency	Percent
High Level of Experience	16	15.2
Adequate Level of Experience	68	64.8
Very Little Experience	17	16.2
No Experience	4	3.8
TOTAL	105	100

B. AIRCRAFT DRAWINGS

	Frequency	Percent
High Level of Experience	19	18.1
Adequate Level of Experience	71	67.6
Very Little Experience	13	12.4
No Experience	2	1.9
TOTAL	105	100

C. WEIGHT AND BALANCES

	Frequency	Percent
High Level of Experience	11	10.5
Adequate Level of Experience	48	45.7
Very Little Experience	41	39
No Experience	5	4.8
TOTAL	105	100

D. FLUID LINES & FITTING

	Frequency	Percent
High Level of Experience	27	25.7
Adequate Level of Experience	62	59.1
Very Little Experience	16	15.2
No Experience	0	0
TOTAL	105	100

E. MATERIALS & PROCESSES

	Frequency	Percent
High Level of Experience	13	12.4
Adequate Level of Experience	50	47.6
Very Little Experience	39	37.1
No Experience	3	2.9
TOTAL	105	100

F. GROUND OPS & SERVICING

	Frequency	Percent
High Level of Experience	49	46.7
Adequate Level of Experience	40	38.1
Very Little Experience	16	15.2
No Experience	0	0
TOTAL	105	100

G. CLEANING & CORROSION

	Frequency	Percent
High Level of Experience	17	16.2
Adequate Level of Experience	73	69.5
Very Little Experience	14	13.4
No Experience	1	0.9
TOTAL	105	100

H. MATHEMATICS

	Frequency	Percent
High Level of Experience	12	11.4
Adequate Level of Experience	87	82.9
Very Little Experience	6	5.7
No Experience	0	0
TOTAL	105	100

I. MAINTENANCE FORMS & RECS

	Frequency	Percent
High Level of Experience	18	17.1
Adequate Level of Experience	32	30.5
Very Little Experience	51	48.6
No Experience	4	3.8
TOTAL	105	100

J. BASIC PHYSICS

	Frequency	Percent
High Level of Experience	2	1.9
Adequate Level of Experience	53	50.5
Very Little Experience	43	40.9
No Experience	7	6.7
TOTAL	105	100

K. MAINTENANCE PUBLICATIONS

	Frequency	Percent
High Level of Experience	35	33.3
Adequate Level of Experience	58	55.2
Very Little Experience	12	11.5
No Experience	0	0
TOTAL	105	100

L. MAINTENANCE PRIVILEGES & LIMITATIONS

	Frequency	Percent
High Level of Experience	5	4.8
Adequate Level of Experience	38	36.2
Very Little Experience	42	40.0
No Experience	20	19.0
TOTAL	105	100

II. AIRFRAME SUBJECTS

A. WOOD STRUCTURES

	Frequency	Percent
High Level of Experience	0	0
Adequate Level of Experience	8	7.6
Very Little Experience	26	24.8
No Experience	71	67.6
TOTAL	105	100

B. AIRCRAFT COVERINGS

	Frequency	Percent
High Level of Experience	2	1.9
Adequate Level of Experience	10	9.5
Very Little Experience	29	27.6
No Experience	64	61
TOTAL	105	100

C. AIRCRAFT FINISHING

	Frequency	Percent
High Level of Experience	4	3.8
Adequate Level of Experience	20	19
Very Little Experience	37	35.2
No Experience	44	42
TOTAL	105	100

D. SHEET METAL & NON-METALLIC STRUCTURES

	Frequency	Percent
High Level of Experience	39	37.1
Adequate Level of Experience	46	43.8
Very Little Experience	17	16.2
No Experience	3	2.9
TOTAL	105	100

E. WELDING

	Frequency	Percent
High Level of Experience	1	0.9
Adequate Level of Experience	30	28.6
Very Little Experience	6	5.7
No Experience	68	64.8
TOTAL	105	100

F. ASSEMBLY & RIGGING

	Frequency	Percent
High Level of Experience	28	26.7
Adequate Level of Experience	56	53.3
Very Little Experience	19	18.1
No Experience	2	1.9
TOTAL	105	100

G. AIRFRAME INSPECTION

	Frequency	Percent
High Level of Experience	66	62.8
Adequate Level of Experience	30	28.6
Very Little Experience	5	4.8
No Experience	4	3.8
TOTAL	105	100

H. ACFT LANDING GEAR SYSTEM

	Frequency	Percent
High Level of Experience	36	34.3
Adequate Level of Experience	42	40
Very Little Experience	25	23.8
No Experience	2	1.9
TOTAL	105	100

I. HYDRAULIC & PNEUMATIC POWER SYSTEM

	Frequency	Percent
High Level of Experience	17	16.2
Adequate Level of Experience	70	66.7
Very Little Experience	15	14.2
No Experience	3	2.9
TOTAL	105	100

J. CABIN ATMOSPHERE CONTROL SYSTEM

	Frequency	Percent
High Level of Experience	5	4.8
Adequate Level of Experience	47	44.8
Very Little Experience	43	40.9
No Experience	10	9.5
TOTAL	105	100

K. AIRCRAFT INSTRUMENT SYSTEMS

	Frequency	Percent
High Level of Experience	6	5.7
Adequate Level of Experience	59	56.2
Very Little Experience	28	26.7
No Experience	12	11.4
TOTAL	105	100

L. COMMUNICATION & NAVIGATION SYSTEMS

	Frequency	Percent
High Level of Experience	13	12.4
Adequate Level of Experience	49	46.7
Very Little Experience	41	39
No Experience	2	1.9
TOTAL	105	100

M. AIRCRAFT FUEL SYSTEMS

	Frequency	Percent
High Level of Experience	16	15.2
Adequate Level of Experience	68	64.8
Very Little Experience	17	16.2
No Experience	4	3.8
TOTAL	105	100

N. AIRCRAFT ELECTRICAL SYS TEMS

	Frequency	Percent
High Level of Experience	19	18.1
Adequate Level of Experience	53	50.5
Very Little Experience	29	27.6
No Experience	4	3.8
TOTAL	105	100

O. POSITION & WARNING SYSTEMS

	Frequency	Percent
High Level of Experience	6	5.7
Adequate Level of Experience	51	48.6
Very Little Experience	46	43.8
No Experience	2	1.9
TOTAL	105	100

P. ICE & RAIN CONTROL SYSTEMS

	Frequency	Percent
High Level of Experience	4	3.8
Adequate Level of Experience	47	44.8
Very Little Experience	45	42.8
No Experience	9	8.6
TOTAL	105	100

Q. FIRE PROTECTION SYSTEMS

	Frequency	Percent
High Level of Experience	7	6.7
Adequate Level of Experience	35	33.3
Very Little Experience	52	49.5
No Experience	11	10.5
TOTAL	105	100

III. POWERPLANT SUBJECTS

A. RECIPROCATING ENGINES

	Frequency	Percent
High Level of Experience	21	20
Adequate Level of Experience	28	26.7
Very Little Experience	17	16.2
No Experience	39	37.1
TOTAL	105	100

B. TURBINE ENGINES

	Frequency	Percent
High Level of Experience	37	35.2
Adequate Level of Experience	40	38.1
Very Little Experience	21	20
No Experience	7	6.7
TOTAL	105	100

C. ENGINE INSPECTION

	Frequency	Percent
High Level of Experience	71	67.6
Adequate Level of Experience	21	20
Very Little Experience	10	9.5
No Experience	3	2.9
TOTAL	105	100

D. ENGINE INSTRUMENT SYSTEMS

	Frequency	Percent
High Level of Experience	13	12.4
Adequate Level of Experience	47	44.7
Very Little Experience	32	30.5
No Experience	13	12.4
TOTAL	105	100

E. ENGINE FIRE PROTECTION SYSTEMS

	Frequency	Percent
High Level of Experience	3	2.9
Adequate Level of Experience	34	32.4
Very Little Experience	47	44.7
No Experience	21	20
TOTAL	105	100

F. ENGINE ELECTRICAL SYSTEMS

	Frequency	Percent
High Level of Experience	10	9.5
Adequate Level of Experience	49	46.7
Very Little Experience	40	38.1
No Experience	6	5.7
TOTAL	105	100

G. LUBRICATION SYSTEMS

	Frequency	Percent
High Level of Experience	48	45.7
Adequate Level of Experience	41	39
Very Little Experience	15	14.3
No Experience	1	1
TOTAL	105	100

H. IGNITION SYSTEMS

	Frequency	Percent
High Level of Experience	38	36.2
Adequate Level of Experience	47	44.8
Very Little Experience	18	17.1
No Experience	2	1.9
TOTAL	105	100

I. FUEL METERING SYSTEMS

	Frequency	Percent
High Level of Experience	19	18.1
Adequate Level of Experience	50	47.6
Very Little Experience	31	29.5
No Experience	5	4.8
TOTAL	105	100

J. ENGINE FUEL SYSTEMS

	Frequency	Percent
High Level of Experience	20	19
Adequate Level of Experience	53	50.5
Very Little Experience	29	27.6
No Experience	3	2.9
TOTAL	105	100

K. INDUCTION & ENGINE AIRFLOW SYSTEMS

	Frequency	Percent
High Level of Experience	21	20
Adequate Level of Experience	54	51.4
Very Little Experience	28	26.7
No Experience	2	1.9
TOTAL	105	100

L. ENGINE COOLING SYSTEM

	Frequency	Percent
High Level of Experience	9	8.6
Adequate Level of Experience	60	57.1
Very Little Experience	30	28.6
No Experience	6	5.7
TOTAL	105	100

M. ENGINE EXHAUST & REVERSER SYSTEM

	Frequency	Percent
High Level of Experience	6	5.7
Adequate Level of Experience	42	40
Very Little Experience	33	31.4
No Experience	24	22.9
TOTAL	105	100

N. PROPELLERS

	Frequency	Percent
High Level of Experience	3	2.9
Adequate Level of Experience	35	33.3
Very Little Experience	38	36.2
No Experience	29	27.6
TOTAL	105	100

O. AUXILARY POWER UNITS

	Frequency	Percent
High Level of Experience	4	3.8
Adequate Level of Experience	33	31.4
Very Little Experience	45	42.9
No Experience	23	21.9
TOTAL	105	100

8.0 Technician Survey Findings

The first part of this survey covers background information relating to the AMT's type and length of experience, and their opinion on the A&P testing process. The second part of the survey assesses the technicians preparation is specific subject areas.

Question #4 revealed that the majority of applicants currently qualifying through civilian experience have over 40 months of experience. A structured program that could shorten this timeframe would have a positive impact on the recruitment and retention of potential AMT's. Shortening a program could also have a beneficial effect on retention of knowledge for testing purposes.

Questions #6 & #7 provide for an interesting comparison. Reviewing the results of these questions indicates that the AMT's believe that the experience has better prepared them for the performance of their daily duties than for the FAA testing process. Creating a structure that adds exposure to a wider array of subject areas should help to alleviate this problem.

The second part of the survey provides insight into the AMT applicant experience level as it relates to specific skill task areas. As might be expected specific skill strengths and weaknesses vary widely from applicant to applicant. However, a few general trends do emerge that should be addressed in a structured experience program. Technician applicants are generally weak in subject areas that are traditionally considered classroom topics such as Maintenance Privileges and Limitations (FAR's) and Maintenance Forms & Records. Individuals also do not believe that they have adequate experience in aircraft systems. This is particularly evident in the area of electronics. The AMT's believe that they have a high level of experience in areas that have a high degree of hands on activity such as wheels & brakes and corrosion control.

For people within the aviation industry there are many anecdotal reports on the certification process and experience of individuals testing for the A&P based on civilian experience. Thus it was important to determine what the typical experience level was for AMT's qualifying with civilian experience. This survey was conducted of AMT technicians who qualified for their AMT certification based on civilian experience. The survey was designed to research the background and experience of those individuals as they related to preparation for the FAA examining process and also their entry into the workforce. The fundamental research question being asked was:

- What areas of weakness were encountered by AMT's (Aircraft Maintenance Technicians) who qualified through OJT experience during the FAA technician examination process?

This survey was conducted of AMT technicians who qualified for their AMT certification based on civilian experience. The survey was designed to research the background and experience of those individuals as they related to preparation for the FAA examining process and entry into the workforce. For this survey, a sample of convenience was used. The survey has been used to develop descriptive statistics, therefore not requiring an

accurate probability sample. Time and budget limitations prevented including the participation of the entire population.

The survey was administered at various aviation maintenance operations that were selected due to their history of qualifying technicians based on experience. An effort was made to include maintenance operations that represented the full spectrum of the aviation industry. Surveys were distributed in person and by mail. A total of 250 surveys were distributed with 105 surveys returned for a 42% response rate.

8.1 Correlation with the Job-Task-Analysis

An Aviation Maintenance Technician, Job-Task-Analysis was completed in 1989 by The Transportation Center of Northwestern University. This study provided a comprehensive review of the job tasks currently performed by today's aviation maintenance technician. The study result provides a chart of typical maintenance tasks rated by frequency, criticality and difficulty. This list of maintenance tasks in order of criticality is provided in Appendix D. The results of the JTA were compared with the technician survey conducted for this project. This comparison reveals that there are currently several critical job-tasks that technicians frequently perform that AMT's in the technicians study checked off as having "Very Little Experience" or "No Experience". This experience gap is particularly evident in the area of electronics, systems, and fault-analysis.

The JTA listing of maintenance tasks contained in Appendix D provides a comprehensive listing of defined maintenance tasks from which to construct a structured experience program. It is not intended or reasonable that all JTA tasks be included as a part of a technician's practical experience. However, the data provided by the JTA should be utilized in the selection of program content. JTA tasks with frequency and criticality ratings of 3.0 or higher should be strongly considered for inclusion in the program as appropriate for the AMO activities. Tasks with frequency and criticality ratings of less than 2.0 will, in most cases, not need to be included in the program.

9.0 Structured-Experience Program Overview

The proposed Structured Experience Program will provide the AMT applicant with experience consistent with the curriculum requirements of 14CFR Part 147 Appendix B, C, and D. The practical maintenance experience tasks will be unique to the AMO and provide exposure to a broad range of maintenance skills consistent with the sprit of the regulatory requirements.

Under the proposals contained in this report the Aviation Maintenance Organization (AMO) would submit for approval to their local FSDO a description of their program including a syllabus detailing the specifics of the material to be learned and practical tasks to be completed during the training program. The program submission when approved will become an operational document that must be adhered to in similar to other FAA approved documents. The structure of the requirements along with FAA approval and surveillance could allow well-developed programs to be completed in 24 months.

A Structured Experience Program has two components; theoretical knowledge and practical experience. The theoretical knowledge component may use self-directed study, company and manufactures training, Part 147 AMTS courses, or approved distance-learning courses. The AMO will develop a syllabus and schedule for the completion of the knowledge requirements. Appendix H of this report contains 3 sample course outlines, which can be used as models in the development of a program. The AMO must use some form of evaluation to insure that the persons in the program meet the minimum level of knowledge in the various subject areas.

The practical experience component will be unique to the AMO. A list of typical maintenance tasks will be developed and placed in the syllabus. The maintenance tasks chosen must insure a broad range of exposure to the structures, systems and powerplants of the aircraft maintained at the AMO. The list of tasks should allow the trainee the opportunity to learn from unique maintenance opportunities that arise in an operational maintenance facility. Practical maintenance experience and practical projects, as defined for this report, are typical maintenance activities performed at the AMO. When the trainee is completing any maintenance activities it should be documented. The trainer and structured experience program supervisor should monitor daily maintenance activities at the AMO for unique opportunities to provide the trainee(s) with tasks consistent to the maintenance activities detailed in the JTA (Appendix E)

The proposed structured experience program will require the appointment of two individuals to coordinate the content and delivery of the program. These two appointees will serve in the roles of Program Supervisor; and OJT Trainer. The people selected for these positions may have these duties included with other related duties.

The Program Supervisor is responsible for the overall operation of the program. This person must insure that the trainees are completing the requirements of the program in a timely manner consistent with the specifics of the approved program. They are responsible for the overall quality assurance of the program and must insure that the OJT Trainer is properly supervising the trainee(s).

The OJT Trainer is responsible for the direct supervision of the trainee(s). The OJT Trainer must instruct the trainee on the proper use of tools, test equipment, maintenance manuals and company procedures. It is permissible to have more than one individual designated as an OJT Trainer. The OJT Trainer will be in the immediate vicinity when the trainee is performing maintenance tasks. The OJT Trainer will not sign-off a skill task on the trainees' record sheet until satisfied that the trainee has successfully completed all aspects of the item at the required skill level

The OJT Trainer is key to the successful operation of this program. This person must have a broad range of aircraft maintenance experience and skills. They must be able to relate to the trainee in a manner that will maximize the trainees' knowledge and skills, while also instilling the highest level of safety, responsibility, and ethics.

