Job Task Analysis of the Aviation Maintenance Technician—Phase II

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LIST OF ABBREVIATIONS

A&P -- Aircraft and Powerplant Certificate
AMT -- Aviation Maintenance Technician
ATA -- Air Transport Association
FAA -- Federal Aviation Administration
FAR -- Federal Aviation Regulation
FCC -- Federal Communications Commission
FSDO -- Flight Standards District Office
JTA -- Job Task Analysis
NATA -- National Air Transport Association
NBAA -- National Business Aircraft Association
RAA -- Regional Airline Association

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

The Transportation Center at Northwestern University is under grant from the Federal Aviation Administration (FAA) to perform a job task analysis (JTA) of the aviation maintenance technician (AMT). The objective of this research is to update a similar analysis, the Allen Study, performed in 1974 by The University of California, Los Angeles. The Allen Study was used as regulatory support for Federal Aviation Regulation (FAR) Part 147, which outlines the curriculum requirements for AMT schools. Similarly, the results of the JTA will provide an updated description of the tasks an AMT performs and will be used to make appropriate changes to the FARs.

The **JTA** project is being performed in three phases. In Phase I, which was completed in June 1994, the research team developed and validated a research and survey methodology for a sample of aircraft maintenance tasks. As a result of Phase I, the research team identified an efficient and unobtrusive method to administer surveys.

The objective of Phase II was to conduct a full-scale survey of the major tasks technicians perform. A list of 303 tasks was constructed that provided a broad coverage of tasks that an **AMT** performs. The survey questionnaire and the interview process were revised to reflect the expanded task list. A total of 2,434 surveys were collected from 84 facilities across all segments of the industry. The data from the surveys were input into a database to facilitate a flexible analysis.

The data analysis detailed in this report provides information about the facilities that participated in the study. The results from the background section of the survey reports demographic information about the respondents. The results from the task analysis are listed by industry segment to demonstrate the similarities and differences between the individual segments.

Phase III will concentrate on analyzing the data collected in the context of a revised **FAR** Part 147. A committee of representatives from both the industry and **AMT** schools will assist in this effort. Phase III is expected to be completed in the third quarter of 1997.

1.INTRODUCTION

1.1 Background

The Federal Aviation Administration (FAA) is responsible for the training and certification requirements of Aviation Maintenance Technicians (AMTs). These standards are currently summarized in two Federal Aviation Regulations (FARs), specifically FAR Part 65, which governs the certification of AMTs and FAR Part 147, which outlines the curriculum for AMT schools. In principle, these regulations build upon a realistic understanding of the job responsibilities of an AMT.

Currently, the licensing structure outlined in **FAR** Part 65 is in the process of being revised and will become FAR Part 66. The existing Airframe and Powerplant (A&P) certificate will be replaced by the Aviation Maintenance Technician (AMT) certificate. An additional endorsement to the certificate, a transport rating (-T), will allow the holder to return Part 25 or Part 29 transport category aircraft to service. A change in the licensing structure implies that the training requirements in Part 147 must be revised as well.

The current version of **FAR** Part 147 is based upon data collected as part of the Allen Study, which was completed in 1974. The Allen study noted that rapid technological changes within the aviation industry require that the **AMT** schools update their instructional program. Technological advances are still continuing at a rapid rate and will continue to do so.

Like the Allen Study, the Job Task Analysis (JTA) of the Aviation Maintenance Technician study will provide information about tasks that are performed by **AMT**s throughout the entire aviation industry. This study is helping to set the stage for a possible round of curriculum revisions that can be incorporated into the efforts of those schools that are responsible for the training of AMTs.

1.2 Objectives and Scope

The objective of this study is to provide a task analysis of the occupation of the **AMT**. The project consists of three phases. The objective of Phase I was to develop and validate survey methods. During Phase II the full-scale survey was performed on a complete set of tasks. Phase III will concentrate on a more in-depth analysis of the data collected, particularly within the context of a revised **FAR** Part 147.

The objectives of Phase II are to:

- Develop a list of tasks that broadly define the occupation of the **AMT**
- Administer the survey to a representative sample of facilities covering all segments of the aviation industry
- Analyze the data collected in order to identify tasks that are no longer relevant, tasks that continue to be important, and tasks that are indicators of the impact of technological change on the industry over the past twenty years
- Analyze the data in order to identify similarities and differences that are characteristic of each segment in the industry

Additional analysis will be performed in Phase III. The objectives for this phase of the project are to:

- Organize the data to facilitate revisions to **AMT** school curricula.
- Review the data with representatives from **AMT** schools and discuss the implications for curriculum reform.
- Review the data with industry representatives and discuss the implications for training within the industry.

There is currently an increasing emphasis on research in the area of human factors. Thus it is apparent that the environment in which **AMT**s work could be modified in order to simplify the responsibilities of AMTs. These developments have important implications for the training of AMTs and ultimately for their certification. The results of this study may be relevant to developments in the area of human factors, but any discussion of these issues is beyond the scope of this study.

1.3 Overview of the Report

This report details the activities associated with Phase II of this project. The first section reviews the activities completed as part of Phase I. The **Task List and Survey Procedure Development** section discusses how the data collation methods were adapted and carried out in Phase II. **Analysis Overview** details the results of the survey, including the background section of the survey and the task analysis. **Plans for Phase III** provides an overview of the additional analysis that will be completed during this part of the study. The final section, **Summary and Conclusions**, highlights the major details from Phase II.

2. PHASE I REVIEW

2.1 Objective and Purpose

Most job task analyses focus on a specific occupation, or examine a position within a single organization. The objective of this study is to complete a job task analysis for the position of **AMT** across the entire aviation industry. Because the aviation industry varies greatly in terms of work environment and type of aircraft, the occupation of AMT can be defined in equally as broad terms. For this reason, traditional job task analyses methods needed to be revised to accommodate this expanded scope.

The objective of Phase I was to design and validate a survey method to perform the task analysis. This section will briefly discuss these activities. During this initial phase of the study, three survey methods were designed and tested: a written survey questionnaire, an interview schedule, and observations recorded on videotape. Procedures for administering the three data collection methods were developed and implemented. A more thorough discussion of these activities is included in *Job Task Analysis c f the Aviation Maintenance Technician--Phase I Report.*

2.2 Overview of Survey Methods

The primary form of data collection for the quantitative portion of the task analysis was the survey questionnaire. The questionnaire used in Phase I included four sections: Background Information, Documentation, Task Inventory, and Specialized Services.

In the Background Information section, the respondents were requested to provide information pertaining to their work area and organization, certificates and licenses and duration held, areas of relevant aviation maintenance experience, and source and type of primary training. The Documentation section asked respondents to evaluate how often a given list of references were used during the course of their work and if they were responsible for returning aircraft to service.

In the Task Inventory section, the respondents were presented with a list of 23 tasks. If the respondent performed the task, he or she was requested to rate the task according to six performance measures. They included

- Frequency: how often the task is performed
- Criticality to Flight Operation: possible consequences if task is not performed correctly
- Difficulty to Learn: level of difficulty to learn the task
- Technical Knowledge: level of technical knowledge required to complete the task
- Manipulative Skill: degree of manipulative skill required to complete the task
- Industry Training: amount of industry training received related to the task

A rating scale for each of the measures had a corresponding scale ranging from one through five.