There are no fixed limits on the size of a Structured Experience Program. However the AMO must have sufficient diversity in its operations to provide the trainee with the

required skill experiences. There should be sufficient OJT Trainers designated to insure that they can properly oversee the activities of the trainees in the program.
A well-designed Structured Experience Program can provide the trainee with the knowledge, skills and experiences consistent with the requirements of 14CFR 65 in a period of not less than 24 months. Any program less than 30 months in length, must include a request for exemption from rule 14CFR 65.77 submitted in accordance with 114CFR 11.25. It must also be considered that not all trainees will be prepared in the minimum amount of time. Each trainee should be judged on his or her overall competency.

This proposed program differs from the present requirements of 14CFR 65.77 in that the Aviation Maintenance Organization (AMO) must submit for approval to their local FSDO a description of their program including a student syllabus detailing the specific requirement of material to be learned and practical tasks to be completed during the program.

The program submission once approved, will be come an operational document that must be adhered to in similar manner to other FAA approved documents.

9.1 Guidelines for Program Submission

An AMO that desires to operate a Structured-Experience Program must submit a request to the local FSDO. The submission should include the scope and detail of the program as outlined in this section.

9.2 Operational Guidelines

- The AMO must designate a Program Supervisor. This individual is responsible for the operation and quality control of the structured experience program.

The designated individual must have a written job description specifying their level of responsibility and placement on the AMO organizational chart. This individual must have the appropriate certification and experience suitable for the specific duties of this position.

- A list of persons designated as program OJT Trainers.

All persons who are to be involved with the instruction or supervision of trainees must be designated. A current list of trainer designees must contain name, certificate number and training responsibilities.

- Length of program.

The length of the program must be specified. A structure-experience program should be minimum of 24 months in length. It should be recognized that not all students will complete the program in the minimum time allowed. Any program less than 30 months on length, must include a request for exemption from rule 14CFR 65.77 submitted in accordance with 14CFR 11.25.

- Maximum number of participants.

The number of participants should not be such that they cannot be properly and closely supervised by the designated trainer(s) or that could adversely effect the quality of the work produced by the AMO.

- A description of the program attendance record-keeping procedures.

Provide a description of how student time will be tracked. The procedures for counting and recording the time should be detailed. The trainee record should also indicate completed practical tasks and successful completion of knowledge requirements. Provide a sample of the forms to be utilized. A sample record-keeping form may be found in Appendix D.

- Program completion letter.

The AMO must provide to the trainee and FAA a signed letter stating successful completion of the program. The content provided should the specificity to satisfy FAA regulatory requirements. This may accomplished through an attachment of the trainees training records. A sample letter is provided in Appendix E

9.2.1 Knowledge Requirements

- A listing of subjects to be covered.

This listing should include the appropriate subject items as is found in 14CFR 147 appendix B,C, & D. These subject areas may be weighted to focus on the knowledge that may be applied within the present scope of the AMO operation. However, it is paramount that the breath of knowledge be sufficient to cover the complete spectrum of AMT privileges. Appendix H of this report contains 3 sample course outlines, which can be used as models in the development of a program.

- A method to be used for timely and appropriate interaction between trainer and trainee.

It is important that a process be in place to insure open and regular communication between the trainee and the trainer. The document submission should provide details of such a system.

- A listing of the learning resources to be utilized in the successful completion of the program.

This listing will typically include such items as textbooks, video tapes, and technical reference materials. If the training program will utilize manufacturer training or Part 147 courses, either on site or through distance learning, these courses must be specified.

9.2.2 Skill Requirements

- Provide a listing of the minimum required practical skill tasks required for the successful completion of the program.

The applicant must complete typical maintenance tasks covering the breadth and scope of skills required of maintenance technicians within the approved maintenance operation. The tasks must include work on aircraft structures, systems and powerplants typical to the AMO. Tasks of a general nature expected of all AMT's (e.g. aircraft servicing, inspection, fueling, ground handling and mooring, and general servicing skills) must be included A structured experience program should retain the flexibility to take advantage of maintenance opportunities at the AMO. These tasks are to be typical and actual maintenance activities performed at the AMO. Where practical these activities should be consistent with the maintenance tasks outlined in the AMT Job Task Analysis. Appendix E of this report contains a list of JTA maintenance tasks categorized by the subject areas in 14CFR Part 147 and listed by criticality level. It is strongly recommended that these be written broad enough so that participants are not limited to only certain specific tasks. The maintenance tasks need not be completed in the order listed.
The trainer and structured experience program supervisor should monitor daily maintenance activities at the AMO for unique opportunities to provide the trainee with tasks consistent to the maintenance activities detailed in the JTA skills listing in Appendix E of this report.

9.2.3 Trainee Evaluation

- A description of the trainee evaluation process.

Provide a complete listing of the types of evaluation procedures to be utilized. Include a description of any written, oral, practical exams or quizzes that are part of the training program. This section should include a complete listing of all required tests and or/quizzes and their sequence in the training program. Include information on how the successful completion of practical projects will be determined.

10.0 Summary of Recommendations and Findings

- The surveys conducted document that the aviation industry believes that a structured experience program is capable of producing a well-qualified AMT.

- Structured-experience programs provide a viable alternative to assist selected segments of the aviation industry in meeting critical maintenance manpower requirements.

- The present regulatory language in Part 65.77 does not insure that AMT qualification through civilian work experience is equal to other methods of AMT certification.

- Through the utilization of a well-designed structured-experience program, an applicant could meet the requirements for AMT certification within a 24-month calendar period.

- The skill tasks identified in the Job Task Analysis with a high level of frequency and criticality should be incorporated into a structured experience program.

- The FAA should strive to create a climate that encourages AMO's to utilize a structured experience program as one method to meet their AMT manpower requirements.

- The inclusion of a structured-experience program in an AMO would require the FAA to modify the existing regulation 14CFR Part 65, or grant an exemptions to FAR Part 65.77.

- Language should be added to the FAA Airworthiness Inspector's Handbook (Order 8300.10) that establishes guidelines and procedures for the implementation of a structured experience program in an approved AMO.

- The FAA should look favorably on requests for exemptions to 14CFR 65.77 and provide assistance with preparation of the exemption request.

- The AMO's Principle Maintenance Inspector should handle the approval process of the structured experience program in accordance with established FAA practices and procedures.

- The FAA should encourage collaboration among schools and AMO's for the development and delivery of structured-experience programs.

- The FAA should move to implement these recommendations as soon as possible.

11.0 References

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APPENDIX A

SAMPLE INDUSTRY QUESTIONAIRE

APPENDIX A
SAMPLE INDUSTRY QUESTIONAIRE

Your insights and guidance are requested for clarifying the Federal Aviation Regulations with respect to certification of Aviation Maintenance Technicians, through the apprenticeship option.

FOR THE PURPOSE OF THIS SURVEY AN "APPRENTICESHIP PROGRAM" IS INTENDED FOR A NON-CERTIFICATED INDIVIDUAL TO GAIN THE EXPERIENCE NECESSARY TO QUALIFY FOR AN A&P CERTIFICATE.

3. Our company would use a universal AMT apprentice program developed for the industry.

Strongly agree *Agree* *No Opinion* *Disagree* *Strongly Disagree*

4. Apprenticeship programs do not create good technicians.

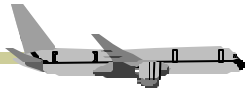
Strongly agree *Agree* *No Opinion* *Disagree* *Strongly Disagree*

5. An apprenticeship program will limit a technician's ability to perform a job that was not included in the training process.

Strongly agree *Agree* *No Opinion* *Disagree* *Strongly Disagree*

6. The aviation industry should create universal standards for an AMT apprenticeship program.

Strongly agree *Agree* *No Opinion* *Disagree* *Strongly Disagree*



7. An apprenticeship program will not fill this company's need for technicians.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

8. Standards for the evaluation of work experience, for the purpose of AMT certification, are necessary.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

9. An apprenticeship program will reduce our productivity.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

10. There is no uniform method to evaluate work experience for the purpose of certification for an AMT.

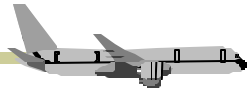
Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

11. This company would benefit from an apprenticeship program.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

12. An apprenticeship program would help create company loyalty.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*



13. Apprenticeship programs are too costly for this company.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

14. An apprenticeship program will help create technicians well prepared for work in this company.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

15. The aviation industry should develop a structured AMT apprenticeship program.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

16. Technicians trained in an apprenticeship program are likely to stay with the company.

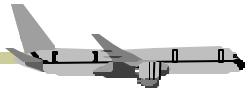
Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

17. An apprenticeship program will not provide a technician with a broad base of skills.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

18. Work experience, for the purpose of AMT certification, is interpreted with consistency.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*



19. There are no structured AMT apprenticeship programs available from the FAA.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

20. Apprenticeship programs are too labor intensive for this company.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

21. A universally mandated, structured apprenticeship program is not practical.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

22. FAR 65 provides sufficient guidance to develop an AMT apprenticeship program.

Strongly agree	*Agree*	*No Opinion*	*Disagree*	*Strongly Disagree*

23. Which categories best describe the industry in which your company operates?

- ❑ Commercial Aviation
- ❑ Manufacturing
- ❑ Corporate Aviation
- ❑ General Aviation
- ❑ Other

24. Which category best describes your business?

- ❑ Major Airline
- ❑ Regional Airline
- ❑ Air Charter
- ❑ Cargo
- ❑ Aircraft Manufacturer
- ❑ Component Manufacturer
- ❑ Corporate Flight Department
- ❑ Repair Station
- ❑ Fixed Base Operation
- ❑ Other

25. Approximately how many aircraft technicians does your company employ?

- ❑ 1 to 10
- ❑ 11 to 25
- ❑ 25 to 50
- ❑ 51 to 100
- ❑ 101 to 500
- ❑ Greater than 500

26. What statement best describes your position in the company?

- ❑ Service & Maintenance Department Director / Manager and related personnel
- ❑ Maintenance Training Instructor
- ❑ Parts Department Director / Manager and related personnel
- ❑ Owner / Manager, Company Officer and related personnel
- ❑ Flight Department Manager / Chief Pilot
- ❑ Aviation Technician / Technician / AMT
- ❑ Avionics Technician
- ❑ Certified Inspector
- ❑ Engineer
- ❑ Other

27. Do you have a technical background in aviation?

- ❑ Yes
- ❑ No

A. If yes, do you have an A&P?

- ❑ Yes
- ❑ No

a) If you have an A&P, how did you receive your training?

- ❑ Military training
- ❑ AMT school
- ❑ On-The-Job Training

Aviation Technical Training & Consulting

109 Platinum Drive
Suite G
Bridgeport, WV 26330
Phone: 304-842-0234
Fax: 304-842-0221
E-Mail: cw-white@msn.com

Dear Participant,

Our research team is seeking industry partners in the development of standards for the certification of work experience for the purpose of AMT licensing. If you are interested in participating further in this research please fill out the following information and mail this form separately to the following address.

Aviation Technical Training & Consulting
109 Platinum Drive, Suite G
Bridgeport, WV 23330

Company: _____
Your Name: _____
Phone Number: _____
Email: _____

1. Does your company have a formal on-the-job training / apprenticeship program?
   - ❑ Yes
   - ❑ No

2. If you answered yes, please provide a brief description of your program.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

APPENDIX B

SAMPLE TECHNICIAN SURVEY

APPENDIX B
SAMPLE TECHNICIAN SURVEY

Aviation Technical Training & Consulting

ATT&C

1. What FAA Technicians certificate(s) do you hold? (check all that apply)
- ? Airframe only
- ? Powerplant only
- ? Airframe & Powerplant

2. What type of experience did you use to satisfy the FAA requirements? (check all that apply)
- ? Aircarrier
- ? FBO
- ? Repair Station
- ? Military
- ? Other (explain)_____

3. What category (type) aircraft did you maintain? (check all that apply)
- ? Large Jet Transport
- ? Regional Jet
- ? Turbo prop
- ? Helicopter
- ? Piston powered fixed wing

4. How many <u>months</u> of experience did you have prior to taking the FAA exam?

? 18-months ? 19 – 24 ? 25-30 ? 30-40 ? over 40

5. Prior to taking your FAA written exams did you attend a Test Prep Course.

? Yes ? No

6. My practical aviation experience prepared me well to perform my daily duties as an aircraft technician.

? *Strongly Agree* ? *Agree* ? *No Opinion* ? *Disagree* ? *Strongly Disagree*

7. My experience prepared me well to successfully complete the FAA testing process for the AMT license.

? *Strongly Agree* ? *Agree* ? *No Opinion* ? *Disagree* ? *Strongly Disagree*

	THE FOLLOWING IS A LIST OF SUBJECT AREAS THAT THE FAA USES TO TEST AMT TECHNICIANS. PLEASE CHECK THE APPROPRIATE BOX ON HOW EXPERIENCED YOU WERE IN THESE SUBJECTS AT THE TIME OF YOUR FAA EXAMS.	HIGH LEVEL OF EXPERIENCE	ADEQUATE EXPERIENCE	VERY LITTLE EXPERIENCE	NO EXPERIENCE
GENERAL SUBJECT AREAS	BASIC ELECTRICITY				
	AIRCRAFT DRAWINGS				
	WEIGHT AND BALANCE				
	FLUID LINES & FITTINGS				
	MATERIALS & PROCESSES				
	GROUND OPS & SERVICING				
	CLEANING & CORROSION				
	MATHEMATICS				
	MAINTENANCE FORMS & RECORDS				
	BASIC PHYSICS				
	MAINTENANCE PUBLICATIONS				
	TECHNICIAN PRIVILEGES & LIMITATIONS				
AIRFRAME SUBJECTS	WOOD STRUCTURES				
	AIRCRAFT COVERINGS				
	AIRCRAFT FINISHES				
	SHEET METAL & NON-METALLIC STRUCTURES				
	WELDING				
	ASSEMBLY & RIGGING				
	AIRFRAME INSPECTION				
	ACFT LANDING GEAR SYSTEMS				
	HYDRAULIC & PNEUMATIC POWER SYSTEMS				
	CABIN ATMOSPHERE CNTL SYS				
	ACFT INSTRUMENT SYSTEMS				
	COMMUNICATION & NAVIGATION SYSTEMS				
	AIRCRAFT FUEL SYSTEMS				
	ACFT ELECTRICAL SYSTEMS				
	POSITION & WARNING SYSTEMS				
	ICE & RAIN CONTROL SYSTEMS				
	FIRE PROJECTION SYSTEMS				
POWERPLANT SUBJECTS	RECIPROCATING ENGINES				
	TURBINE ENGINES				
	ENGINE INSPECTION				
	ENGINE INSTRUMENT SYSTEMS				
	ENGINE FIRE PROTECTION SYS				
	ENGINE ELECTRICAL SYSTEMS				
	LUBRICATION SYSTEMS				
	IGNITION SYSTEMS				
	FUEL METERING SYSTEMS				
	ENGINE FUEL SYSTEMS				
	INDUCTION & ENGINE AIRFLOW SYSTEMS				
	ENGINE COOLING SYSTEMS				
	ENGINE EXHAUST & REVERSER SYSTEMS				
	PROPELLERS				
	AUXILARY POWER UNITS				

APPENDIX C

INDUSTRY CROSSTABULATION RESULTS

APPENDIX C
INDUSTRY CROSSTABULATION RESULTS

Question 1 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac - turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	2	1		1		4
Disagree	2		5	1		8
No Opinion	3	1	9	4		17
Agree	33	2	14	8	1	58
Strongly Agree	7	3	5	9		24
total	47	7	33	23	1	111

Question 2 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac - turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	9	2	11	4	1	27
Disagree	29	5	11	13		58
No Opinion	5		8	4		17
Agree	4		3	2		9
Strongly Agree						0
total	47	7	33	23	1	111

Question 3 * Industry Crosstabulation

Count

	Commercial Aviation	Manufacturin g	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	2	2	7	2		13
Disagree	31	4	16	12	1	64
No Opinion	4			4		8
Agree	10		9	5		24
Strongly Agree		1	1			2
total	47	7	33	23	1	111

Question 4 * Industry Crosstabulation

Count

	Commercial Aviation	Manufacturing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	2			2		4
Disagree	6		2			8
No Opinion	1	1	2	1		5
Agree	28	2	24	11	1	66
Strongly Agree	10	4	5	9		28
total	47	7	33	23	1	111

Question 5 * Industry Crosstabulation

Count

	Commercial Aviation	Manufacturing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	5	2	2	2		11
Disagree	26	3	17	14	1	61
No Opinion	5	1	9	3		18
Agree	9		4	3		16
Strongly Agree	2	1	1	1		5
total	47	7	33	23	1	111

Question 6 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	1	2				3
Disagree	5			2		7
No Opinion	1					1
Agree	26	1	22	14	1	64
Strongly Agree	14	4	11	7		36
total	47	7	33	23	1	111

Question 7 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	6	1	3			10
Disagree	23	2	14	14		53
No Opinion	7	3	7	4		21
Agree	10	1	9	3	1	24
Strongly Agree	1			2		3
total	47	7	33	23	1	111

Question 8 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	2	2				4
Disagree	11	3	4	8		26
No Opinion	6		2	1		9
Agree	19	1	24	12	1	57
Strongly Agree	9	1	3	2		15
total	47	7	33	23	1	111

Question 9 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	3	1	1	1		6
Disagree	5	1	2	2		10
No Opinion	6		10	3		19
Agree	27	3	18	13	1	62
Strongly Agree	6	2	2	4		14
total	47	7	33	23	1	111

Question 10 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	2			1		3
Disagree	7		5	1		13
No Opinion	7	2	11	10		30
Agree	28	4	16	8	1	57
Strongly Agree	3	1	1	3		8
total	47	7	33	23	1	111

Question 11 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	5	2	2			9
Disagree	26	2	18	15		61
No Opinion	10	2	11	5	1	29
Agree	5	1	1	2		9
Strongly Agree	1		1	1		3
total	47	7	33	23	1	111

Question 12 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	2		1			3
Disagree	4		4			8
No Opinion	4		6	5		15
Agree	31	4	18	15	1	69
Strongly Agree	6	3	4	3		16
total	47	7	33	23	1	111

Question 13 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	2		1	1		4
Disagree	2			2		4
No Opinion	1	1	4	1	1	8
Agree	38	3	22	12		75
Strongly Agree	4	3	6	7		20
total	47	7	33	23	1	111

Question 14 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	1					1
Disagree	14	2	6	3		25
No Opinion	4		8	10		22
Agree	27	4	17	9	1	58
Strongly Agree	1	1	2	1		5
total	47	7	33	23	1	111

Question 15 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	5	2	9			16
Disagree	27	3	17	17	1	65
No Opinion	5	1	3	3		12
Agree	9	1	3	3		16
Strongly Agree	1		1			2
total	47	7	33	23	1	111

Question 16 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	9		5	2		16
Disagree	18	3	10	9	1	41
No Opinion	8	2	7	7		24
Agree	11		11	5		27
Strongly Agree	1	2				3
total	47	7	33	23	1	111

Question 17 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	1					1
Disagree	2			2		4
No Opinion	15	3	18	10	1	47
Agree	22	4	11	10		47
Strongly Agree	7		4	1		12
total	47	7	33	23	1	111

Question 18 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	3		3			6
Disagree	25	6	13	9	1	54
No Opinion	13	1	13	7		34
Agree	4		2	6		12
Strongly Agree	2		2	1		5
total	47	7	33	23	1	111

Question 19 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	5	3	5	1		14
Disagree	25	2	18	11	1	57
No Opinion	6	2	5	6		19
Agree	10		4	4		18
Strongly Agree	1		1	1		3
total	47	7	33	23	1	111

Question 20 * Industry Crosstabulation

Count

	Commercial Aviation	Manufac-turing	Corporate Aviation	General Aviation	Other	total
Strongly Disagree	6		3			9
Disagree	19	2	15	8		44
No Opinion	15	4	9	11	1	40
Agree	7	1	5	4		17
Strongly Agree			1			1
total	47	7	33	23	1	111

Question 1 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	1	1			
Disagree	1		1		
No Opinion	1		4		
Agree	4	4	17	5	2
Strongly Agree			3	2	2
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree	1		1		4
Disagree		5		1	8
No Opinion	1	7	2	2	17
Agree		14	11	1	58
Strongly Agree		4	8	4	23
total	2	30	22	8	110

Question 2 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	3		3		2
Disagree	3	3	19	3	2
No Opinion	1	1	1	3	
Agree		1	2	1	
Strongly Agree					
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		11	5	2	26
Disagree	2	11	11	4	58
No Opinion		6	3	2	17
Agree		2	3		9
Strongly Agree					
total	2	30	22	8	110

Question 3 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	2		2		2
Disagree	4	3	16	5	2
No Opinion	1		1	1	
Agree		2	6	1	
Strongly Agree					
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		5	2		13
Disagree	1	16	12	4	63
No Opinion			4	1	8
Agree		8	4	3	24
Strongly Agree	1	1			2
total	2	30	22	8	110

Question 4 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree		2			
Disagree	2		3	1	
No Opinion				1	1
Agree	1	3	19	5	1
Strongly Agree	4		3		2
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree			1	1	4
Disagree		2			8
No Opinion		1	1	1	5
Agree	1	21	13	2	66
Strongly Agree	1	6	7	4	27
total	2	30	22	8	110

Question 5 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree			4		2
Disagree	4	4	11	5	1
No Opinion			6	1	1
Agree	3		4	1	
Strongly Agree		1			
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		2	3		11
Disagree	1	15	14	5	60
No Opinion		7	2	1	18
Agree		4	2	2	16
Strongly Agree	1	2	1		5
total	2	30	22	8	110

Question 6 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree			1		2
Disagree	1	1	1		
No Opinion			1		
Agree	2	2	12	7	
Strongly Agree	4	2	10		2
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree					3
Disagree			2	2	7
No Opinion					1
Agree	1	20	15	4	63
Strongly Agree	1	10	5	2	36
total	2	30	22	8	110

Question 7 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	1		4		1
Disagree	3	4	10	5	1
No Opinion	1		5	1	2
Agree	2		6	1	
Strongly Agree		1			
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		1	3		10
Disagree		15	12	2	52
No Opinion	1	6	3	2	21
Agree	1	8	3	3	24
Strongly Agree			1	1	3
total	2	30	22	8	110

Question 8 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree			1	1	2
Disagree	4	2	4		1
No Opinion			4		
Agree	1	1	14	5	1
Strongly Agree	2	2	2	1	
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree					4
Disagree	2	5	5	3	26
No Opinion		1	4		9
Agree		21	10	3	56
Strongly Agree		3	3	2	15
total	2	30	22	8	110

Question 9 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	1	2			
Disagree			2	1	
No Opinion	3		4	1	
Agree	3	3	15	5	2
Strongly Agree			4		2
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree	1	1	1		6
Disagree	1	3	1	2	10
No Opinion		8	2	1	19
Agree		15	14	4	61
Strongly Agree		3	4	1	14
total	2	30	22	8	110

Question 10 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree		1	1		
Disagree	2	1	2		
No Opinion	1	2	7	2	1
Agree	4	1	14	5	3
Strongly Agree			1		
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree			1		3
Disagree		6	1	1	13
No Opinion	1	9	5	2	30
Agree		14	11	4	56
Strongly Agree	1	1	4	1	8
total	2	30	22	8	110

Question 11 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	2			1	2
Disagree	2	3	17	4	1
No Opinion	2		7	2	1
Agree	1	1	1		
Strongly Agree		1			
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		2	2		9
Disagree		17	13	3	60
No Opinion	1	10	3	3	29
Agree	1	1	2	2	9
Strongly Agree			2		3
total	2	30	22	8	110

Question 12 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree		2			
Disagree	1		1	1	
No Opinion			1	1	
Agree	4	3	20	4	2
Strongly Agree	2		3	1	2
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		1			3
Disagree		5			8
No Opinion		6	4	3	15
Agree	1	15	14	5	68
Strongly Agree	1	3	4		16
total	2	30	22	8	110

Question 13 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree		2			
Disagree	1				
No Opinion			2	1	1
Agree	5	3	19	6	
Strongly Agree	1		4		3
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		1	1		4
Disagree			1	2	4
No Opinion		2	2		8
Agree	2	22	14	3	74
Strongly Agree		5	4	3	20
total	2	30	22	8	110

Question 14 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree		1			
Disagree	3	1	5	2	1
No Opinion	1	1	3	1	
Agree	3	2	17	4	3
Strongly Agree					
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree					1
Disagree	1	7	3	2	25
No Opinion		7	6	3	22
Agree		14	11	3	57
Strongly Agree	1	2	2		5
total	2	30	22	8	110

Question 15 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	1		1	2	2
Disagree	4	3	16	5	1
No Opinion	2		3		1
Agree		1	5		
Strongly Agree		1			
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		8	2		16
Disagree	1	16	13	5	64
No Opinion		2	3	1	12
Agree	1	3	4	2	16
Strongly Agree		1			2
total	2	30	22	8	110

Question 16 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	1	1	2	2	
Disagree	4		11	3	1
No Opinion	2	2	5	1	1
Agree		2	6	1	
Strongly Agree			1		2
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		7	2	1	16
Disagree	1	9	7	4	40
No Opinion	1	4	7	1	24
Agree		10	6	2	27
Strongly Agree					3
total	2	30	22	8	110

Question 17 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree				1	
Disagree		1	1	1	
No Opinion	2	1	13	1	2
Agree	4	3	10	2	2
Strongly Agree	1		1	2	
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree					1
Disagree				1	4
No Opinion	1	15	8	3	46
Agree	1	10	11	4	47
Strongly Agree		5	3		12
total	2	30	22	8	110

Question 18 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	1				
Disagree	2	3	13	5	4
No Opinion	2		11	2	
Agree	2	1	1		
Strongly Agree		1			
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		2	3		6
Disagree	1	12	12	1	53
No Opinion	1	12	2	4	34
Agree		2	3	3	12
Strongly Agree		2	2		5
total	2	30	22	8	110

Question 19 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	2		1	1	2
Disagree	3	3	14	4	1
No Opinion			5		1
Agree	2	1	5	2	
Strongly Agree		1			
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		4	4		14
Disagree	1	17	11	2	56
No Opinion	1	6	4	2	19
Agree		2	2	4	18
Strongly Agree		1	1		3
total	2	30	22	8	110

Question 20 * Business Crosstabulation

Count

	Major Airline	Regional Airline	Air Charter	Cargo	Aircraft Manufacturer
Strongly Disagree	1	1	1	1	
Disagree	4		12	2	1
No Opinion	1	3	8	2	2
Agree	1	1	4	2	1
Strongly Agree					
total	7	5	25	7	4

	Component Manufacturer	Corporate Flight Department	Repair Station	Fixed Base Operation	total
Strongly Disagree		4	1		9
Disagree		13	10	2	44
No Opinion	2	9	9	3	39
Agree		3	2	3	17
Strongly Agree		1			1
total	2	30	22	8	110

Question 1 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	1		1		1	1	4
Disagree	3		1	1		3	8
No Opinion	6	3	1	1	2	2	15
Agree	13	4	7	5	12	13	54
Strongly Agree	4	3	5	2	2	4	20
total	27	10	15	9	17	23	101

Question 2 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	7	3	2	3	3	6	24
Disagree	14	6	11	1	12	12	56
No Opinion	4	1	1	2	1	4	13
Agree	2		1	3	1	1	8
Strongly Agree							
total	27	10	15	9	17	23	101

Question 3 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	1	3	1	3	1	2	11
Disagree	15	5	9	2	10	18	59
No Opinion	2	2		1	1		6
Agree	9		5	2	4	3	23
Strongly Agree				1	1		2
total	27	10	15	9	17	23	101

Question 4 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	2				2		4
Disagree		1		1	3	3	8
No Opinion	2		1	1			4
Agree	18	7	9	5	9	14	62
Strongly Agree	5	2	5	2	3	6	23
total	27	10	15	9	17	23	101

Question 5 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	2	1	3	2		1	9
Disagree	14	6	5	3	14	12	54
No Opinion	5	3	3	3	1	2	17
Agree	5		3	1	1	6	16
Strongly Agree	1		1		1	2	5
total	27	10	15	9	17	23	101

Question 6 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree		1					1
Disagree	2			1	1	2	6
No Opinion				1			1
Agree	14	7	9	3	10	16	59
Strongly Agree	11	2	6	4	6	5	34
total	27	10	15	9	17	23	101

Question 7 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	1	1	1	4	1	1	9
Disagree	15	5	10		7	11	48
No Opinion	6		3	2	5	3	19
Agree	3	4	1	3	3	8	22
Strongly Agree	2				1		3
total	27	10	15	9	17	23	101

Question 8 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree		1				1	2
Disagree	5	2	5	1	5	7	25
No Opinion	2	2	2	1	1		8
Agree	16	4	7	4	9	12	52
Strongly Agree	4	1	1	3	2	3	14
total	27	10	15	9	17	23	101

Question 9 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	1		1		3	1	6
Disagree	5		1	1	1	2	10
No Opinion	7	3	2	2		4	18
Agree	10	6	9	4	12	15	56
Strongly Agree	4	1	2	2	1	1	11
total	27	10	15	9	17	23	101

Question 10 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	2				1		3
Disagree	2		1	1	1	5	10
No Opinion	10	3	6	2	4	5	30
Agree	12	7	5	4	11	12	51
Strongly Agree	1		3	2		1	7
total	27	10	15	9	17	23	101

Question 11 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	2			2	1	1	6
Disagree	12	7	11	2	10	12	54
No Opinion	8	3	3	5	2	8	29
Agree	3		1		3	2	9
Strongly Agree	2				1		3
total	27	10	15	9	17	23	101

Question 12 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree					2	1	3
Disagree	2		1	1		4	8
No Opinion	10		2	1	1	1	15
Agree	13	7	9	4	13	15	61
Strongly Agree	2	3	3	3	1	2	14
total	27	10	15	9	17	23	101

Question 13 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	1				2	1	4
Disagree	2		1			1	4
No Opinion	2	1	2	2		1	8
Agree	17	6	8	4	14	19	68
Strongly Agree	5	3	4	3	1	1	17
total	27	10	15	9	17	23	101

Question 14 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree					1		1
Disagree	3	2	4	3	4	7	23
No Opinion	9	2	2		2	4	19
Agree	15	5	7	5	10	11	53
Strongly Agree		1	2	1		1	5
total	27	10	15	9	17	23	101

Question 15 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	3	2	3	3	1	2	14
Disagree	16	6	9	2	13	13	59
No Opinion	4	2	2	1		2	11
Agree	4		1	3	2	5	15
Strongly Agree					1	1	2
total	27	10	15	9	17	23	101

Question 16 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	3		1	2	3	5	14
Disagree	11	5	5	2	6	8	37
No Opinion	7	2	5	2	3	4	23
Agree	6	3	3	3	5	6	26
Strongly Agree			1				1
total	27	10	15	9	17	23	101

Question 17 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	1						1
Disagree	1		1			2	4
No Opinion	13	7	4	5	6	5	40
Agree	9	3	9	2	9	12	44
Strongly Agree	3		1	2	2	4	12
total	27	10	15	9	17	23	101

Question 18 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree		1		3	1	1	6
Disagree	11	4	10	1	9	10	45
No Opinion	10	5	3	5	4	6	33
Agree	4		2		1	5	12
Strongly Agree	2				2	1	5
total	27	10	15	9	17	23	101

Question 19 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	2	3	1	2	1	2	11
Disagree	13	5	9	2	5	17	51
No Opinion	6	1	3	4	4	1	19
Agree	5	1	2	1	5	3	17
Strongly Agree	1				2		3
total	27	10	15	9	17	23	101

Question 20 * Number of technicians employed Crosstabulation

Count

	1 to 10	11 to 25	25 to 50	51 to 100	101 to 500	Greater than 500	total
Strongly Disagree	1			2	1	5	9
Disagree	9	3	10	2	9	9	42
No Opinion	11	5	4	2	5	7	34
Agree	6	2	1	3	1	2	15
Strongly Agree					1		1
total	27	10	15	9	17	23	101

Question 1 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician/Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	2	1			1		4
Disagree	4	1	3				8
No Opinion	4	8	1	1	1		15
Agree	28	14	4	1	1	5	53
Strongly Agree	12	7	1			1	21
total	50	31	9	2	3	6	101

Question 2 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	11	5	3	1	1	4	25
Disagree	29	19	5			2	55
No Opinion	8	4			1		13
Agree	2	3	1	1	1		8
Strongly Agree							
total	50	31	9	2	3	6	101

Question 3 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	6	1			2	2	11
Disagree	30	17	7	1		4	59
No Opinion	3	3					6
Agree	11	9	1	1	1		23
Strongly Agree		1	1				2
total	50	31	9	2	3	6	101

Question 4 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	1	1		1	1		4
Disagree	7				1		8
No Opinion	1	2	1				4
Agree	31	18	7	1	1	3	61
Strongly Agree	10	10	1			3	24
total	50	31	9	2	3	6	101

Question 5 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	4	3	1			1	9
Disagree	28	16	3	1	2	4	54
No Opinion	7	6	4				17
Agree	9	5		1		1	16
Strongly Agree	2	1	1		1		5
total	50	31	9	2	3	6	101

Question 6 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree		1					1
Disagree	4	2					6
No Opinion	1						1
Agree	29	16	7	1	2	4	59
Strongly Agree	16	12	2	1	1	2	34
total	50	31	9	2	3	6	101