The Specialized Services section also applied to the set of tasks. This section sought to collect information about tasks that are performed by internal support shop or outside vendors. If the respondent recognized one of these tasks as a specialized service, they were presented with a list of questions concerning the reasons a task is referred to a specialized service provider, the frequency of occurrence and who actually performs the task.

The interview schedule was divided into two sections. The Background Information section was the same as the background section in the survey. The Task Performance Inquiry section was organized by the convention outlined in the Air Transportation Association's (ATA) Specification 100. First, the respondent was asked to provide tasks under the chapter that they perform frequently. This information provided a basis for the complete task list in Phase II. The respondent was then asked what knowledge and skills an **AMT** should possess to perform tasks proficiently. Finally, the respondent was asked what special tools or equipment an AMT should know how to use.

The observations were the least structured of the data collection methods. At a limited number of sites, permission was obtained to observe and record on videotape **AMT**s carrying out specific tasks. The information obtained through the use of the videotape was supplemented by comments made by the AMT while he or she was carrying out the task.

The project staff began to contact sites in the local Chicago area with the assistance of the local **FAA** Flight Standards District Office (FSDO) to participate in the study. The local area sites provided the staff with an opportunity to develop a visit protocol to ensure consistent administration of the survey. Each site was visited twice. The purpose of the initial visit was to explain the project purpose and develop a plan and schedule to administer the surveys. Surveys, interviews, and observations were conducted during the subsequent visit.

After the visit protocol was developed and tested locally, additional sites were identified to complete the sample. The project staff worked with the **ATA** and the National Air Transport Association (NATA) to identify additional facilities. Major facilities, such as an airline base or line facility, or large repair station were identified. Then as many smaller facilities in the area were contacted and visited in order to obtain a representative sample of facilities as well as to maximize the travel budget.

2.3 Overview of Results

During Phase I, the research team at Northwestern visited 34 aircraft maintenance facilities. The facilities were classified according to the **FAR** operating certificate under which the majority of the maintenance work was performed. The segments were defined as listed in **Table 1-a**.

Table 1-a. Industry Segment Abbreviations in Phase I	
Segment	Abbreviation
FAR Part 121/Line	121 L
FAR Part 121/Base	121 B
FAR Part 135	135
FAR Part 145	145
FAR Part 91	91

Figure 1 details the number of the facilities per segment. A total of 1,262 surveys were collected. **Figure 2** depicts the surveys classified according to industry segment. While the largest number of facilities that participated in the survey were from the general aviation segments, the largest number of surveys were from the airline segments.

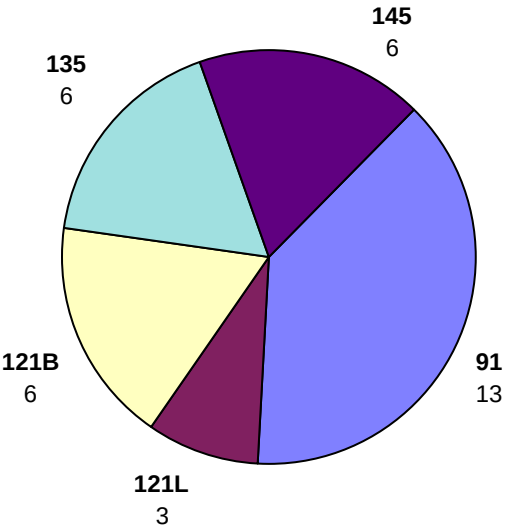

Figure 1. Number of Facilities for Each Industry Segment in Phase I

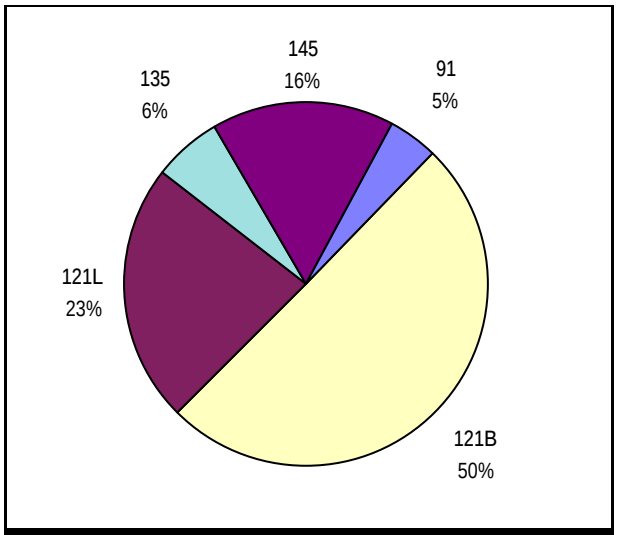

Figure 2. Percentage of Surveys Collected from Each Industry Segment in Phase I

A plot of the number of respondents versus the number of years that they have been involved in aircraft maintenance is shown in **Figure 3**. The distribution of respondents is bimodal, with one large group of respondents peaking at about eight years experience (1985) and another smaller group at 27 years (1966) experience. This distribution closely correlates with two major periods of expansion in the airline industry.

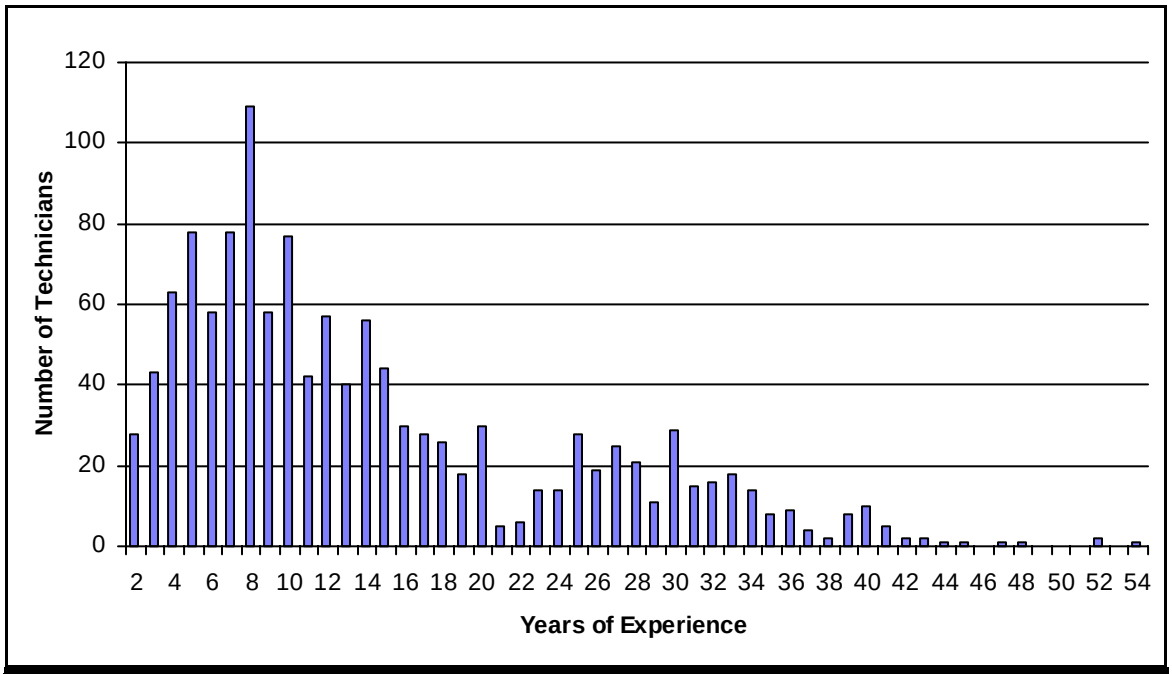

Figure 3. Frequency Count of Years Experience for All Respondents in Phase I

Specific results for the Documentation, Task Inventory, and Specialized Services sections are listed in the Job Task Analysis of the Aviation Maintenance Technician--Phase I Report. The Documentation section reported information as to which documents **AMT**s referenced on-the-job and under which regulation the aircraft was returned to service. The Task Inventory section listed the average for the six performance measures along with the percent response for each of the tasks. Both of these two sections worked well in the survey and few problems were encountered. The Specialized Services results were problematic since it proved difficult to ask generic questions that would apply to all segments of the industry for this section.