Question 7 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	3	3	1		1	1	9
Disagree	22	15	4	2	1	4	48
No Opinion	9	8	2				19
Agree	14	5	2			1	22
Strongly Agree	2				1		3
total	50	31	9	2	3	6	101

Question 8 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician/Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	1	1					2
Disagree	11	8	3		1	2	25
No Opinion	3	5					8
Agree	27	13	6	1	1	4	52
Strongly Agree	8	4		1	1		14
total	50	31	9	2	3	6	101

Question 9 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician/Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	2	1		1	1	1	6
Disagree	3	4	3				10
No Opinion	7	7	3	1			18
Agree	35	14	1		2	4	56
Strongly Agree	3	5	2			1	11
total	50	31	9	2	3	6	101

Question 10 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician/Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	1	1			1		3
Disagree	5	1	3	1			10
No Opinion	16	10	1	1	1	1	30
Agree	25	16	4		1	5	51
Strongly Agree	3	3	1				7
total	50	31	9	2	3	6	101

Question 11 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	3	2				1	6
Disagree	27	18	4		2	3	54
No Opinion	16	6	5	1		1	29
Agree	3	4		1		1	9
Strongly Agree	1	1			1		3
total	50	31	9	2	3	6	101

Question 12 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	1			1	1		3
Disagree	3	1	3	1			8
No Opinion	3	8	4				15
Agree	36	17	2		2	4	61
Strongly Agree	7	5				2	14
total	50	31	9	2	3	6	101

Question 13 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	2			1	1		4
Disagree	2	2					4
No Opinion	3	1	1	1		2	8
Agree	37	19	7		2	3	68
Strongly Agree	6	9	1			1	17
total	50	31	9	2	3	6	101

Question 14 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician/Technician/AMT	Certified Inspector	Other	total
Strongly Disagree					1		1
Disagree	11	6	3	1		2	23
No Opinion	9	9	1				19
Agree	28	13	5	1	2	4	53
Strongly Agree	2	3					5
total	50	31	9	2	3	6	101

Question 15 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician/Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	7	3	1		2	1	14
Disagree	30	19	6			4	59
No Opinion	7	3		1			11
Agree	5	6	2	1		1	15
Strongly Agree	1				1		2
total	50	31	9	2	3	6	101

Question 16 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician/Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	8	2	2		1	1	14
Disagree	18	15	2		1	2	38
No Opinion	11	9	1	1		1	23
Agree	13	5	3	1	1	2	25
Strongly Agree			1				1
total	50	31	9	2	3	6	101

Question 17 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree		1					1
Disagree	1		1			2	4
No Opinion	17	17	4		1	2	41
Agree	25	12	1	2	2	1	43
Strongly Agree	7	1	3			1	12
total	50	31	9	2	3	6	101

Question 18 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	3	1			1	1	6
Disagree	24	14	3		1	3	45
No Opinion	15	11	4	1		2	33
Agree	6	4	1	1			12
Strongly Agree	2	1	1		1		5
total	50	31	9	2	3	6	101

Question 19 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	4	5			1	1	11
Disagree	26	14	6		1	4	51
No Opinion	8	7	3			1	19
Agree	10	5		2			17
Strongly Agree	2				1		3
total	50	31	9	2	3	6	101

Question 20 * Position held in company Crosstabulation

Count

	Service & Maintenance Dep. Director/Manager & personnel	Owner/Manager, Company Officer & personnel	Flight Dep. Manager/Chief Pilot	Aviation Technician /Technician/AMT	Certified Inspector	Other	total
Strongly Disagree	6	1	1	1			9
Disagree	24	10	3		1	3	41
No Opinion	13	15	5			2	35
Agree	7	5		1	2		15
Strongly Agree						1	1
total	50	31	9	2	3	6	101

Question 1 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	3	1	4
Disagree	8		8
No Opinion	13	2	15
Agree	46	8	54
Strongly Agree	22	1	23
total	92	12	104

Question 2 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	23	4	27
Disagree	49	7	56
No Opinion	13		13
Agree	7	1	8
Strongly Agree			
total	92	12	104

Question 3 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	12	1	13
Disagree	51	9	60
No Opinion	6		6
Agree	21	2	23
Strongly Agree	2		2
total	92	12	104

Question 4 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	4		4
Disagree	8		8
No Opinion	4		4
Agree	53	10	63
Strongly Agree	23	2	25
total	92	12	104

Question 5 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	9	2	11
Disagree	49	7	56
No Opinion	17		17
Agree	13	2	15
Strongly Agree	4	1	5
total	92	12	104

Question 6 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	3		3
Disagree	6		6
No Opinion	1		1
Agree	52	8	60
Strongly Agree	30	4	34
total	92	12	104

Question 7 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	10		10
Disagree	43	6	49
No Opinion	17	4	21
Agree	19	2	21
Strongly Agree	3		3
total	92	12	104

Question 8 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	4		4
Disagree	21	5	26
No Opinion	6	2	8
Agree	48	5	53
Strongly Agree	13		13
total	92	12	104

Question 9 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	5	1	6
Disagree	9	1	10
No Opinion	17	1	18
Agree	52	5	57
Strongly Agree	9	4	13
total	92	12	104

Question 10 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	3		3
Disagree	10		10
No Opinion	26	3	29
Agree	48	7	55
Strongly Agree	5	2	7
total	92	12	104

Question 11 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	8		8
Disagree	48	8	56
No Opinion	25	3	28
Agree	8	1	9
Strongly Agree	3		3
total	92	12	104

Question 12 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	3		3
Disagree	8		8
No Opinion	13	2	15
Agree	55	7	62
Strongly Agree	13	3	16
total	92	12	104

Question 13 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	4		4
Disagree	4		4
No Opinion	6	2	8
Agree	60	8	68
Strongly Agree	18	2	20
total	92	12	104

Question 14 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	1		1
Disagree	23		23
No Opinion	15	3	18
Agree	50	7	57
Strongly Agree	3	2	5
total	92	12	104

Question 15 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	15	1	16
Disagree	51	9	60
No Opinion	10	1	11
Agree	14	1	15
Strongly Agree	2		2
total	92	12	104

Question 16 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	12	1	13
Disagree	35	4	39
No Opinion	18	5	23
Agree	24	2	26
Strongly Agree	3		3
total	92	12	104

Question 17 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	1		1
Disagree	2	2	4
No Opinion	36	7	43
Agree	42	2	44
Strongly Agree	11	1	12
total	92	12	104

Question 18 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	6		6
Disagree	41	8	49
No Opinion	29	3	32
Agree	11	1	12
Strongly Agree	5		5
total	92	12	104

Question 19 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	13		13
Disagree	45	7	52
No Opinion	14	5	19
Agree	17		17
Strongly Agree	3		3
total	92	12	104

Question 20 * Technical Background Crosstabulation

Count

	Yes	No	total
Strongly Disagree	8		8
Disagree	39	3	42
No Opinion	29	8	37
Agree	15	1	16
Strongly Agree	1		1
total	92	12	104

Question 1 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	2		2
Disagree	5	3	8
No Opinion	10	3	13
Agree	39	9	48
Strongly Agree	16	6	22
total	72	21	93

Question 2 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	17	5	22
Disagree	39	12	51
No Opinion	10	3	13
Agree	6	1	7
Strongly Agree			
total	72	21	93

Question 3 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	8	3	11
Disagree	42	10	52
No Opinion	2	4	6
Agree	18	4	22
Strongly Agree	2		2
total	72	21	93

Question 4 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	4		4
Disagree	6	1	7
No Opinion	4		4
Agree	40	15	55
Strongly Agree	18	5	23
total	72	21	93

Question 5 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	5	4	9
Disagree	40	10	50
No Opinion	12	5	17
Agree	11	2	13
Strongly Agree	4		4
total	72	21	93

Question 6 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree		3	3
Disagree	5		5
No Opinion	1		1
Agree	43	12	55
Strongly Agree	23	6	29
total	72	21	93

Question 7 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	6	3	9
Disagree	35	9	44
No Opinion	13	5	18
Agree	15	4	19
Strongly Agree	3		3
total	72	21	93

Question 8 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	1	3	4
Disagree	14	5	19
No Opinion	3	4	7
Agree	42	8	50
Strongly Agree	12	1	13
total	72	21	93

Question 9 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	4	1	5
Disagree	8	1	9
No Opinion	11	6	17
Agree	44	9	53
Strongly Agree	5	4	9
total	72	21	93

Question 10 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	3		3
Disagree	8	1	9
No Opinion	24	3	27
Agree	33	16	49
Strongly Agree	4	1	5
total	72	21	93

Question 11 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	5	3	8
Disagree	40	10	50
No Opinion	17	7	24
Agree	7	1	8
Strongly Agree	3		3
total	72	21	93

Question 12 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	3		3
Disagree	8		8
No Opinion	8	5	13
Agree	45	12	57
Strongly Agree	8	4	12
total	72	21	93

Question 13 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	4		4
Disagree	3	1	4
No Opinion	5	1	6
Agree	49	13	62
Strongly Agree	11	6	17
total	72	21	93

Question 14 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	1		1
Disagree	19	3	22
No Opinion	12	5	17
Agree	37	13	50
Strongly Agree	3		3
total	72	21	93

Question 15 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	11	4	15
Disagree	37	15	52
No Opinion	9	1	10
Agree	13	1	14
Strongly Agree	2		2
total	72	21	93

Question 16 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	12		12
Disagree	28	6	34
No Opinion	15	3	18
Agree	17	9	26
Strongly Agree		3	3
total	72	21	93

Question 17 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	1		1
Disagree	2	1	3
No Opinion	23	15	38
Agree	37	3	40
Strongly Agree	9	2	11
total	72	21	93

Question 18 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	5	1	6
Disagree	33	9	42
No Opinion	20	10	30
Agree	9	1	10
Strongly Agree	5		5
total	72	21	93

Question 19 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	8	5	13
Disagree	37	10	47
No Opinion	11	3	14
Agree	13	3	16
Strongly Agree	3		3
total	72	21	93

Question 20 * Have an A&P Crosstabulation

Count

	Yes	No	total
Strongly Disagree	8		8
Disagree	33	8	41
No Opinion	18	12	30
Agree	12	1	13
Strongly Agree	1		1
total	72	21	93

Question 1 * How received training Crosstabulation

Count

	Military Training	AMT On the Job School	Training	total
Strongly Disagree		2		2
Disagree		5		5
No Opinion	1	5	3	9
Agree	7	25	6	38
Strongly Agree	4	9	3	16
total	12	46	12	70

Question 2 * How received training Crosstabulation

Count

	Military Training	AMT On the Job School	Training	total
Strongly Disagree	5	9	3	17
Disagree	4	25	8	37
No Opinion	1	9		10
Agree	2	3	1	6
Strongly Agree				
total	12	46	12	70

Question 3 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	2	3	3	8
Disagree	7	26	7	40
No Opinion		2		2
Agree	3	13	2	18
Strongly Agree		2		2
total	12	46	12	70

Question 4 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree		3	1	4
Disagree		5	1	6
No Opinion		2	1	3
Agree	9	23	7	39
Strongly Agree	3	13	2	18
total	12	46	12	70

Question 5 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	2	3		5
Disagree	7	24	9	40
No Opinion	2	7	1	10
Agree	1	8	2	11
Strongly Agree		4		4
total	12	46	12	70

Question 6 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree				
Disagree	1	2	2	5
No Opinion	1			1
Agree	4	28	10	42
Strongly Agree	6	16		22
total	12	46	12	70

Question 7 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	3	2	1	6
Disagree	7	20	7	34
No Opinion	2	7	3	12
Agree		14	1	15
Strongly Agree		3		3
total	12	46	12	70

Question 8 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	1			1
Disagree	3	9	2	14
No Opinion	1	1	1	3
Agree	4	27	9	40
Strongly Agree	3	9		12
total	12	46	12	70

Question 9 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree		4		4
Disagree	1	5	2	8
No Opinion	3	6	2	11
Agree	6	28	8	42
Strongly Agree	2	3		5
total	12	46	12	70

Question 10 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	1	2		3
Disagree		7	1	8
No Opinion	5	12	5	22
Agree	5	22	6	33
Strongly Agree	1	3		4
total	12	46	12	70

Question 11 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	2	3		5
Disagree	8	22	10	40
No Opinion	2	12	1	15
Agree		6	1	7
Strongly Agree		3		3
total	12	46	12	70

Question 12 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree		3		3
Disagree	1	6	1	8
No Opinion	2	4	2	8
Agree	6	29	8	43
Strongly Agree	3	4	1	8
total	12	46	12	70

Question 13 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree		4		4
Disagree		2	1	3
No Opinion		4		4
Agree	9	29	10	48
Strongly Agree	3	7	1	11
total	12	46	12	70

Question 14 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree		1		1
Disagree	4	11	3	18
No Opinion	1	8	3	12
Agree	6	24	6	36
Strongly Agree	1	2		3
total	12	46	12	70

Question 15 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	6	3	2	11
Disagree	5	21	10	36
No Opinion		8		8
Agree	1	12		13
Strongly Agree		2		2
total	12	46	12	70

Question 16 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	2	10		12
Disagree	5	16	7	28
No Opinion	2	10	2	14
Agree	3	10	3	16
Strongly Agree				
total	12	46	12	70

Question 17 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	1			1
Disagree		1	1	2
No Opinion	3	13	6	22
Agree	6	25	5	36
Strongly Agree	2	7		9
total	12	46	12	70

Question 18 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	2	2	1	5
Disagree	6	21	5	32
No Opinion	4	11	4	19
Agree		7	2	9
Strongly Agree		5		5
total	12	46	12	70

Question 19 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree	2	4	2	8
Disagree	9	21	7	37
No Opinion	1	8		9
Agree		10	3	13
Strongly Agree		3		3
total	12	46	12	70

Question 20 * How received training Crosstabulation

Count

	Military Training	AMT School	On the Job Training	total
Strongly Disagree		8		8
Disagree	8	17	6	31
No Opinion	1	14	3	18
Agree	3	6	3	12
Strongly Agree		1		1
total	12	46	12	70

APPENDIX D

JOB TASK ANALYSIS OF THE AVIATION MAINTENANCE TECHNICIAN

Appendix D
Job Task Analysis of the
Aviation Maintenance Technician

Percent Response and Frequency Chart

The percent response and frequency charts are provided with each subject area summary. Each task is listed within its functional category. The response rates and frequencies are listed for each industry segment and the overall values are shown in the rightmost column. The percent response is an indication of the number of technicians responding to the task versus the number of technicians surveyed.

The frequency is a measure of the number of times each task is performed in a calendar year:

- A **1** indicates the task is performed on a less than quarterly basis.
- A **2** indicates the task is performed on a quarterly basis.
- A **3** indicates the task is performed on a monthly basis.
- A **4** indicates the task is performed on a weekly basis.
- A **5** indicates the task is performed on a daily basis.

Criticality and Difficulty Chart

The criticality and difficulty chart is also provided with each subject area. Each task is listed within its functional category. The criticality and difficulty values are listed for each segment and the overall values are shown in the rightmost column.

Criticality measures the importance of the task in terms of the negative consequences if the task is not completed properly. The rating scale is defined in terms of damage to equipment or injury to passengers and crew and the operation of the aircraft:

- A **1** means the effects are negligible. There is little effect on the operation of the aircraft.
- A **2** means the effects are average. The system or function would still not be critical to the continuation of the flight. However, special maintenance procedures are required to dispatch the aircraft with the system inoperative.
- A **3** means the effects are average. Failure to perform this task correctly may result in a flight incident.
- A **4** means the effects are high. There are maintenance manual warnings and/or cautions associated with the task. There is possible injury to people or damage to equipment.
- A **5** means the effects are extremely high. There is great potential for a condition threatening the safety of the aircraft or human life.
  Difficulty refers to the effort associated in becoming skilled at performing a task. This measure considers what training is required, the complexity of the task and any special skills required in completing the task:
- A **1** means the task is not difficult. The task can be completed following straight forward directions. No special skill or knowledge is required.
- A **2** means the task is somewhat difficult. The task can be mastered with a minimal amount of practice. On-the-job training is useful.

- A **3** means the task is moderately difficult. The task requires the ability to transfer existing knowledge to new situations. Basic, formal training is useful.
- A **4** means the task is increasingly difficult. The completion of the task requires the subjective judgment of the technician. In-depth training is useful.
- A **5** means the task is very difficult. Proficiency at this task is shown only after considerable experience and practice. Specialized training is required. This task is complex and involves multiple steps.

JTA Task Ordered by Overall Criticality

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Replace jet engine.	26.3%	2.33	4.46	3.75
Replace turboprop engine.	7.5%	2.03	4.44	3.75
Adjust, align or rig flight control components.	45.9%	2.73	4.40	3.79
Change flight control surfaces.	44.0%	2.35	4.32	3.38
Replace or overhaul hot section.	19.3%	2.71	4.25	3.87
Fabricate control cables.	24.4%	1.73	4.24	3.32
Perform internal repairs to engine.	18.3%	2.87	4.21	3.83
Troubleshoot jet engine.	28.7%	3.06	4.17	4.05
Change primary flight control servos or actuators.	48.7%	2.34	4.09	3.22
Overhaul prop assembly.	1.9%	1.69	4.08	3.69
Remove and install fuel control unit.	28.5%	2.19	4.07	3.50
Balance control surfaces.	27.5%	1.93	4.06	3.22
Check control surface balance.	29.0%	1.87	4.06	3.22
Tear down and build-up prop assembly.	2.4%	1.84	4.04	3.57
Troubleshoot flight control systems.	46.0%	2.61	4.04	3.62
Replace propeller.	10.5%	2.49	4.01	2.85
Perform internal repairs to opposed piston engs.	2.3%	1.80	4.00	3.51
Replace propeller assembly.	9.1%	2.43	4.00	2.90
Inspect flight control cables for tension, fraying, nicks or crimps.	45.8%	3.05	3.97	2.73
Overhaul, repair or replace landing gear.	34.6%	2.07	3.97	3.44

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Repair or replace attach points or tracks for control surfaces.	34.4%	2.09	3.97	3.20
Troubleshoot fuel control problems.	32.6%	2.56	3.97	3.69
Operational check flight control and landing systems.	50.4%	3.43	3.94	3.52
Functional test retractable gear.	42.7%	2.72	3.93	2.92
Operational check engine.	35.3%	3.64	3.93	3.47
Troubleshoot turboprop engine.	10.4%	2.87	3.92	3.80
Refinish composite blades.	10.5%	1.88	3.91	3.59
Inspect cable routing, pulleys, turnbuckles or flight control components.	44.7%	3.06	3.89	2.76
Functional test emergency gear extension system.	39.5%	2.67	3.88	2.74
Inspect engine mounts.	43.8%	3.03	3.88	2.64
Operational test flight controls and actuators.	44.9%	3.32	3.88	2.77
Remove and install fuel pumps.	37.6%	2.26	3.86	3.09
Rig or check autopilot flight control actuators and servos.	31.8%	2.22	3.85	3.47
Modify or alter landing gear assembly.	17.6%	1.80	3.84	3.58
Perform an x-ray or similar non-destructive inspection of skin or structure.	24.8%	2.08	3.84	3.42
Repair or replace fuel control components.	34.6%	2.61	3.84	3.14
Inspect wood structure.	0.5%	1.42	3.83	3.17
Certify pitot and static system.	24.4%	2.67	3.82	3.19
Functional test fuel control system.	28.4%	2.82	3.80	3.16
Rig doors and emergency evacuation systems.	38.8%	2.34	3.79	3.43
Check flight control travel.	44.3%	2.88	3.78	2.85
Troubleshoot landing gear control and actuating systems.	42.4%	2.29	3.78	3.41
Troubleshoot retractable gear systems.	36.2%	2.30	3.78	3.41
Perform borescope inspection.	17.8%	2.53	3.77	3.42
Rig propeller blades.	4.8%	2.41	3.77	3.06
Functional test fire protection system.	35.6%	3.55	3.76	2.22

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Repair or replace landing gear control and actuating system components.	38.0%	2.23	3.76	3.08
Troubleshoot electrically operated technical components (example: electric landing gear actuator.)	63.1%	3.48	3.76	3.48
Replace automatic flight control, autopilot or all-weather landing systems components.	31.8%	2.72	3.75	3.55
Troubleshoot landing gear position indication and warning systems.	38.8%	2.36	3.75	3.25
Detailed inspection of landing gear assemblies and subassemblies.	37.3%	3.38	3.72	2.87
Service gear reduction section.	13.1%	2.81	3.72	2.83
Functional test aircraft warning systems.	55.1%	3.75	3.71	2.59
Remove and install flight control trim motors.	40.9%	1.98	3.71	3.06
Troubleshoot fire extinguishing and control systems.	33.5%	2.40	3.71	2.85
Inspect flight control surface for damage.	47.7%	3.83	3.69	2.46
Troubleshoot fire detection circuits.	36.8%	2.31	3.67	3.06
Repair or replace sensitive position sensing devices (examples: gimble gyroscopes, laser ring gyros).	21.9%	2.39	3.64	3.14
Replace doors.	32.2%	1.84	3.64	3.18
Troubleshoot flight instruments.	26.2%	3.03	3.64	3.52
Perform stall warning test.	37.2%	3.13	3.63	2.50
Rig shut-off valves.	19.0%	2.13	3.63	3.07
Troubleshoot central air data collection and distribution system.	22.2%	2.43	3.63	3.46
Inspect engine and components for security and leaks.	41.7%	3.89	3.62	2.71
Leak check pitot static system.	39.2%	2.78	3.62	3.11
Repair or replace fire detection/protection components.	48.1%	2.46	3.62	2.63
Repair or replace landing gear position indication and warning components.	36.2%	2.21	3.62	2.92
Inspect fan blades for FOD (Foreign Object Damage).	36.5%	3.91	3.61	2.36
Replace pitot/static system components.	33.2%	2.25	3.60	2.82
Rig nose gear steering.	34.5%	1.93	3.60	3.32

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Operational check fire detection system.	36.2%	3.59	3.59	2.14
Repair or replace central air data collection and distribution components.	21.3%	2,44	3.59	3.11
Inspect hinge bearings for condition and excessive and excessive play.	46.7%	3.19	3.58	2.51
Inspect opposed piston engine.	4.6%	3.18	3.58	2.84
Repair or replace hydraulic components.	54.8%	3.09	3.58	2.82
Repair or replace sheetmetal frame sections and fittings, fairings or stringers.	34.3%	2.63	3.57	3.43
Troubleshoot pressurized hydraulic system (1,000-3,000 psi).	39.7%	2.91	3.56	3.05
Certify transponder and altitude reporting equipment.	18.4%	2.92	3.55	3.35
Functional test brake system.	43.8%	3.36	3.55	2.50
Inspect engine fire loop.	43.0%	2.97	3.55	2.24
Inspect fire-extinguishing system.	31.8%	3.20	3.55	2.19
Operational test escape slides of life rafts.	18.8%	2.17	3.55	2.39
Operational test lift dumpers, air brakes, or spoilers.	40.5%	3.20	3.55	2.64
Perform a magnetic particle inspection.	17.8%	2.54	3.55	2.64
Remove and replace flight instruments (airspeed indicator, altimeter, VSI, etc.).	45.2%	2.78	3.55	2.68
Fabricate flexible or rigid lines and attach connectors.	27.5%	1.98	3.54	2.91
Perform failure analysis on electrical power systems.	32.1%	2.93	3.54	3.54
Operational check caution and warning systems.	35.4%	3.60	3.53	2.61
Repair landing gear wiring and switches.	31.0%	2.15	3.53	2.87
Replace buss switching and control devices.	29.2%	2.31	3.53	2.87
Service bleed valve propeller governor.	2.3%	1.98	3.53	2.64
Troubleshoot aircraft electrical wiring and connectors.	39.2%	3.22	3.52	3.57
Perform eddy current or ultrasound inspection on skin or structure.	13.4%	2.08	3.51	3.48
Perform wiring modifications.	31.0%	2.47	3.51	2.41

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Repair skin.	34.2%	2.52	3.51	3.27
Troubleshoot dependent reference systems such as VOR and ILS.	21.6%	2.96	3.51	3.51
Visually inspect wing structure.	42.7%	3.70	3.51	2.47
Repair or replace thrust reversers.	24.0%	2.33	3.50	3.18
Replace electrical de-ice boots.	19.0%	1.85	3.50	2.94
Test navigation systems.	24.7%	3.17	3.50	3.28
Troubleshoot AC/DC power generation systems.	38.8%	2.64	3.50	3.53
Troubleshoot autopilot.	27.4%	2.91	3.50	4.13
Functional test EFIS (Electronic Flight Instrumentation System).	25.3%	3.22	3.49	3.18
Remove and install air data computer.	23.2%	2.48	3.49	2.69
Troubleshoot electrical distribution & switching.	33.6%	2.84	3.49	3.56
Troubleshoot intersystem data exchange problems.	18.1%	2.40	3.49	3.77
Operational check crew alerting systems (examples: EFIS, EICAS and ECAM).	26.6%	3.47	3.48	3.07
Repair hydraulic system leaks.	44.0%	2.92	3.48	2.65
Inspect fire detection elements for connections and security.	34.1%	3.04	3.47	2.23
Troubleshoot autothrottle.	25.8%	2.11	3.47	3.70
Troubleshoot engine-indicating problems.	40.0%	2.81	3.47	3.32
Visually inspect parts or components to detect surface cracks with dye penetrant.	55.4%	2.53	3.47	2.60
Calibrate capacitance type fuel quantity indication systems.	28.7%	2.19	3.46	3.43
Inspect propellers for damage.	9.8%	3.78	3.46	2.12
Repair or replace fuel system pumping.	41.7%	2.02	3.46	2.66
Repair or replace aircraft electrical wiring and connectors.	38.9%	2.98	3.45	2.87
Troubleshoot brake system.	37.4%	2.52	3.45	2.93
Blend fan blades.	25.0%	2.36	3.44	2.73
Service turbine engine.	33.4%	3.95	3.44	2.18

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Perform an intensive visual inspection of a zone or system.	45.0%	3.69	3.43	2.75
Replace tire or wheel assemblies.	45.2%	3.37	3.43	2.24
Troubleshoot electronic engine indicating systems.	33.7%	2.61	3.43	3.27
Functional test electrical switching & distribution	40.1%	3.42	3.42	2.95
Functional test hydraulic system.	46.1%	3.63	3.42	2.55
Inspect cargo and passenger doors.	46.3%	3.61	3.42	2.53
Perform EFIS (Electronic Flight Instrumentation System) test.	24.1%	3.17	3.42	3.08
Repair carbon composites.	15.6%	2.16	3.42	3.68
Inspect fuel distribution components (pumps, valves, controls).	42.1%	2.98	3.41	2.51
Troubleshoot capacitance-based fuel indicating system.	32.5%	2.23	3.41	3.54
Functional check pneumatic ice fog removal systems.	32.5%	2.73	3.40	2.50
Repair damaged wiring and connectors.	47.5%	3.06	3.40	2.64
Replace CSD (Constant Speed Drive) or IDG (Integrated Drive Generator).	27.1%	2.09	3.40	2.95
Replace fuel distribution system components.	42.1%	2.15	3.40	2.72
Replace or clean engine components.	36.5%	3.48	3.40	2.78
Test passenger or cargo smoke detection system.	40.9%	3.16	3.40	2.14
Troubleshoot constant speed propeller.	5.6%	2.19	3.40	3.10
Inspect extinguishers and fire bottles.	37.9%	3.52	3.39	1.87
Operational check fixed and constant speed propellers.	7.3	3.04	3.39	2.53
Repair or replace anti-skid system components.	38.7%	2.29	3.39	2.96
Repair or replace electronic system components.	36.5%	3.39	3.39	3.00
Replace aircraft generator.	39.5%	2.36	3.39	3.12
Test electronic instrumentation systems.	22.4%	3.10	3.39	3.27
Troubleshoot vacuum driven flight instruments.	18.5%	2.21	3.39	3.12
Inspect fabric covered and doped surfaces.	0.7%	1.75	3.38	2.38

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Repair or replace scoops and leading edge anti-ice components.	29.9%	2.32	3.38	2.71
Adjust governor.	6.7%	2.14	3.37	2.89
Operational check DC and AC generating systems.	46.1%	3.38	3.37	2.89
Repair or replace fuel system warning devices.	25.4%	1.95	3.37	2.80
Troubleshoot ice, rain or fog removal systems.	39.1%	2.40	3.37	2.94
Operational test thrust reversers.	38.5%	2.99	3.36	2.70
Perform a detailed dimensional inspection.	47.5%	3.31	3.36	2.69
Repair or replace vacuum driven flight instrument components.	22.0%	2.23	3.35	2.75
Troubleshoot cabin pressurization system and-or ECS System.	42.7%	2.63	3.35	3.31
Troubleshoot vacuum system.	21.7%	2.06	3.35	2.97
Replace electrical circuit protection devices.	33.6%	2.39	3.34	2.57
Troubleshoot anti-skid system.	35.6%	2.29	3.34	3.27
Troubleshoot central maintenance parameter and system computer.	8.1%	2.71	3.34	3.57
Troubleshoot fuel distribution system.	39.8%	2.22	3.34	3.09
Functional check flight management system.	20.3%	2.88	3.33	3.36
Repair or replace engine-indicating components.	39.4%	2.79	3.33	2.70
Repair, replace or construct wood structures.	0.3%	1.00	3.33	3.00
Replace turbine and jet oil filter elements.	37.3%	3.14	3.33	2.14
Troubleshoot ignition problems	36.8%	2.39	3.33	2.92
Inspect for loose rivets, defects, disbands, cracks, etc.	55.3%	4.10	3.32	2.38
Remove and install fuel filter.	40.8%	3.08	3.32	2.17
Repair minor sheet metal defects or damage to control surfaces.	37.1%	2.74	3.32	2.17
Functional check electrical ice, rain or fog removal systems.	36.0%	2.97	3.31	2.42
Functional test fuel distribution system.	45.7%	2.90	3.31	2.45
Inspect air scoops and leading edge ice control systems.	37.4%	3.47	3.31	2.24

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Operational check standby power or emergency generation system.	50.6%	3.11	3.31	2.60
Repair printed circuit board.	17.4%	2.33	3.30	3.70
Repair, replace or polish windows or windscreens.	43.4%	2.27	3.30	2.72
Inspect booster starting systems.	11.8%	2.52	3.29	2.64
Repair or replace fuel measurement components.	32.6%	2.10	3.29	2.82
Replace smoke detection components.	39.9%	2.27	3.29	2.11
Inspect high-tension ignition systems.	35.2%	2.97	3.28	2.47
Repair or replace ignition components.	41.7%	2.60	3.28	2.22
Service piston engine.	4.7%	3.02	3.28	2.22
Troubleshoot radar system.	23.0%	2.65	3.28	3.51
Visually inspect landing gear, wheel wells, and doors.	41.7%	3.79	3.28	2.36
Check for leaks in hydraulic system.	48.8%	3.85	3.27	2.97
Identify de-lamination or disbanding of carbon composites.	40.5%	2.96	3.27	2.97
Inspect chip detectors and/or oil filters.	40.2%	3.42	3.27	2.14
Repair or replace high-tension ignition system components.	38.8%	2.52	3.26	2.45
Service engine and scavenger oil.	39.4%	3.78	3.26	1.89
Inspect passenger and crew oxygen system components.	43.5%	3.27	3.25	2.30
Repair or replace components associated with DME, transponder, radar or other pulse systems.	24.9%	2.82	3.25	3.01
Replace or rejuvenate fabric covered and doped surfaces.	6.6%	1.52	3.25	3.16
Troubleshoot float-based fuel indicating system.	19.1	1.87	3.25	2.83
Functional test anti-skid system.	42.6%	2.91	3.24	2.63
Inspect radial piston engine.	1.5%	1.62	3.24	2.90
Repair or replace honeycomb structure.	25.9%	2.29	3.24	3.31
Operational test autothrottle.	16.0%	2.43	3.23	3.16
Repair or replace electronic display components.	28.2%	2.51	3.23	2.68
Swing (calibrate) compass system.	26.5%	1.90	3.23	2.80

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Prepare and install patch (composite, fabric, metal).	39.3%	2.84	3.22	3.18
Remove or install excitor box.	35.5%	2.24	3.22	2.30
Repair or replace vacuum pumps, hoses and connectors.	17.2	2.03	3.22	2.19
Service scavenger filter.	29.4%	3.00	3.22	2.19
Replace central maintenance system components.	7.1	2.45	3.21	3.12
Service passenger oxygen system.	40.4%	3.36	3.21	2.08
Check navigation system annunciators for operation.	27.9%	3.44	3.20	2.69
Replace regulator, mask or oxygen bottles.	41.2%	2.53	3.20	2.27
Replace transformers, rectifiers and electrical filters.	26.1%	2.19	3.20	2.68
Service nose gear assemblies.	40.8%	2.78	3.20	2.43
Troubleshoot pneumatic system.	44.3%	2.68	3.20	3.07
Operational check pressurization system.	52.8%	2.87	3.19	2.83
Perform repairs using arc or spot welding.	8.0%	1.52	3.19	3.38
Repair structure or component by riveting.	44.4%	3.04	3.19	2.93
Repair integral fuel tank leaks.	34.2%	2.23	3.18	2.93
Inspect for general corrosion, corrosion under lap joints, etc.	50.1%	3.34	3.17	2.46
Inspect wire bundles.	47.1%	3.32	3.17	2.27
Perform repairs using gaseous welding.	8.8%	1.57	3.17	3.26
Remove or install ignitor plug.	39.2%	2.76	3.17	2.24
Repair bleed air ducting systems.	42.2%	2.45	3.17	2.69
Service hydraulic system.	47.2%	3.69	3.17	1.95
Check clogging indicators on filters.	47.4%	3.52	3.16	1.86
Inspect access door latches and hinge attachments.	44.9%	3.53	3.16	2.32
Perform fuel quality test.	37.0%	2.75	3.16	2.46
Install racks, controls, connections, antennas and associated electrical components.	47.0%	2.82	3.15	2.79
Repair or replace pressurization system components.	52.4%	2.59	3.15	2.74