2.4 Visit Committee

The purpose of the visit committee is to review the survey procedures and results from an industry perspective. The membership includes representatives from all segments of the industry and are listed in **Table 1-b**.

Table 1-b. Visit Committee Members

Mr. William Culhane	American Airlines
Mr. David Henley	FFV Aerotech
Mr. Michael Mertens	Duncan Aviation
Mr. William Magyar	Flight Safety International
Mr. Robert Mukenschnabl	Mukenschnabl Aviation
Mr. Alan Radecki	Ameriflight
Mr. James Rezich	Nams International
Mr. Terry Washow	Flagship Airlines
Mr. Richard Yeatter	USAir

The first visit committee meeting was held in May 1994. The objectives of this meeting were to review the Phase I results and to provide suggestions for improving the presentation, content, and clarity of the associated report. The committee also offered recommendations on proceeding into Phase II of the study. The issues covered included constructing the task list and revising the survey methods accordingly.

3. TASK LIST AND SURVEY PROCEDURES

3.1 Introduction

Since only 23 tasks were studied in Phase I, the survey procedures needed to be modified to reflect the expanded task list in Phase II. This section outlines the development of the task list and the survey procedures. The first step was to determine the list of tasks that were to be surveyed. The format and content of the survey questionnaire was then designed to accommodate the expanded task list. An interview format was developed to compliment the information collected in the survey document. A protocol was formed in order to consistently administer the survey and interview at each facility. Finally, potential sites were identified to be contacted to participate in the study.

3.2 Task List Development

An important issue in developing a task list for Phase II was the number of tasks the list included. An exhaustive list of tasks that an **AMT** performs would prove too long to incorporate into the survey. On the other hand, a compact list could sacrifice the level of detail necessary to distinguish between different levels of task performance. The list of tasks needed to be aggregated to a level that was neither ambiguous, nor lengthy.

The Allen Study outlined 589 tasks. However, many of the tasks were knowledge-based, such as "read and write in the English Language." The performance based tasks number closer to 400.

Figure 4 depicts the general matrix that was used to construct the task list. The top axis lists major systems and components of an aircraft. The side axis lists the generic levels of performance that occur on each system or component. These levels are grouped into three categories: service, inspect, test or check; repair, replace, modify, overhaul or calibrate; and troubleshoot. The applicable actions were then noted for each system.

Systems and Components Performance Levels	Major System	Major Components
Check, Test, Service, Inspect		
Repair, Replace, Modify, Calibrate		
Troubleshoot		

Figure 4: Task List Generation Matrix

From this point, if the task in the matrix was too general, it was desegregated either into its components or further sub-actions. For example, "rig flight controls" could be further broken down into "rig flaps," "rig rudder," etc. Or, if the task in the matrix was too specific, some tasks could be condensed into one. For example, "check tires" and "inflate tires" could be combined into one single task, "check and service tires."

The result of this process is a list of 303 tasks. The tasks were then grouped by the applicable **ATA**

chapter code of the particular component or system. This list was further grouped into 20 subject areas. The subject areas are listed below in **Table 2**. The list was reviewed by the visit committee and several **AMT**s at facilities that participated in Phase I.

Table 2. Subject Areas

Airframe or Structure

- Cleaning and Corrosion Control
- Landing Gear
- Structures
- Fuel System
- Minor Repairs and Welding

Powerplant

- Engines
- Fuel Control and Lubrication
- Propellers

Avionics

- Navigation
- Communication

Avionics

- Autoflight
- Ignition and Starting
- Flight Controls
- Electrical Power and Aircraft Lighting
- Cabin Atmosphere Control

General

- Hydraulics and Pneumatics
- Inspections
- Fire Protection
- Anti-Icing and De-Icing
- Indicating, Recording and Warning Systems

3.3 Survey Development

The written questionnaire used in Phase I was modified to accommodate the expanded task list. The overall goal for developing the questionnaire was to take no longer than one hour to complete.

The Phase I questionnaire contained a detailed background information section. While most of this information was useful, only the information that was critical to performing the analysis of the data was retained. This included: level of current position within the company, maintenance certificates or licenses held, areas of previous work experience, and total number of years experience while working in aircraft maintenance.

The Phase I questionnaire also included a documentation section which identified common references that **AMT**s made on the job. Again, for the sake of brevity, this section was deleted. The Phase I data proved an adequate sample for this information.

Three performance measures were retained from the Phase I survey. These measures include frequency, criticality, and difficulty to learn. Each of these measures has a discrete scale from one to five associated with it, where one represents the minimum in that measure, and five the maximum. A fourth measure, percent response, is the number of respondents who report that they performed the task in the last calendar year.

Difficulty to learn was used as a measure versus difficulty to perform. This is an important distinction because a task that is difficult to learn may initially be easy to perform once proficiency is achieved. Information about difficulties in learning tasks is valuable in helping schools and industry training providers determine where extra time is needed on a particular subject area or where alternative teaching methods should be employed.

The criticality variable determines how critical a task is to the safety of flight operations. Identifying critical tasks is imperative because these are areas where technicians need to have sufficient expertise even if the task is performed infrequently.

The Phase I questionnaire included a "Specialized Services" section that was attached to the task section. The objective of this section was to find out which tasks were contracted out to an outside vendor or third party and for what reason. This section was difficult to structure into a format suitable for a questionnaire and did not yield satisfactory results in Phase I. This section was deleted in Phase II.

3.4 Interview Development

Interviews were conducted to supplement information collected in the survey questionnaire. While the surveys gather information in a very structured format, the interviews allow for more open-ended response to the questions. The interview in Phase II was broadened to focus on issues related to the maintenance organization, the work environment, and training.

The interview schedule comprises four sections. The background information section asks questions

about the experience of the respondent, including current position, total years experience working in aircraft maintenance, educational experience, and previous work experience.

The remaining three sections involve questions specific to the facility at which the respondent works. The first section focuses on questions related to task assignment and supervision. The second section deals with training within the organization; when it is delivered and for what reasons. The third section pertains to specialization of technicians and shops. This section tries to determine the reasons a specialized shop exists within an organization and if unique skills are required and/or obtained.

3.5 Site Classification and Selection

The classification scheme devised in Phase I categorized each facility according to the **FAR** certificate under which the facility operated. This method presented problems at many facilities that operated under multiple certificates. In some cases, it was difficult to separate under which certificate the majority of maintenance work was performed. For example, many smaller general aviation facilities operated under FAR Part 135 for their on-demand air charter work, FAR Part 145 repair station for maintenance on other aircraft, and FAR Part 121 for contracted line services for an airline. Also, regional airlines could be classified as Part 135 or Part 121.

The objective of the classification scheme is to group facilities that are similar in both organization and work environment for the **AMT**. For this reason, the classification scheme was revised and is depicted in **Figure 5**. Major airline facilities were divided into line (ML) and base (MB). The categories of regional airline (RG) and corporate (CP) facilities were added. General aviation facilities were classified as large if the facility employed more than 20 technicians and had dedicated specialized shops, such as an avionics or sheetmetal shop. Likewise, general aviation facilities were classified as small if they employed fewer than twenty technicians with no specialized shops.

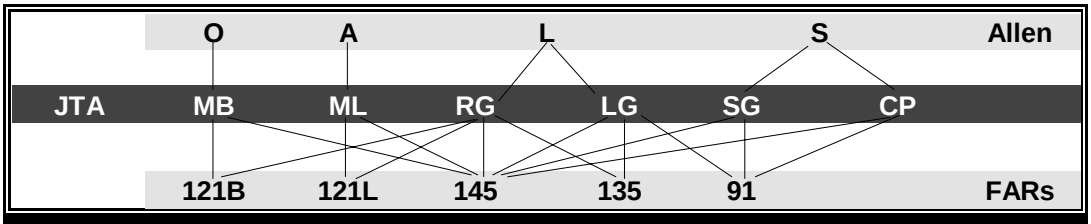

Figure 5: Comparison of Industry Classification Schemes

The Phase II classification scheme also allows an easier comparison to the Allen Study. Overhaul (O) and line (L) facilities of major airlines correspond directly. The large general aviation (L) segment in the Allen Study corresponds to the regional airline and large general aviation segments in the **JTA** study. The small general aviation (S) segment encompasses both the small general aviation and corporate facilities in the JTA study.

Sites to participate in the study were identified using this scheme. The facilities visited during Phase I that were still in operation formed a basis of sites to visit in Phase II. Again, the **ATA** and the **NATA** identified potential facilities for participation in the study. To broaden the sample of facilities, the National Business Aircraft Association and the Regional Airline Association also enlisted the support of their respective memberships. The local **FAA FSDO** also often proved an excellent source of potential sites.

A similar strategy to the one used in Phase I was employed in choosing cities to concentrate in. A large facility would be chosen, such as an airline's base or line facility or a major repair station. Then, as many smaller facilities in the vicinity would be involved in the study as possible.

3.6 Visit Protocol

The visit protocol developed in Phase I was modified for use in Phase II. Again, both an initial visit and a survey visit were made to each facility. The logistical issues of participating in the study were decided upon during the initial visit and the survey was administered during the subsequent survey visit.

The purpose of the initial visit was to provide an opportunity for the **JTA** research team to familiarize themselves with the maintenance facility and to brief its management about the project. In addition, management at the facility determined the best manner in which to administer the survey. People who attended the initial visit varied at each site, but always included those who had a supervisory role within the organization and who would assist in coordinating the survey administration.

A site questionnaire was completed at the time of the initial visit which provided the following information: number of **AMT**s employed, number of non **A&P** certificated maintenance personnel employed, number of shifts worked and shift duration, major types of maintenance work performed at the facility, and **FAA** certificate/regulations under which the facility operates. This information assisted in developing a plan to administer the survey.

The number of technicians surveyed depended on the size of the facility. At smaller facilities, as many technicians as possible completed a survey. At larger facilities, a representative sample of technicians was sought, with a maximum of 250. Specifically the group would vary by years of experience, supervisory role, shift worked, and area of work (e.g., turbines, pneumatics, sheet metal, etc.).

The surveys were tailored to each site based upon the type of work performed. If a facility did not perform *any* work on turbine engines or turbine-powered aircraft, the surveys would not include tasks relating to turbine engines. Because the list of tasks was too large to be included in a single survey that could be completed in less than an hour, different versions of the survey were created depending on the organization of the facility. If technicians worked mainly on a specific component or system of an aircraft, they would receive a survey that only included tasks from one of three categories: airframe, powerplant, or avionics. Thus, if technicians primarily performed engine overhaul work, then they received a powerplant survey. In instances where a technician worked on the entire aircraft, the technician received a general survey, which would contain only one-half the set of tasks. In this manner, the surveys were divided so that each technician was not required to evaluate the entire list of tasks. The time to complete the survey remains one-hour, yet each task could be evaluated by at least one technician at the facility.

The details of how the survey would be implemented at a site were also determined. Three options formed the basis for determining the best method of administering the survey. The primary objective was to collect the data for the study while being as unobtrusive as possible to on-going work. These options

included:

Option I: Small groups gathered in a conference room. A member of the **JTA** staff delivered a brief presentation which provided an overview of the project and instructions on how to complete the survey. The employees completed the survey in the conference room. The JTA staff was present to monitor those taking the survey and answer any questions.

Option II: A member of the **JTA** staff delivered a presentation to all those employees taking the survey. The JTA staff distributed the surveys to the employees who would complete the survey as directed by on-site management. All surveys were collected by the site coordinator and returned to the JTA staff. This option allowed ample time for the respondent to complete the survey.

Option III: A member of the **JTA** staff set up an information table in a prominent location at the site. Employees spoke with the staff member and were given the survey and instructions. The employee completed the survey and returned it to the JTA staff member or the site coordinator. This option allowed the employee to complete the survey at a time most convenient to their individual schedule.

Arrangements for the interviews were also made at the initial visit. Fewer employees participated in the interviews than in the survey because of the logistics and the time involved. At smaller facilities, a supervisor or director of maintenance was interviewed, and time permitting, one technician. At larger facilities, the goal was to interview approximately one technician for every twenty surveys. Again, a diversity of employee backgrounds participating in the interview was sought. A mix of supervisors and technicians were interviewed. If applicable, personnel in the training department were also interviewed.

Finally, one employee at the site was designated as the site coordinator for the survey. This person served as the **JTA** research team's point of contact to assist in scheduling times for the administration of the survey, interviews and observations. The site coordinator was someone in a supervisory role who was familiar with the organization of the facility.

3.7 Collection of Data

A total of 2,434 surveys from 84 facilities were collected from September 1994 to December 1995. The complete list of facilities is listed in **Appendix A.**

After the surveys were collected, each survey was reviewed using three separate validity checks. First, each survey was examined to verify that the Background Information section was properly completed. In particular, the certificates and licenses held had to be appropriately completed, or the survey was discarded. Second, each survey was examined to verify that the performance measures for each task were entered appropriately and that the respondent followed the survey instructions correctly. This check included review of all survey task responses, and was accomplished simultaneously with input of the survey information into the database. The most common error observed in the task response section of the surveys was completion of only one of the three performance measures boxes for each task. Finally, each survey was reviewed for overall consistency and appropriateness. This check involved reviewing the survey for errors and blatant disregard for survey accuracy. If the survey failed any one of

these three checks, it was discarded.

The survey was entered into a database that was programmed in Access 2.0. This database allows for easy entry of the survey results, a flexible analysis, and customized reports.

As an additional method of ensuring database accuracy, an audit procedure was implemented from the very beginning of the data entry process. Since each survey required detailed data entry, the possibility for error was great, and an audit procedure was developed. Implementation of this audit procedure ensured that the database contained accurate information and virtually eliminated the possibility of systematic data entry errors.