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Service IDG (Integrated Drive Generator) oil level.	32.4%	3.18	3.15	2.24
Inspect honeycomb and laminated structure.	45.1%	2.99	3.14	2.61
Replace engine filters.	33.6%	3.27	3.13	1.91
Replace solid state inverters.	26.3%	1.80	3.13	2.42
Check fuel tanks for water.	44.9%	3.63	3.11	1.54
Troubleshoot fuel tank leaks.	36.1%	2.44	3.11	2.71
Functional check pneumatic system.	38.1%	2.96	3.10	2.67
Operational check aircraft battery charging system.	55.6%	3.09	3.10	2.38
Identify types of corrosion such as fretting, interangular, granular, etc.	48.2%	3.21	3.09	2.78
Perform repairs by brazing.	8.9%	1.42	3.09	2.95
Service hydraulic accumulator.	43.7%	3.09	3.09	2.09
Repair or install a device by soldering.	32.4%	2.82	3.08	2.57
Repair or replace de-ice boot.	11.1%	2.17	3.08	2.66
Service shock struts.	44.1%	2.81	3.07	2.38
Drain and flush oil tank.	30.6%	2.55	3.05	2.07
Dress nicks and irregularities in propeller.	8.3%	2.79	3.05	2.27
Drill or ream structure or component.	44.5%	3.29	3.04	2.75
Remove corrosion and repair surrounding area.	50.4%	2.98	3.03	2.77
Service each fuel tank sump to remove water and inspect tank valve.	34.0%	3.24	3.03	1.93
Drain and replace oil in piston engine.	4.1%	2.95	3.01	1.73
Functional check air conditioning and pressurization systems.	48.0%	3.07	3.01	2.84
Test fuel transfer system.	36.5%	2.70	3.01	2.34
Troubleshoot propeller heat.	8.8%	2.50	3.01	2.60
Inspect body skin and lower body surface.	38.6%	3.64	3.00	2.11
Perform a general interior or exterior visual inspection.	55.6%	4.18	3.00	2.11
Functional check prop heat.	10.1%	3.15	2.99	1.99

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Inspect windshield ice or rain removal systems.	35.4%	3.04	2.99	2.29
Repair or replace APU (Auxiliary Power Unit).	38.6%	2.23	2.99	3.22
Maintain batteries.	29.2%	2.93	2.98	2.13
Remove and install starter.	40.3%	2.62	2.93	2.29
Analyze fuel tank for microbiological contamination.	21.3%	2.38	2.90	2.04
Lubricate propeller.	7.3%	2.78	2.90	2.04
Service tires.	45.4%	3.76	2.90	1.67
Lubricate required flight control components (hinges, rollers, pinions, gears)	47.5%	3.30	2.89	1.75
Repair or install a part by soldering.	18.3%	2.29	2.89	2.43
Operational test of cabin emergency lighting.	43.3%	3.59	2.88	1.94
Service fluid in compass system.	11.6%	1.35	2.86	2.36
Test communication systems.	46.0%	3.50	2.86	2.50
Troubleshoot voice or data communication systems.	38.1%	2.86	2.86	3.08
Check pressure of tires.	48.1%	3.99	2.84	1.42
Identify and control bacteria in fuel tanks.	21.2%	2.19	2.80	2.09
Bleed hydraulic system pressure.	45.7%	3.50	2.79	2.05
Inspect plastics and fiberglass.	44.8%	3.63	2.79	2.19
Fabricate replacement brackets, panels or small parts.	44.7%	3.17	2.77	2.85
Repair or replace voice or data communication system components.	39.4%	2.81	2.77	2.77
Replace or repair antennas.	38.2%	2.17	2.77	2.20
Troubleshoot and repair air/vapor cycle conditioning system.	37.7%	2.58	2.73	3.06
Service and operate APU (Auxiliary Power Unit.)	42.8%	3.47	2.72	2.48
Lubricate landing gear components (bearings, hinges, pivots, up/downlocks, etc.)	44.2%	3.20	2.71	1.71
Operational check APU (Auxiliary Power Unit.)	41.9%	3.29	2.71	2.62
Repair or replace plastics and fiberglass.	35.6%	2.63	2.71	2.66

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Inspect electronic equipment blowers and flow sensors.	31.3%	2.74	2.70	2.36
Repair air/vapor cycle conditioning system.	35.0%	2.48	2.70	2.91
Service and inspect air/vapor cycle cooling system.	38.0%	2.66	2.61	2.56
Replace loose or missing fasteners.	53.8%	3.57	2.60	2.10
Troubleshoot ACARS (Airborne Communication and Reporting System).	17.9%	2.46	2.59	3.10
Troubleshoot propeller synchronization.	6.7%	1.91	2.57	3.19
Operational check air conditioning system.	45.9%	3.06	2.54	2.53
Troubleshoot exterior lighting systems.	45.2%	3.33	2.52	2.16
Repair small cracks by stop drilling.	49.3%	2.83	2.49	1.92
Repair or replace exterior aircraft lighting.	47.8%	3.36	2.42	1.75
Service doors, windows and moveable components with appropriate lubricant.	43.3%	3.06	2.41	1.81
Inspect aircraft interior areas.	40.7%	3.86	2.37	1.99
Operational test ACARS (Airborne Communication and Reporting System) link function.	17.8%	2.73	2.35	2.64
Paint control surfaces.	16.0%	1.84	2.32	2.30
Clean or remove paint or coatings from parts or skin using stripping agents or chemical bath.	21.8%	2.14	2.28	2.11
Inspect and check static discharge wicks.	59.3%	3.55	2.25	1.66
Clean or remove surface deposits or material.	42.2%	3.33	2.23	1.84
Prepare surface and prime.	32.3%	2.89	2.23	1.97
Clean electronic equipment cooling filters.	30.7%	2.48	2.22	1.55
Repair or replace static discharger wicks and mounts.	48.6%	2.42	2.20	1.76
De-fuel aircraft.	37.9%	2.53	2.16	1.93
Operational test of cockpit recorder.	33.5%	3.15	2.15	1.81
Paint parts or surfaces.	39.3%	3.07	1.95	1.89

APPENDIX E

JTA/FAA 147 SUBJECT AREAS

SKILL TASK CORRELATION

The maintenance activities listed in An Aviation Maintenance Technician, Job-Task-Analysis by The Transportation Center of Northwestern University has been correlated and placed under the appropriate AMT subject matter heading. The tasks are listed by order of criticality as defined in the JTA. This list is not to be considered the only tasks acceptable for meeting the requirements of this program. It has be developed to assist the program supervisors with a guide to help them in evaluating AMO maintenance activities to insure that the trainee is exposed to the breadth and scope of maintenance activities that have been previously determined important in the development of an AMT.

GENERAL SUBJECT AREAS

A. BASIC ELECTRICITY

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Perform failure analysis on electrical power systems.	32.1%	2.93	3.54	3.54
Maintain batteries.	29.2%	2.93	2.98	2.13

B. AIRCRAFT DRAWINGS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

C. WEIGHT AND BALANCE

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

D. FLUID LINES AND FITTINGS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Fabricate flexible or rigid lines and attach connectors.	27.5%	1.98	3.54	2.91

E. MATERIALS AND PROCESSES

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Perform a detailed dimensional inspection.	47.5%	3.31	3.36	2.69
Perform an x-ray or similar non-destructive inspection of skin or structure.	24.8%	2.08	3.84	3.42
Perform a magnetic particle inspection.	17.8%	2.54	3.55	2.64
Perform eddy current or ultrasound inspection on skin or structure.	13.4%	2.08	3.51	3.48
Visually inspect parts or components to detect surface cracks with dye penetrant.	55.4%	2.53	3.47	2.60
Perform a detailed dimensional inspection.	47.5%	3.31	3.36	2.69
Drill or ream structure or component.	44.5%	3.29	3.04	2.75

F. GROUND OPERATION AND SERVICING

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

G. CLEANING AND CORROSION CONTROL

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Inspect for general corrosion, corrosion under lap joints, etc.	50.1%	3.34	3.17	2.46
Identify types of corrosion such as fretting, interangular, granular, etc.	48.2%	3.21	3.09	2.78
Remove corrosion and repair surrounding area.	50.4%	2.98	3.03	2.77
Clean or remove surface deposits or material.	42.2%	3.33	2.23	1.84

H. MATHEMATICS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

I. MAINTENANCE FORMS AND RECORDS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

J. BASIC PHYSICS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

K. MAINTENANCE PUBLICATIONS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

L. MECHANIC PRIVILEGES AND LIMITATIONS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

AIRFRAME SUBJECT AREAS

A. WOOD STRUCTURES

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Inspect wood structure.	0.5%	1.42	3.83	3.17
Repair, replace or construct wood structures.	0.3%	1.00	3.33	3.00

B. AIRCRAFT COVERING

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Inspect fabric covered and doped surfaces.	0.7%	1.75	3.38	2.38
Replace or rejuvenate fabric covered and doped surfaces.	6.6%	1.52	3.25	3.16
Prepare and install patch (composite, fabric, metal).	39.3%	2.84	3.22	3.18

C. AIRCRAFT FINISHES

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Paint control surfaces.	16.0%	1.84	2.32	2.30
Clean or remove paint or coatings from parts or skin using stripping agents or chemical bath.	21.8%	2.14	2.28	2.11
Prepare surface and prime.	32.3%	2.89	2.23	1.97
Paint parts or surfaces.	39.3%	3.07	1.95	1.89

D. SHEET METAL AND NON-METALLIC STRUCTURES

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Replace doors.	32.2%	1.84	3.64	3.18
Repair or replace sheetmetal frame sections and fittings, fairings or stringers.	34.3%	2.63	3.57	3.43
Repair skin.	34.2%	2.52	3.51	3.27
Repair carbon composites.	15.6%	2.16	3.42	3.68
Inspect for loose rivets, defects, disbands, cracks, etc.	55.3%	4.10	3.32	2.38
Repair minor sheet metal defects or damage to control surfaces.	37.1%	2.74	3.32	2.17
Repair, replace or polish windows or windscreens.	43.4%	2.27	3.30	2.72
Identify delamination or disbanding of carbon composites.	40.5%	2.96	3.27	2.97

Repair or replace honeycomb structure.	25.9%	2.29	3.24	3.31
Prepare and install patch (composite, fabric, metal).	39.3%	2.84	3.22	3.18
Repair structure or component by riveting.	44.4%	3.04	3.19	2.93
Repair bleed air ducting systems.	42.2%	2.45	3.17	2.69
Inspect access door latches and hinge attachments.	44.9%	3.53	3.16	2.32
Inspect honeycomb and laminated structure.	45.1%	2.99	3.14	2.61
Inspect body skin and lower body surface.	38.6%	3.64	3.00	2.11
Inspect plastics and fiberglass.	44.8%	3.63	2.79	2.19
Fabricate replacement brackets, panels or small parts.	44.7%	3.17	2.77	2.85
Repair or replace plastics and fiberglass.	35.6%	2.63	2.71	2.66
Replace loose or missing fasteners.	53.8%	3.57	2.60	2.10
Repair small cracks by stop drilling.	49.3%	2.83	2.49	1.92
Service doors, windows and moveable components with appropriate lubricant.	43.3%	3.06	2.41	1.81

E. WELDING

Description	**Percent**	**Avg Frequency**	**Avg Criticality**	**Avg Difficulty**
Perform repairs using arc or spot welding.	8.0%	1.52	3.19	3.38
Perform repairs using gaseous welding.	8.8%	1.57	3.17	3.26
Perform repairs by brazing.	8.9%	1.42	3.09	2.95
Repair or install a device by soldering.	32.4%	2.82	3.08	2.57
Repair or install a part by soldering.	18.3%	2.29	2.89	2.43

F. ASSEMBLY AND RIGGING

Description	**Percent**	**Avg Frequency**	**Avg Criticality**	**Avg Difficulty**
Functional check flight management system.	20.3%	2.88	3.33	3.36
Adjust, align or rig flight control components.	45.9%	2.73	4.40	3.79
Change flight control surfaces.	44.0%	2.35	4.32	3.38
Fabricate control cables.	24.4%	1.73	4.24	3.32
Change primary flight control servos or actuators.	48.7%	2.34	4.09	3.22
Balance control surfaces.	27.5%	1.93	4.06	3.22
Check control surface balance.	29.0%	1.87	4.06	3.22
Troubleshoot flight control systems.	46.0%	2.61	4.04	3.62
Inspect flight control cables for tension, fraying, nicks or crimps.	45.8%	3.05	3.97	2.73
Repair or replace attach points or tracks for control surfaces.	34.4%	2.09	3.97	3.20

Inspect cable routing, pulleys, turnbuckles or flight control components.	44.7%	3.06	3.89	2.76
Operational test flight controls and actuators.	44.9%	3.32	3.88	2.77
Rig or check autopilot flight control actuators and servos.	31.8%	2.22	3.85	3.47
Rig doors and emergency evacuation systems.	38.8%	2.34	3.79	3.43
Check flight control travel.	44.3%	2.88	3.78	2.85
Replace automatic flight control, autopilot or all-weather landing systems components.	31.8%	2.72	3.75	3.55
Remove and install flight control trim motors.	40.9%	1.98	3.71	3.06
Inspect flight control surface for damage.	47.7%	3.83	3.69	2.46
Inspect hinge bearings for condition and excessive and excessive play.	46.7%	3.19	3.58	2.51
Operational test lift dumpers, air brakes, or spoilers.	40.5%	3.20	3.55	2.64
Lubricate required flight control components (hinges, rollers, pinions, gears)	47.5%	3.30	2.89	1.75

G. AIRFRAME INSPECTION

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Operational test escape slides of liferafts.	18.8%	2.17	3.55	2.39
Visually inspect wing structure.	42.7%	3.70	3.51	2.47
Perform an intensive visual inspection of a zone or system.	45.0%	3.69	3.43	2.75
Inspect cargo and passenger doors.	46.3%	3.61	3.42	2.53
Visually inspect landing gear, wheel wells, and doors.	41.7%	3.79	3.28	2.36
Perform a general interior or exterior visual inspection.	55.6%	4.18	3.00	2.11
Inspect aircraft interior areas.	40.7%	3.86	2.37	1.99
Inspect and check static discharge wicks.	59.3%	3.55	2.25	1.66
Repair or replace static discharger wicks and mounts.	48.6%	2.42	2.20	1.76

A. AIRCRAFT LANDING GEAR SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Repair or replace anti-skid system components.	38.7%	2.29	3.39	2.96
Troubleshoot anti-skid system.	35.6%	2.29	3.34	3.27
Overhaul, repair or replace landing gear.	34.6%	2.07	3.97	3.44
Operational check flight control and	50.4%	3.43	3.94	3.52

landing systems.				
Functional test retractable gear.	42.7%	2.72	3.93	2.92
Functional test emergency gear extension system.	39.5%	2.67	3.88	2.74
Modify or alter landing gear assembly.	17.6%	1.80	3.84	3.58
Troubleshoot landing gear control and actuating systems.	42.4%	2.29	3.78	3.41
Troubleshoot retractable gear systems.	36.2%	2.30	3.78	3.41
Repair or replace landing gear control and actuating system components.	38.0%	2.23	3.76	3.08
Detailed inspection of landing gear assemblies and subassemblies.	37.3%	3.38	3.72	2.87
Repair or replace landing gear position indication and warning components.	36.2%	2.21	3.62	2.92
Rig nose gear steering.	34.5%	1.93	3.60	3.32
Functional test brake system.	43.8%	3.36	3.55	2.50
Repair landing gear wiring and switches.	31.0%	2.15	3.53	2.87
Troubleshoot brake system.	37.4%	2.52	3.45	2.93
Replace tire or wheel assemblies.	45.2%	3.37	3.43	2.24
Repair or replace anti-skid system components.	38.7%	2.29	3.39	2.96
Troubleshoot anti-skid system.	35.6%	2.29	3.34	3.27
Functional test anti-skid system.	42.6%	2.91	3.24	2.63
Service nose gear assemblies.	40.8%	2.78	3.20	2.43
Service tires.	45.4%	3.76	2.90	1.67
Check pressure of tires.	48.1%	3.99	2.84	1.42
Lubricate landing gear components (bearings, hinges, pivots, up/downlocks, etc.)	44.2%	3.20	2.71	1.71