4. ANALYSIS

4.1 Introduction

The survey questionnaire results form the basis of the task analysis, which is detailed in this section of the report. First, information related to the facilities and technicians that participated in the survey is detailed. The results from the Background Information section are reported. Then, the results of the task section of the survey in tabular form, grouped by subject area. A general discussion of the task analysis follows.

4.2 Profile of Sample

The surveys were collected from a total of 84 maintenance facilities. Each facility has been categorized into one of six groups, according to its primary business activities. The six industry segments are listed in **Table 3**.

Table 3: Industry Segment Abreviations

Abbreviation	Facility Type
ML	Major Line
MB	Major Base
RG	Regional
LG	Large General Aviation
SG	Small General Aviation
CP	Corporate Flight Department

Figure 6 shows a breakdown of the facilities from which surveys were obtained by facility type. The largest number of facilities visited were those in the small general aviation and corporate aviation segments. While these categories do not represent the largest concentrations of **AMT**s, it was necessary to visit proportionately more of these facility types in order to obtain an appropriately representative sample from all industry segments.

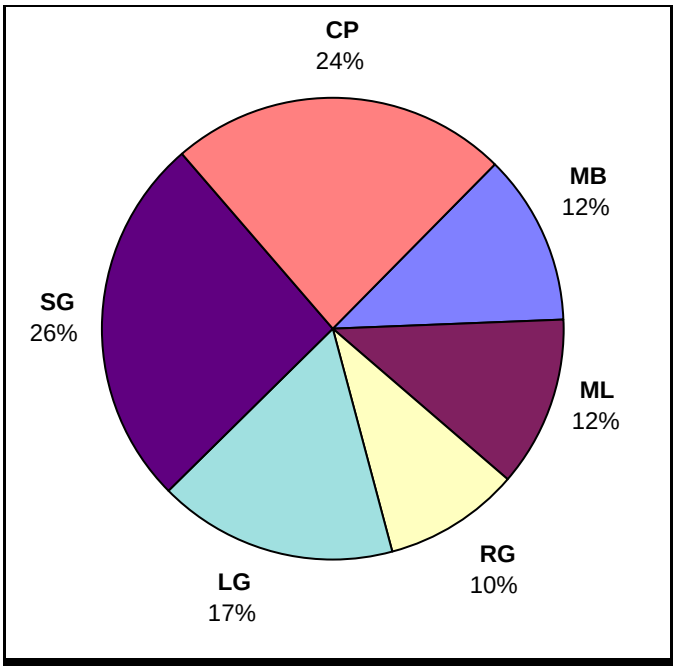

Figure 6. Percentage of Facilities Surveyed by Industry Segment

Figure 6 shows the percentages of surveys by industry segment. This breakdown details the actual representation in the database of the different facility types. The two largest segments of the industry are base (MB) and line (ML) facilities of the major airlines. Approximate matching of this percentage breakdown to actual employment levels in the industry was a key objective of the surveying process.

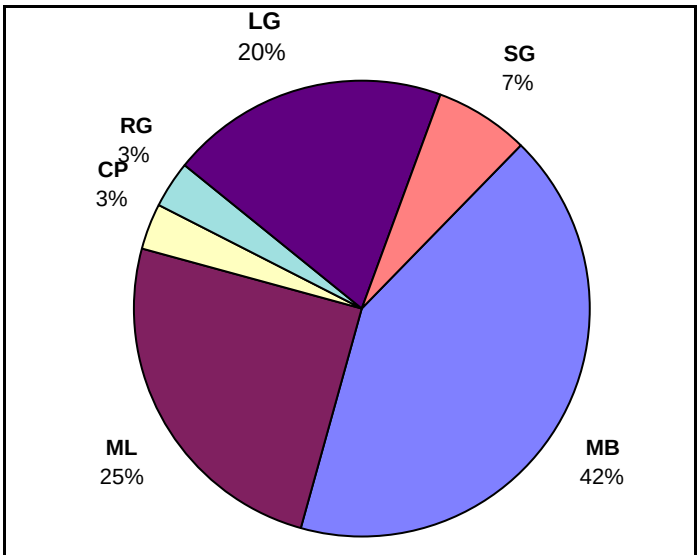

Figure 7. Percentage of Surveys from Each Industry Segment

Figure 8 and **Figure 9** show estimates of industry employment levels obtained from the **FAA**

Blue Ribbon Panel Study "Pilots and Aviation Maintenance Technicians for the Twenty-First Century, An Assessment of Availability and Quality." (FAA, 1993) This panel study used historical numbers of maintenance technicians and aircraft fleet size (1988 - 1992) and projected future numbers of maintenance technicians as a function of expectations for future aircraft fleet size by industry segment.

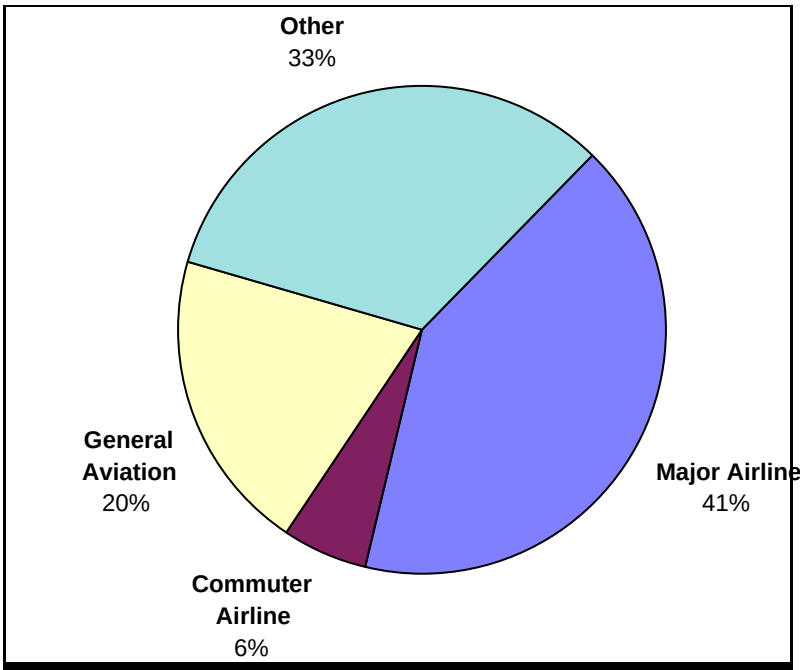

Figure 8. Blue Ribbon Estimates of Technicians In Each Industry Segment

The segments of the industry in the classification scheme used in the panel study are very broad (**Figure 8**), and different than those utilized in this report. However, an approximate comparison can be made by removing the "Other" category from the panel study data and recalculating the relative proportions. The panel study "Other" category includes maintenance technicians employed by the Federal government (military), aircraft manufacturers, and third-party component overhaul facilities, none of which were surveyed for this project. The resulting proportions are shown in **Figure 9**. A comparison of Figure 9 with **Figure 7** reveals a close match between the survey percentages and the actual employment levels estimated by the **FAA** Blue Ribbon Panel Study.

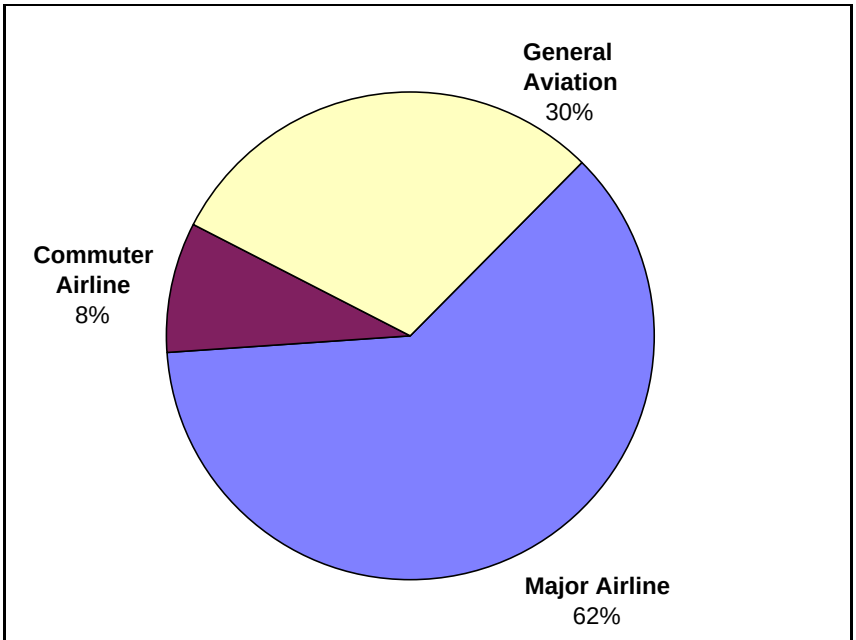

Figure 9. Blue Ribbon Estimates Adjusted for Comparison with JTA

4.3 Background Information

The background information included in the survey consists of information about job title, certificates and licenses held, sources of experience, and years of experience.

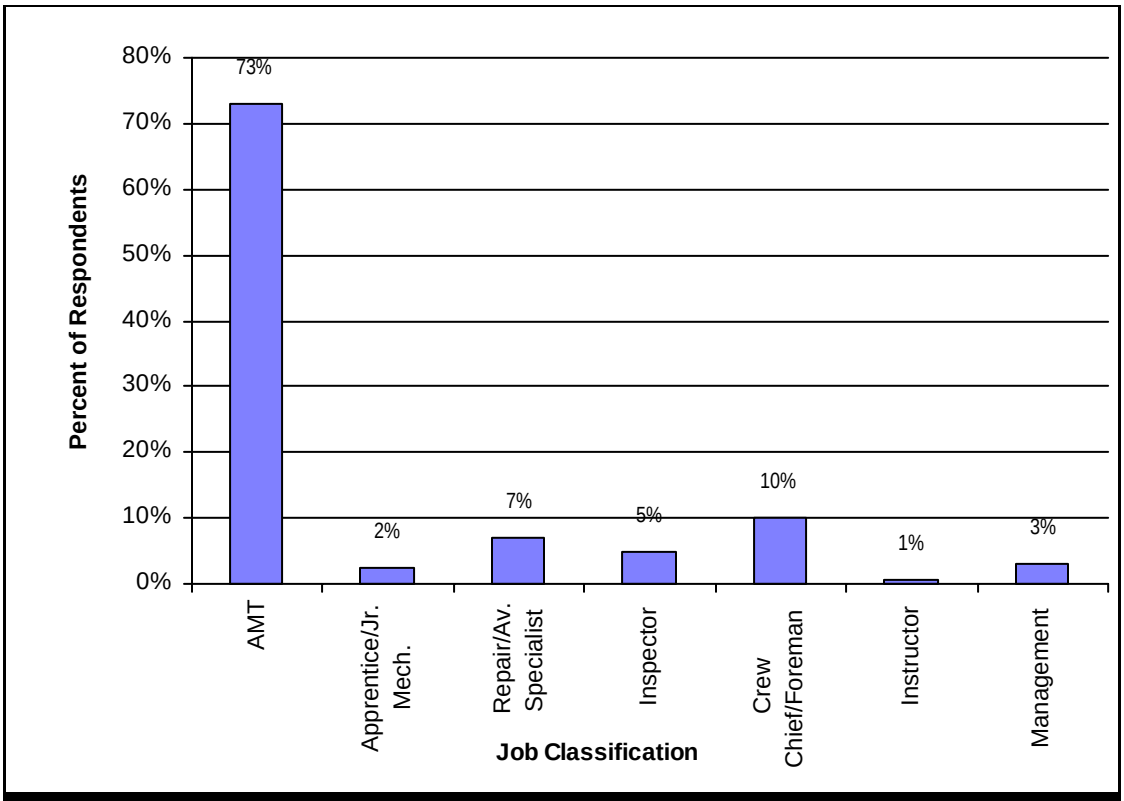

Figure 10. Job Classification of RespondentsùAll Industry Segments Combined

Figure 10 shows the percentages of survey respondents in each of seven job classifications. (The percentages total to slight more than 100% due to rounding). Most respondents indicated that their job title is "Aviation Maintenance Technician." **Figure 11** shows the same data broken out by industry segment. This graph shows that the relative proportion of **AMT**s is significantly higher at major airline facilities than at general aviation and corporate facilities. It also shows higher concentrations of inspectors at small general aviation and corporate facilities.

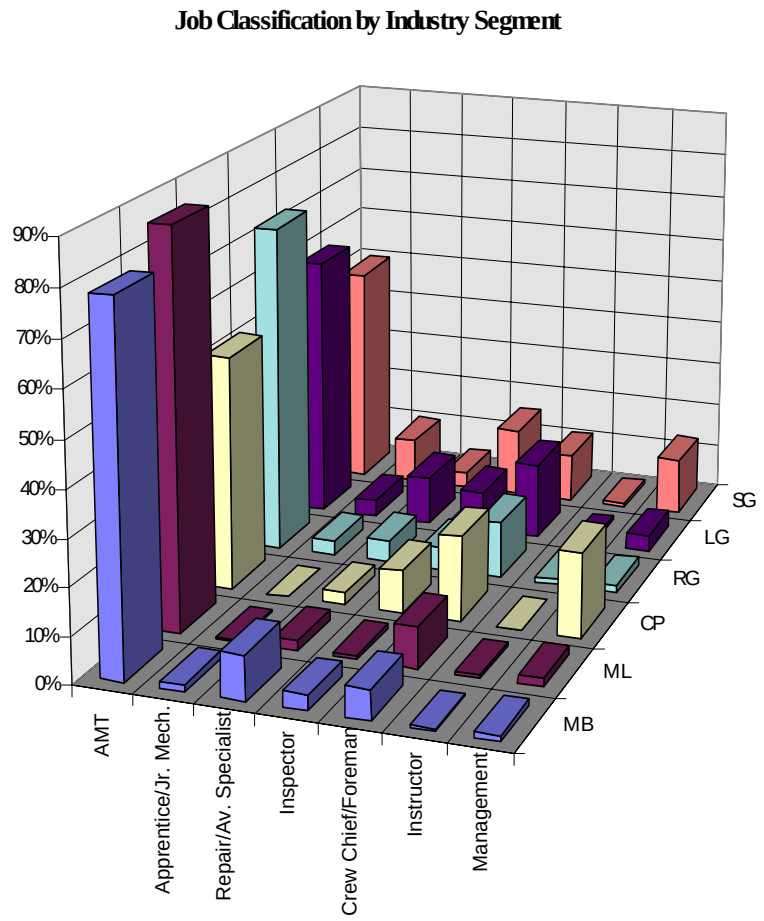

Figure 11. Job Classification of Respondents by Industry Segment

Figure 11 shows the average years of experience for all survey respondents broken out by industry segment. The overall average across all industry segments is 16.1 years. This graph shows that regional airline technicians have on average the fewest years of experience at 10.5 years, while technicians at corporate aviation facilities have on average the highest level of experience at 19.9 years. The differences in average experience levels between industry segments are consistent with industry trends.