B. HYDRAULIC AND PNEUMATIC POWER SYSTEMS

Description	**Percent**	**Avg Frequency**	**Avg Criticality**	**Avg Difficulty**
Troubleshoot vacuum system.	21.7%	2.06	3.35	2.97
Repair or replace hydraulic components.	54.8%	3.09	3.58	2.82
Troubleshoot pressurized hydraulic system (1,000-3,000 psi).	39.7%	2.91	3.56	3.05
Repair hydraulic system leaks.	44.0%	2.92	3.48	2.65
Functional test hydraulic system.	46.1%	3.63	3.42	2.55
Check for leaks in hydraulic system.	48.8%	3.85	3.27	2.97
Troubleshoot pneumatic system.	44.3%	2.68	3.20	3.07
Service hydraulic system.	47.2%	3.69	3.17	1.95
Check clogging indicators on filters.	47.4%	3.52	3.16	1.86
Functional check pneumatic system.	38.1%	2.96	3.10	2.67
Service hydraulic accumulator.	43.7%	3.09	3.09	2.09
Service shock struts.	44.1%	2.81	3.07	2.38
Bleed hydraulic system pressure.	45.7%	3.50	2.79	2.05

C. CABIN ATMOSPHERE CONTROL SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Troubleshoot cabin pressurization system and-or ECS System.	42.7%	2.63	3.35	3.31
Troubleshoot cabin pressurization system and-or ECS System.	42.7%	2.63	3.35	3.31
Inspect passenger and crew oxygen system components.	43.5%	3.27	3.25	2.30
Service passenger oxygen system.	40.4%	3.36	3.21	2.08
Replace regulator, mask or oxygen bottles.	41.2%	2.53	3.20	2.27
Operational check pressurization system.	52.8%	2.87	3.19	2.83
Repair or replace pressurization system components.	52.4%	2.59	3.15	2.74
Functional check air conditioning and pressurization systems.	48.0%	3.07	3.01	2.84
Troubleshoot and repair air/vapor cycle conditioning system.	37.7%	2.58	2.73	3.06
Repair air/vapor cycle conditioning system.	35.0%	2.48	2.70	2.91
Service and inspect air/vapor cycle cooling system.	38.0%	2.66	2.61	2.56
Operational check air conditioning system.	45.9%	3.06	2.54	2.53

D. AIRCRAFT INSTRUMENT SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Test electronic instrumentation systems.	22.4%	3.10	3.39	3.27
Troubleshoot vacuum driven flight instruments.	18.5%	2.21	3.39	3.12
Repair or replace vacuum driven flight instrument components.	22.0%	2.23	3.35	2.75
Certify pitot and static system.	24.4%	2.67	3.82	3.19
Repair or replace sensitive position sensing devices (examples: gimble gyroscopes, laser ring gyros).	21.9%	2.39	3.64	3.14
Troubleshoot flight instruments.	26.2%	3.03	3.64	3.52
Perform stall warning test.	37.2%	3.13	3.63	2.50
Troubleshoot central air data collection and distribution system.	22.2%	2.43	3.63	3.46
Leak check pitot static system.	39.2%	2.78	3.62	3.11
Replace pitot/static system components.	33.2%	2.25	3.60	2.82
Repair or replace central air data collection and distribution components.	21.3%	2,44	3.59	3.11
Remove and replace flight instruments (airspeed indicator, altimeter, VSI, etc.).	45.2%	2.78	3.55	2.68
Functional test EFIS (Electronic Flight Instrumentation System).	25.3%	3.22	3.49	3.18
Remove and install air data computer.	23.2%	2.48	3.49	2.69
Troubleshoot intersystem data exchange	18.1%	2.40	3.49	3.77

problems.				
Operational check crew alerting systems (examples: EFIS, EICAS and ECAM).	26.6%	3.47	3.48	3.07
Perform EFIS (Electronic Flight Instrumentation System) test.	24.1%	3.17	3.42	3.08
Test electronic instrumentation systems.	22.4%	3.10	3.39	3.27
Troubleshoot vacuum driven flight instruments.	18.5%	2.21	3.39	3.12
Inspect fabric covered and doped surfaces.	0.7%	1.75	3.38	2.38
Repair or replace vacuum driven flight instrument components.	22.0%	2.23	3.35	2.75
Troubleshoot vacuum system.	21.7%	2.06	3.35	2.97
Troubleshoot central maintenance parameter and system computer.	8.1%	2.71	3.34	3.57
Functional check flight management system.	20.3%	2.88	3.33	3.36
Repair or replace electronic display components.	28.2%	2.51	3.23	2.68
Repair or replace vacuum pumps, hoses and connectors.	17.2	2.03	3.22	2.19
Replace central maintenance system components.	7.1	2.45	3.21	3.12

E. COMMUNICATION AND NAVIGATION SYSTEMS

Description	**Percent**	**Avg Frequency**	**Avg Criticality**	**Avg Difficulty**
Certify transponder and altitude reporting equipment.	18.4%	2.92	3.55	3.35
Troubleshoot dependent reference systems such as VOR and ILS.	21.6%	2.96	3.51	3.51
Test navigation systems.	24.7%	3.17	3.50	3.28
Troubleshoot autopilot.	27.4%	2.91	3.50	4.13
Troubleshoot radar system.	23.0%	2.65	3.28	3.51
Repair or replace components associated with DME, transponder, radar or other pulse systems.	24.9%	2.82	3.25	3.01
Swing (calibrate) compass system.	26.5%	1.90	3.23	2.80
Check navigation system annunciators for operation.	27.9%	3.44	3.20	2.69
Install racks, controls, connections, antennas and associated electrical components.	47.0%	2.82	3.15	2.79
Service fluid in compass system.	11.6%	1.35	2.86	2.36
Test communication systems.	46.0%	3.50	2.86	2.50
Troubleshoot voice or data communication systems.	38.1%	2.86	2.86	3.08
Repair or replace voice or data communication system components.	39.4%	2.81	2.77	2.77
Replace or repair antennas.	38.2%	2.17	2.77	2.20
Troubleshoot ACARS (Airborne Communication and Reporting System).	17.9%	2.46	2.59	3.10
Operational test ACARS (Airborne Communication and Reporting System) link function.	17.8%	2.73	2.35	2.64
Clean electronic equipment cooling filters.	30.7%	2.48	2.22	1.55
Operational test of cockpit recorder.	33.5%	3.15	2.15	1.81

F. AIRCRAFT FUEL SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Repair or replace fuel system warning devices.	25.4%	1.95	3.37	2.80
Troubleshoot fuel distribution system.	39.8%	2.22	3.34	3.09
Remove and install fuel pumps.	37.6%	2.26	3.86	3.09
Rig shut-off valves.	19.0%	2.13	3.63	3.07
Calibrate capacitance type fuel quantity indication systems.	28.7%	2.19	3.46	3.43
Repair or replace fuel system pumping.	41.7%	2.02	3.46	2.66
Inspect fuel distribution components (pumps, valves, controls).	42.1%	2.98	3.41	2.51
Troubleshoot capacitance-based fuel indicating system.	32.5%	2.23	3.41	3.54
Replace fuel distribution system components.	42.1%	2.15	3.40	2.72
Repair or replace fuel system warning devices.	25.4%	1.95	3.37	2.80
Troubleshoot fuel distribution system.	39.8%	2.22	3.34	3.09
Remove and install fuel filter.	40.8%	3.08	3.32	2.17
Functional test fuel distribution system.	45.7%	2.90	3.31	2.45
Repair or replace fuel measurement components.	32.6%	2.10	3.29	2.82
Troubleshoot float-based fuel indicating system.	19.1	1.87	3.25	2.83
Repair integral fuel tank leaks.	34.2%	2.23	3.18	2.93
Perform fuel quality test.	37.0%	2.75	3.16	2.46
Check fuel tanks for water.	44.9%	3.63	3.11	1.54
Troubleshoot fuel tank leaks.	36.1%	2.44	3.11	2.71
Service each fuel tank sump to remove water and inspect tank valve.	34.0%	3.24	3.03	1.93
Test fuel transfer system.	36.5%	2.70	3.01	2.34
Analyze fuel tank for microbiological contamination.	21.3%	2.38	2.90	2.04
Identify and control bacteria in fuel tanks.	21.2%	2.19	2.80	2.09
Defuel aircraft.	37.9%	2.53	2.16	1.93

G. AIRCRAFT ELECTRICAL SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Repair or replace electronic system components.	36.5%	3.39	3.39	3.00
Replace aircraft generator.	39.5%	2.36	3.39	3.12
Operational check DC and AC generating systems.	46.1%	3.38	3.37	2.89
Replace electrical circuit protection devices.	33.6%	2.39	3.34	2.57
Troubleshoot electrically operated mechanical components (example: electric landing gear actuator.)	63.1%	3.48	3.76	3.48
Replace buss switching and control devices.	29.2%	2.31	3.53	2.87
Troubleshoot aircraft electrical wiring and connectors.	39.2%	3.22	3.52	3.57
Perform wiring modifications.	31.0%	2.47	3.51	2.41

Troubleshoot AC/DC power generation systems.	38.8%	2.64	3.50	3.53
Troubleshoot electrical distribution & switching.	33.6%	2.84	3.49	3.56
Repair or replace aircraft electrical wiring and connectors.	38.9%	2.98	3.45	2.87
Functional test electrical switching & distribution	40.1%	3.42	3.42	2.95
Repair damaged wiring and connectors.	47.5%	3.06	3.40	2.64
Repair or replace electronic system components.	36.5%	3.39	3.39	3.00
Replace aircraft generator.	39.5%	2.36	3.39	3.12
Operational check DC and AC generating systems.	46.1%	3.38	3.37	2.89
Replace electrical circuit protection devices.	33.6%	2.39	3.34	2.57
Operational check standby power or emergency generation system.	50.6%	3.11	3.31	2.60
Repair printed circuit board.	17.4%	2.33	3.30	3.70
Replace transformers, rectifiers and electrical filters.	26.1%	2.19	3.20	2.68
Inspect wire bundles.	47.1%	3.32	3.17	2.27
Replace solid state inverters.	26.3%	1.80	3.13	2.42
Operational check aircraft battery charging system.	55.6%	3.09	3.10	2.38
Operational test of cabin emergency lighting.	43.3%	3.59	2.88	1.94
Inspect electronic equipment blowers and flow sensors.	31.3%	2.74	2.70	2.36
Troubleshoot exterior lighting systems.	45.2%	3.33	2.52	2.16
Repair or replace exterior aircraft lighting.	47.8%	3.36	2.42	1.75

H. POSITION AND WARNING SYSTEMS

Description	**Percent**	**Avg Frequency**	**Avg Criticality**	**Avg Difficulty**
Troubleshoot central maintenance parameter and system computer.	8.1%	2.71	3.34	3.57
Troubleshoot landing gear position indication and warning systems.	38.8%	2.36	3.75	3.25
Functional test aircraft warning systems.	55.1%	3.75	3.71	2.59
Operational check caution and warning systems.	35.4%	3.60	3.53	2.61

I. ICE AND RAIN CONTROL SYSTEMS

Description	**Percent**	**Avg Frequency**	**Avg Criticality**	**Avg Difficulty**
Repair or replace scoops and leading edge anti-ice components.	29.9%	2.32	3.38	2.71
Troubleshoot ice, rain or fog removal systems.	39.1%	2.40	3.37	2.94
Replace electrical de-ice boots.	19.0%	1.85	3.50	2.94

Functional check pneumatic ice fog removal systems.	32.5%	2.73	3.40	2.50
Repair or replace scoops and leading edge anti-ice components.	29.9%	2.32	3.38	2.71
Troubleshoot ice, rain or fog removal systems.	39.1%	2.40	3.37	2.94
Functional check electrical ice, rain or fog removal systems.	36.0%	2.97	3.31	2.42
Inspect air scoops and leading edge ice control systems.	37.4%	3.47	3.31	2.24
Repair or replace de-ice boot.	11.1%	2.17	3.08	2.66
Inspect windshield ice or rain removal systems.	35.4%	3.04	2.99	2.29

J. FIRE PROTECTION SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Inspect extinguishers and fire bottles.	37.9%	3.52	3.39	1.87
Functional test fire protection system.	35.6%	3.55	3.76	2.22
Troubleshoot fire extinguishing and control systems.	33.5%	2.40	3.71	2.85
Troubleshoot fire detection circuits.	36.8%	2.31	3.67	3.06
Repair or replace fire detection/protection components.	48.1%	2.46	3.62	2.63
Operational check fire detection system.	36.2%	3.59	3.59	2.14
Inspect fire extinguishing system.	31.8%	3.20	3.55	2.19
Inspect fire detection elements for connections and security.	34.1%	3.04	3.47	2.23
Test passenger or cargo smoke detection system.	40.9%	3.16	3.40	2.14
Inspect extinguishers and fire bottles.	37.9%	3.52	3.39	1.87
Replace smoke detection components.	39.9%	2.27	3.29	2.11
Replace engine filters.	33.6%	3.27	3.13	1.91

POWERPLANT SUBJECT AREAS

A. RECIPROCATING ENGINES

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Perform internal repairs to engine.	18.3%	2.87	4.21	3.83
Perform internal repairs to opposed piston engines.	2.3%	1.80	4.00	3.51
Operational check engine.	35.3%	3.64	3.93	3.47
Inspect engine mounts.	43.8%	3.03	3.88	2.64
Perform borescope inspection.	17.8%	2.53	3.77	3.42
Inspect engine and components for security and leaks.	41.7%	3.89	3.62	2.71
Inspect opposed piston engine.	4.6%	3.18	3.58	2.84

Replace or clean engine components.	36.5%	3.48	3.40	2.78
Service piston engine.	4.7%	3.02	3.28	2.22
Inspect radial piston engine.	1.5%	1.62	3.24	2.90
Replace engine filters.	33.6%	3.27	3.13	1.91

B. TURBINE ENGINES

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Replace jet engine.	26.3%	2.33	4.46	3.75
Replace turboprop engine.	7.5%	2.03	4.44	3.75
Replace or overhaul hot section.	19.3%	2.71	4.25	3.87
Perform internal repairs to engine.	18.3%	2.87	4.21	3.83
Troubleshoot jet engine.	28.7%	3.06	4.17	4.05
Operational check engine.	35.3%	3.64	3.93	3.47
Troubleshoot turboprop engine.	10.4%	2.87	3.92	3.80
Inspect engine mounts.	43.8%	3.03	3.88	2.64
Perform borescope inspection.	17.8%	2.53	3.77	3.42
Service gear reduction section.	13.1%	2.81	3.72	2.83
Inspect engine and components for security and leaks.	41.7%	3.89	3.62	2.71
Inspect fan blades for FOD (Foreign Object Damage).	36.5%	3.91	3.61	2.36
Troubleshoot autothrottle.	25.8%	2.11	3.47	3.70
Blend fan blades.	25.0%	2.36	3.44	2.73
Service turbine engine.	33.4%	3.95	3.44	2.18
Replace or clean engine components.	36.5%	3.48	3.40	2.78
Operational test autothrottle.	16.0%	2.43	3.23	3.16
Service IDG (Integrated Drive Generator) oil level.	32.4%	3.18	3.15	2.24

C. ENGINE INSPECTION

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

A. ENGINE INSTRUMENT SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Repair or replace engine indicating components.	39.4%	2.79	3.33	2.70
Troubleshoot engine indicating problems.	40.0%	2.81	3.47	3.32
Troubleshoot electronic engine indicating systems.	33.7%	2.61	3.43	3.27
Repair or replace engine indicating components.	39.4%	2.79	3.33	2.70

B. ENGINE FIRE PROTECTION SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Functional test fire protection system.	35.6%	3.55	3.76	2.22
Troubleshoot fire detection circuits.	36.8%	2.31	3.67	3.06
Repair or replace fire detection/protection components.	48.1%	2.46	3.62	2.63
Inspect engine fire loop.	43.0%	2.97	3.55	2.24
Inspect fire extinguishing system.	31.8%	3.20	3.55	2.19
Inspect extinguishers and fire bottles.	37.9%	3.52	3.39	1.87

C. ENGINE ELECTRICAL SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Replace CSD (Constant Speed Drive) or IDG (Integrated Drive Generator).	27.1%	2.09	3.40	2.95
Remove and install starter.	40.3%	2.62	2.93	2.29

D. LUBRICATION SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Replace turbine and jet oil filter elements.	37.3%	3.14	3.33	2.14
Inspect chip detectors and/or oil filters.	40.2%	3.42	3.27	2.14
Service engine and scavenger oil.	39.4%	3.78	3.26	1.89
Service scavenger filter.	29.4%	3.00	3.22	2.19
Drain and flush oil tank.	30.6%	2.55	3.05	2.07
Drain and replace oil in piston engine.	4.1%	2.95	3.01	1.73

E. IGNITION SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Replace turbine and jet oil filter elements.	37.3%	3.14	3.33	2.14
Troubleshoot ignition problems	36.8%	2.39	3.33	2.92
Inspect booster starting systems.	11.8%	2.52	3.29	2.64
Inspect high-tension ignition systems.	35.2%	2.97	3.28	2.47
Repair or replace ignition components.	41.7%	2.60	3.28	2.22
Repair or replace high tension ignition system components.	38.8%	2.52	3.26	2.45
Remove or install excitor box.	35.5%	2.24	3.22	2.30
Remove or install ignitor plug.	39.2%	2.76	3.17	2.24

F. FUEL METERING SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Remove and install fuel control unit.	28.5%	2.19	4.07	3.50
Troubleshoot fuel control problems.	32.6%	2.56	3.97	3.69
Repair or replace fuel control components.	34.6%	2.61	3.84	3.14
Functional test fuel control system.	28.4%	2.82	3.80	3.16

G. ENGINE FUEL SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

H. INDUCTION AND ENGINE AIRFLOW SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

I. ENGINE COOLING SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty

J. ENGINE EXHAUST AND REVERSER SYSTEMS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Repair or replace thrust reversers.	24.0%	2.33	3.50	3.18
Operational test thrust reversers.	38.5%	2.99	3.36	2.70

K. PROPELLERS

Description	Percent	Avg Frequency	Avg Criticality	Avg Difficulty
Operational check fixed and constant speed propellers.	7.3	3.04	3.39	2.53
Adjust governor.	6.7%	2.14	3.37	2.89
Operational test thrust reversers.	38.5%	2.99	3.36	2.70
Overhaul prop assembly.	1.9%	1.69	4.08	3.69
Tear down and build-up prop assembly.	2.4%	1.84	4.04	3.57
Replace propeller.	10.5%	2.49	4.01	2.85

Replace propeller assembly.	9.1%	2.43	4.00	2.90
Refinish composite blades.	10.5%	1.88	3.91	3.59
Rig propeller blades.	4.8%	2.41	3.77	3.06
Service bleed valve propeller governor.	2.3%	1.98	3.53	2.64
Inspect propellers for damage.	9.8%	3.78	3.46	2.12
Troubleshoot constant speed propeller.	5.6%	2.19	3.40	3.10
Operational check fixed and constant speed propellers.	7.3	3.04	3.39	2.53
Adjust governor.	6.7%	2.14	3.37	2.89
Dress nicks and irregularities in propeller.	8.3%	2.79	3.05	2.27
Troubleshoot propeller heat.	8.8%	2.50	3.01	2.60
Functional check prop heat.	10.1%	3.15	2.99	1.99
Lubricate propeller.	7.3%	2.78	2.90	2.04
Troubleshoot propeller synchronization.	6.7%	1.91	2.57	3.19

L. Unducted Fans

M. Auxiliary Power Units

Description	**Percent**	**Avg Frequency**	**Avg Criticality**	**Avg Difficulty**
Repair or replace APU (Auxiliary Power Unit).	38.6%	2.23	2.99	3.22
Service and operate APU (Auxiliary Power Unit.)	42.8%	3.47	2.72	2.48
Operational check APU (Auxiliary Power Unit.)	41.9%	3.29	2.71	2.62

APPENDIX F

PRACTICAL PROJECT

RECORDKEEPING FORM

Practical Project RecordKeeping Form

Name:_____ **Employee Code:** _____

Hire date:_____ **Tech. Level:** _____

Training Coordinator: _____ **Mentor:** _____

AIRCRAFT GROUND HANDLING SKILLS

Required Practical Project Skills	Hours	Date Completed	Trainer
1. Aircraft Jacking			
2. Aircraft Leveling			
3. Securing Aircraft (Tie-Downs & Gust Locks)			
4. Aircraft Towing			
5. Reciprocating Engine Starting & Operation			
6. Aircraft Taxiing			
7. External Aircraft Cleaning			
8. Aircraft Fueling			
9. Turbine Engine Starting & Operation			
10. Internal Aircraft Cleaning			
11. Aircraft & Engine Degreasing			

Other Ground Handling Practical Projects Completed	Hours	Date Completed	Trainer

APPENDIX G

SAMPLE EXPERIENCE DOCUMENTATION LETTER

March 1, 2002

Dear FAA Airworthiness Inspector:
FSDO XXXX

This letter is to certify that I fully understand the requirements for successful completion of a Structured-Experience Program as specified in FAR Part 65.77 (and exemption XX dated XX).

I have personal knowledge that John Doe has successfully completed the requirements to qualify for the FAA Airframe & Powerplant Certificates. For the period of February 12, 2000, to March 1, 2002 John Doe has been an employee of Acme Aviation, 1200 Airport Road, Fly Away, FL. During this time period he has been a trainee in the company FAA Approved Structured-Experience Program. As a participant in this program, he has accrued the formal training and practical experience shown in the attached training records.

Sincerely,

Jane Doe
AMT 000 00 0000

APPENDIX H

SAMPLE COURSE OUTLINES

Course Outline

Course Title: FEDERAL AVAITION REGULATIONS FOR TECHNICIATIONS

Course Objectives: The student will: become familiar with the certification requirements and privileges and limitations of certified technicians; be able to interpret the performance levels for aircraft maintenance.

Required Reading: FAR Handbook for Aviation Maintenance Technicians, Jeppesen: Part 65, Part 43

AIRCRAFT BASIC SCIENCE, Seventh Edition, Kroes and Rardon, Glenco

Evaluation: The trainer on the subject topics and practical skill tasks completed will conduct a detailed oral examination

Topics for Discussion:

A. Requirements for the A&P
    1. Educational
    2. Experience
    3. Part 147 schools
    4. Grade scale
    5. Issuance
    6. Temporary certificates
    7. Duration
        a. Suspension
        b. Revocation
        c. Surrender
    8. Change of Address
    9. Cheating on tests
    10. Drug convictions

B. Privileges of A&P Certificate
    1. Inspection (100 hour)
    2. Repair

C. Inspection Authorization
    1. Requirements
    2. Privileges
        a. Annual inspection
        b. Progressive
        c. Form 337

D. Repair station
    1. Requirements
    2. Privileges

E. Maintenance required on aircraft
    1. Inspections
    2. Repair and service

F. Types of Maintenance
    1. Inspection
    2. Repair
    3. Alteration
    4. Preventative

G. Authorization to perform maintenance
    1. Responsibility to perform maintenance (mechanic)
    2. Responsibility to make sure maintenance is done (owner/operator)
    3. Communications between

H. Performance rules in general
    1. FAR 43.13

Practical Skill Tasks: *Note – these activities are to be typical and actual maintenance activities performed at the AMO. Where practical these activities should be consistent with the maintenance tasks outline in the AMT Job Task Analysis. Appendix XX of this report contains a list of the JTA maintenance tasks categorized by the subject areas defined in 14CFR FAR Part 147 and listed by criticality level.*

Typical projects
    A. Logbook entries
    B. Research of airworthiness directives
    C. Research of manufactures service bulletins
    D. Proper use of maintenance manuals
    E. Proper use of parts manuals

JTA Correlated Maintenance Tasks

    A. None noted for this course area

Course Outline

Course Title: SHEETMETAL REPAIR

Course Objectives: The student will: develop fundamental skills in the installation and removal of rivets; develop knowledge and skills to analyze damage and design sheet metal repairs in accordance with procedures in AC43.13-1b or manufacturers manuals.

Required Reading: *Note: There are a number of aircraft maintenance textbooks available. The ones referenced here are for example purposes only.*

A. Aircraft Maintenance and Repair: Kroes, Watkins, Delp.
B. Aircraft Inspection & Repair; EA-AC 43.13-1A 7 2A, FAA
C. Standard Aircraft Handbook; Aero Publishers.
D. Aircraft Basic Science; Kroes, Rardon.

Reading Assignment:

Review of riveting and standards A: 202, 215-218
Riveting on aircraft assemblies A: 230-257, B: 51-66; 121-23; D: 229-235
Riveting inspection B: 51-66; C: 75-76
Sheet Metal Repairs A: 239-257; B: 51-66

Evaluation:

Topics for Discussion:

A. Rivet identification
    1. Material
    2. Head style
    3. Diameter and Length

B. Nomenclature
    1. Edge distance
    2. Spacing

C. Material & Rivet Selection
    1. Like materials
    2. Rivet substitution

D. Installation tools
    1. Drill sizes
    2. Sheet fasteners
    3. Chip chaser

4. Deburring tools
5. Hole finders
6. Countersinks
7. Riveting tools
    a. Rivet gun
    b. Rivet sets
    c. Retainers
    d. Bucking bars
8. Rivet squeezers
9. Rivet shaver

E. Hole preparation
1. Countersink
2. Dimpling
3. Deburring

F. Inspection and Correction
1. Defective rivet sets
2. Rivet removal
3. Oversize holes

G. Bend radius

H. Flat pattern layouts

I. Relief holes

J. Repair Principles
1. Restoration of strength
    a. Material type and thickness.
    b. Rivet size and number.
    c. Reinforcement size.
2. Avoiding stress concentrations.
3. Structural vs. non-structural
4. Sources of approved data
    a. AC 43.13-1b
    b. Manufacturers manuals

K. Assessment of damage
1. Repair/replacement
2. Location on aircraft

L. Typical repairs
1. Skin repairs
2. Skin (sheet) splices
3. Stringers

4. Intermediate frames
5. Ribs

M. Regulations for repairs
1. Classification - major/minor
2. Records
3. Approval for return to service

Practical Skill Tasks: *Note – these activities are to be typical and actual maintenance activities performed at the AMO. Where practical these activities should be consistent with the maintenance tasks outline in the AMT Job Task Analysis. Appendix H of this report contains a list of the JTA maintenance tasks categorized by the subject areas defined in 14CFR FAR Part 147 and listed by criticality level.*

Typical projects
1. Identify rivet types.
2. Layout rivet spacing
3. Install & remove universal-head and countersunk rivets.
4. Stop-drill cracks.

JTA Correlated Maintenance Tasks

. SHEET METAL AND NON-METALLIC STRUCTURES

Description	**Percent**	**Avg Frequency**	**Avg Criticality**	**Avg Difficulty**
Replace doors.	32.2%	1.84	3.64	3.18
Repair or replace sheetmetal frame sections and fittings, fairings or stringers.	34.3%	2.63	3.57	3.43
Repair skin.	34.2%	2.52	3.51	3.27
Repair carbon composites.	15.6%	2.16	3.42	3.68
Inspect for loose rivets, defects, disbands, cracks, etc.	55.3%	4.10	3.32	2.38
Repair minor sheet metal defects or damage to control surfaces.	37.1%	2.74	3.32	2.17
Repair, replace or polish windows or windscreens.	43.4%	2.27	3.30	2.72
Identify delamination or disbanding of carbon composites.	40.5%	2.96	3.27	2.97
Repair or replace honeycomb structure.	25.9%	2.29	3.24	3.31
Prepare and install patch (composite, fabric, metal).	39.3%	2.84	3.22	3.18
Repair structure or component by	44.4%	3.04	3.19	2.93

riveting.				
Repair bleed air ducting systems.	42.2%	2.45	3.17	2.69
Inspect access door latches and hinge attachments.	44.9%	3.53	3.16	2.32
Inspect honeycomb and laminated structure.	45.1%	2.99	3.14	2.61
Inspect body skin and lower body surface.	38.6%	3.64	3.00	2.11
Inspect plastics and fiberglass.	44.8%	3.63	2.79	2.19
Fabricate replacement brackets, panels or small parts.	44.7%	3.17	2.77	2.85
Repair or replace plastics and fiberglass.	35.6%	2.63	2.71	2.66
Replace loose or missing fasteners.	53.8%	3.57	2.60	2.10
Repair small cracks by stop drilling.	49.3%	2.83	2.49	1.92
Service doors, windows and moveable components with appropriate lubricant.	43.3%	3.06	2.41	1.81

Course Outline

Course Title: LANDING GEAR COMPONENTS

Course Objectives: The student will: develop knowledge of basic maintenance of wheels and tires and struts; demonstrate the ability to do installations, inspection, maintenance, and servicing procedures of the various brake components;

Required Reading: *Note: There are a number of aircraft maintenance textbooks available. The ones referenced here are for example purposes only.*

Aircraft Maintenance and Repair; Seventh Edition: Kroes, Watkins, Delp Glenco. pages 409 – 412, 434 - 466

Aircraft Inspection & Repair: FAA.AC 43.13-1A, pages 141 - 150

Evaluation: The trainer on the subject topics and practical skill tasks completed will conduct a detailed oral examination. All work performed by the trainee will be to acceptable standards for safe aircraft operation.

Topics for Discussion:

A. Tires and wheels
   1. Cleaning and storage of tires and rubber products
   2. Inspection, dismounting, and installation of tires and wheels
   3. Bearing maintenance

B. Landing gear systems.
   1. Mechanical steering systems
      a. Nose gear
      b. Tail wheel
      c. Other
   2. Shimmy dampeners
   3. Links and braces

C. Shock struts
      a. Air oleo
      b. Spring oleo
      c. Spring steel
      d. Strut servicing

D. Types of brake systems
   1. Single disk
   2. Multi-disk

E. Operating principles
   1. Basic operating principles of each type
   2. Function of a primary pad and backing pad on disk type brakes
   3. Floating calipers on Cleveland style
   4. Floating disks of Goodyear style
   5. Segmented multi disk compression torque tube system

F. Master cylinders
   1. Basic operating principles
   2. Functions of a master cylinder
      a. Pressure actuation
      b. Refill from reservoir
      c. Thermal compensation
   3. Functions of a pilot control valve

G. Brake bleeding of hydraulic systems
   1. Gravity bleeding
   2. Pressure bleeding
   3. Bleeding instructions in maintenance manuals

H. Parking brake types
   1. Mechanical lock
   2. Hydraulic lock
   3. Separate master cylinder
   4. Return block system

I. Causes of brake malfunctions
   1. Fading brakes
   2. Excess brake travel
   3. Grabbing brakes
   4. Spongy brakes
   5. Dragging brakes
   6. Locked brakes
   7. Hydraulic fluids on brake pads
   8. Spilled hydraulic fluid on linings and tires
   9. Mixing Mil-H-7808 with phosphate ester fluids
   10. Contamination of brake surfaces

Practical Skill Tasks: *Note – these activities are to be typical and actual maintenance activities performed at the AMO. Where practical these activities should be consistent with the maintenance tasks outline in the AMT Job Task Analysis. Appendix H of this report contains a list of the JTA maintenance tasks categorized by the subject areas defined in 14CFR FAR Part 147 and listed by criticality level.*

Typical projects

1. Remove & Install wheel from aircraft.
2. Deflate and remove tire from wheel.
3. Inspect wheel.
4. Inspect tire.
4. Install tire on wheel.
5. Clean, inspect, and pack wheel bearings.
6. Inspect & service a shimmy dampener.
7. Inspect & service an air oleo shock strut.

JTA Correlated Maintenance Tasks

AIRCRAFT LANDING GEAR SYSTEMS

Description	**Percent**	**Avg Frequency**	**Avg Criticality**	**Avg Difficulty**
Repair or replace anti-skid system components.	38.7%	2.29	3.39	2.96
Troubleshoot anti-skid system.	35.6%	2.29	3.34	3.27
Overhaul, repair or replace landing gear.	34.6%	2.07	3.97	3.44
Operational check flight control and landing systems.	50.4%	3.43	3.94	3.52
Functional test retractable gear.	42.7%	2.72	3.93	2.92
Functional test emergency gear extension system.	39.5%	2.67	3.88	2.74
Modify or alter landing gear assembly.	17.6%	1.80	3.84	3.58
Troubleshoot landing gear control and actuating systems.	42.4%	2.29	3.78	3.41
Troubleshoot retractable gear systems.	36.2%	2.30	3.78	3.41
Repair or replace landing gear control and actuating system components.	38.0%	2.23	3.76	3.08
Detailed inspection of landing gear assemblies and subassemblies.	37.3%	3.38	3.72	2.87
Repair or replace landing gear position indication	36.2%	2.21	3.62	2.92

and warning components.				
Rig nose gear steering.	34.5%	1.93	3.60	3.32
Functional test brake system.	43.8%	3.36	3.55	2.50
Repair landing gear wiring and switches.	31.0%	2.15	3.53	2.87
Troubleshoot brake system.	37.4%	2.52	3.45	2.93
Replace tire or wheel assemblies.	45.2%	3.37	3.43	2.24
Repair or replace anti-skid system components.	38.7%	2.29	3.39	2.96
Troubleshoot anti-skid system.	35.6%	2.29	3.34	3.27
Functional test anti-skid system.	42.6%	2.91	3.24	2.63
Service nose gear assemblies.	40.8%	2.78	3.20	2.43
Service tires.	45.4%	3.76	2.90	1.67
Check pressure of tires.	48.1%	3.99	2.84	1.42
Lubricate landing gear components (bearings, hinges, pivots, up/downlocks, etc.)	44.2%	3.20	2.71	1.71