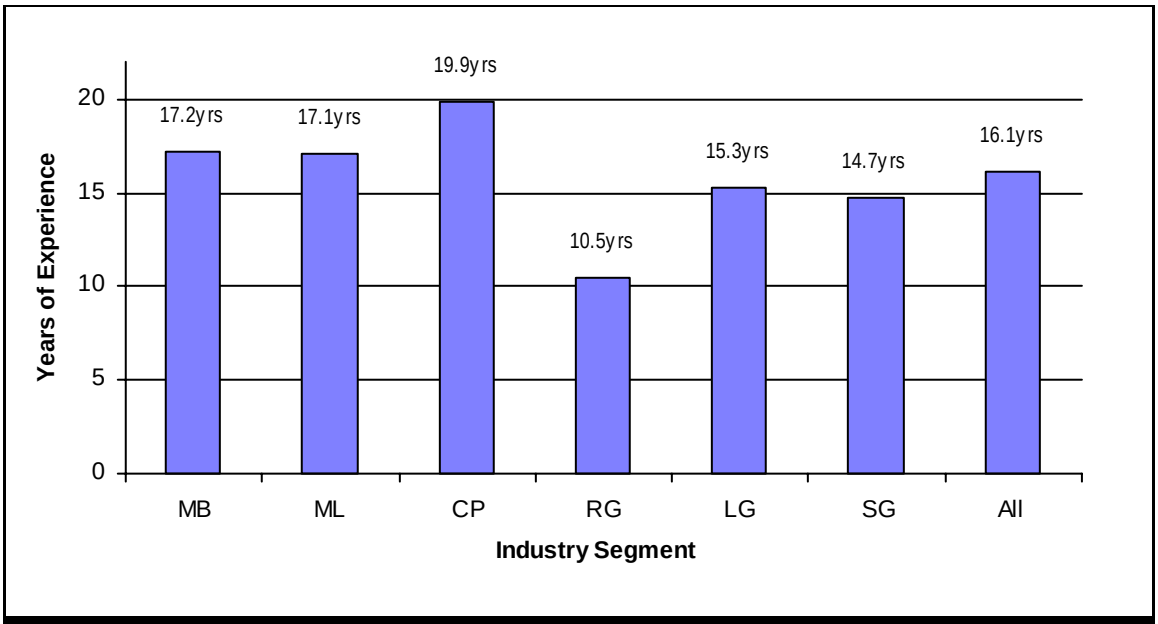

Figure 12. Average Years Experience By Industry Segment

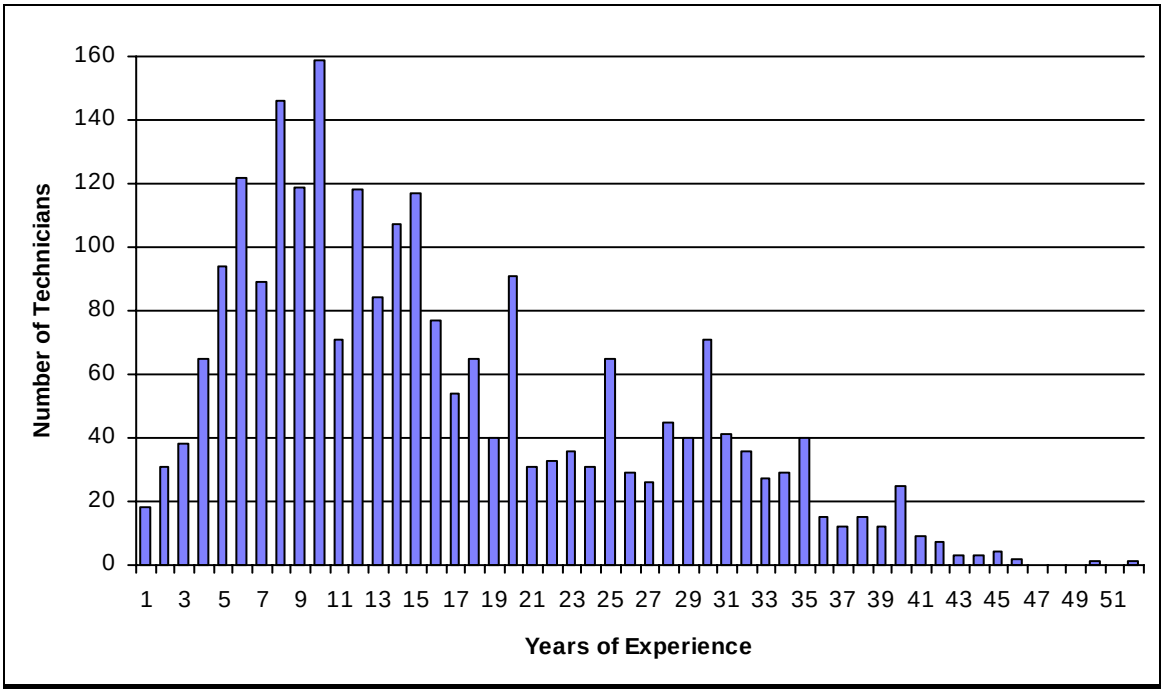

Figure 13. Frequency Count of Years Experience for All Respondents

Figure 13 depicts the frequency distribution of the years of experience data. The median experience for all survey respondent is 14 years. The frequency distribution exhibits a bimodal shape, where the medians of the two modes are approximately 10 years and 29 years of experience. The concentrations of technicians with these levels of experience correspond to the two historical periods of major airline expansion in 1985 and 1966. Also evident from the frequency distribution is that there are relatively few technicians with 0-4 years of experience, indicating that there has been relatively little new hiring over the last few years.

Figure 14 shows the sources of experience indicated by survey respondents. The most common source of experience for all technicians is the military, where 36 percent of respondents indicated they had acquired experience. Each survey respondent indicated an average more than two sources of experience. **Figure 15** shows the same data broken out by industry segment. This graph shows that when broken into industry segments, the most prevalent source of experience for all respondents is within the same industry segment.

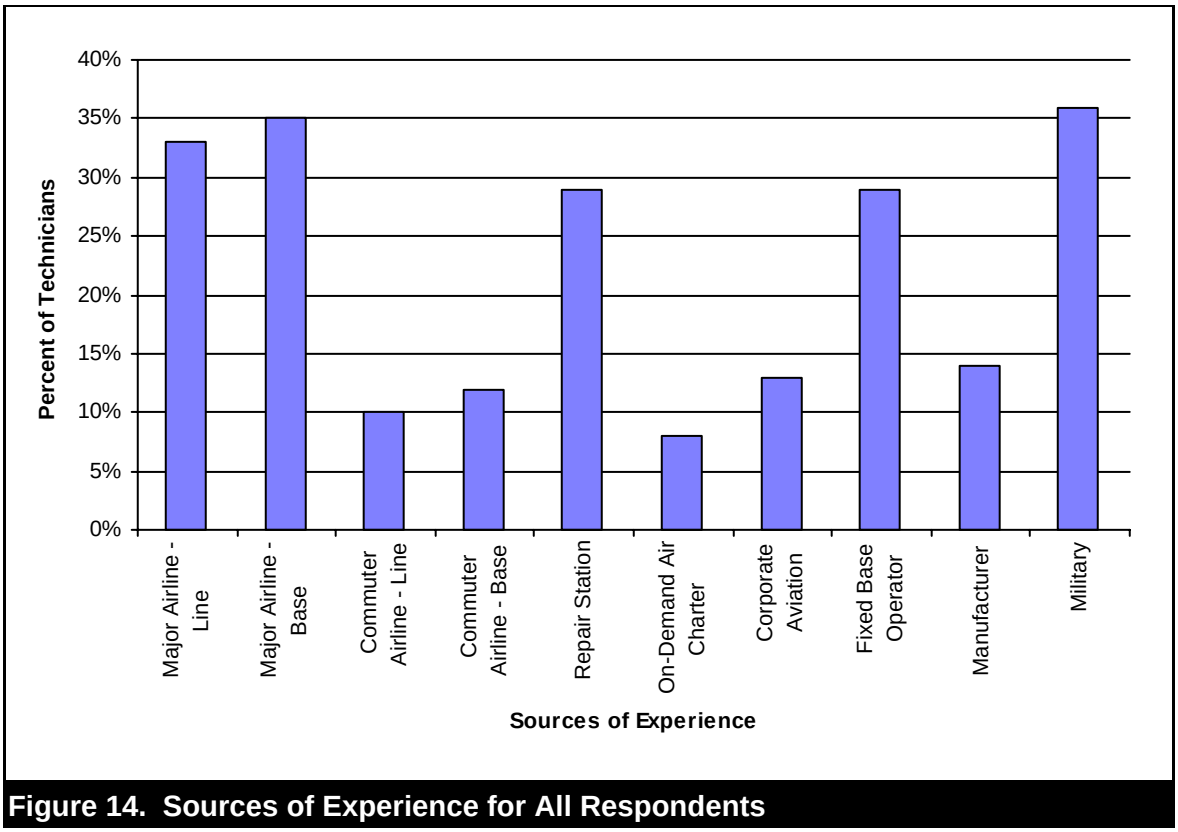

Figure 14. Sources of Experience for All Respondents

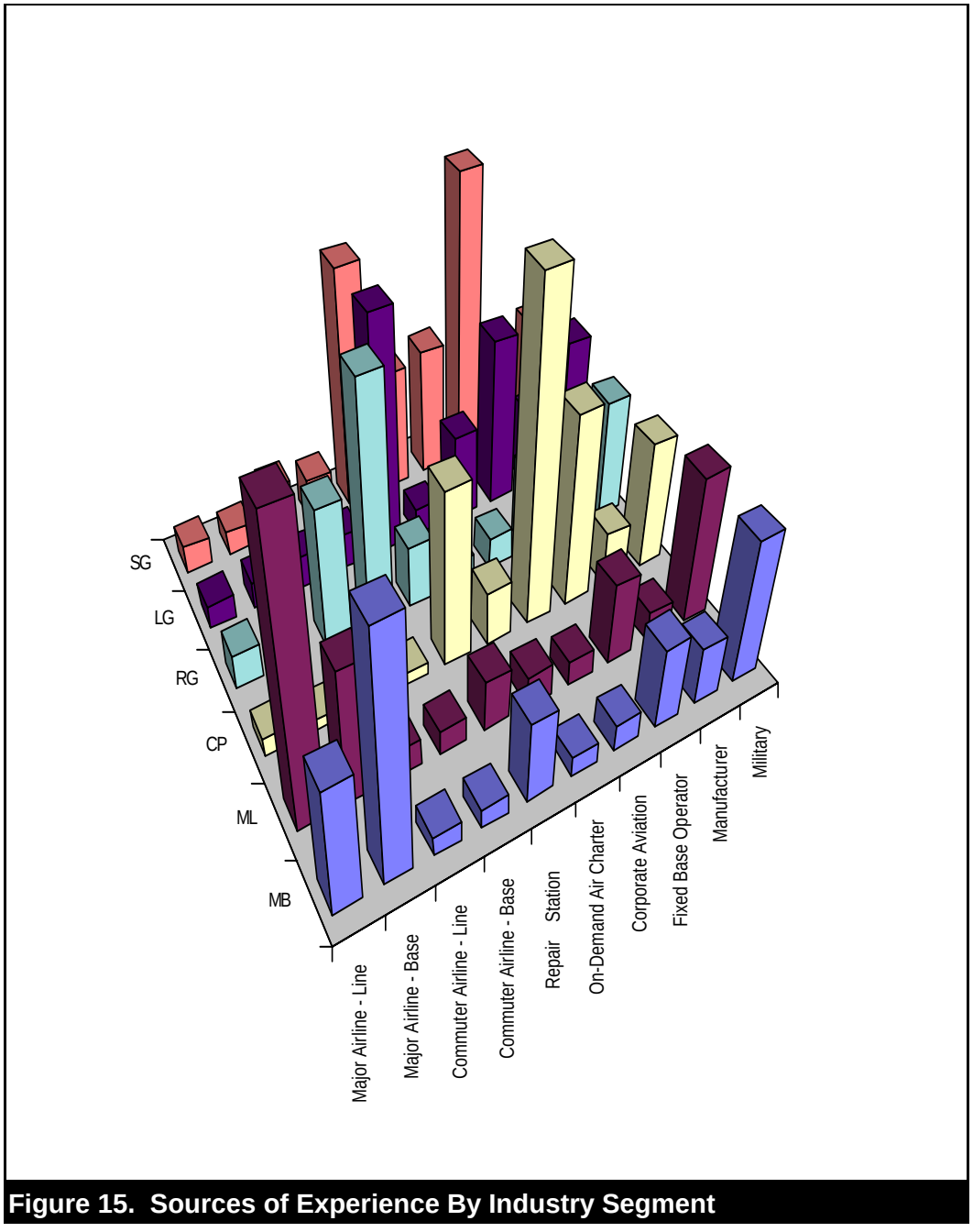

Figure 15. Sources of Experience By Industry Segment

4.4 Task Analysis Survey Results

The 303 tasks, four evaluation dimensions, and six facility types create more than 7,000 data points that need to be interpreted. In order to manage this much data, the 303 tasks have been divided into 20 subject areas. Each subject area includes four tables: a subject area grid, the frequency and percent response results, criticality results, and difficulty to learn results.

The grids describe the level of task detail in each subject area. The vertical side of the grid three general categories of tasks: inspection, repair and replace, and troubleshooting. The horizontal side of the grid is comprised of systems or components that are applicable to the subject area. The corresponding tasks are listed in the appropriate box. **Table 3** outlines a sample subject area grid, "Ignition and Starting."

Table 4. Sample Subject Area Grid

Ignition and Starting: Major Components and/or Systems

Task Function	ignition	starting
Check, test, service, inspect	A, B	H
Repair, remove, replace, modify, and calibrate	C, D, E, F	I
Troubleshoot	G	

The three remaining tables report the survey results for each of the tasks by industry segment. Percent response and frequency data are combined into a single table for each task in the subject area. Criticality and difficulty data results are each listed in an individual table. An example table for frequency and percent response is listed in **Table 5**.

Table 5. Example of Data Tables for Frequency and Percent Response

Frequency: Ignition and Starting

	Task Description	**ML**		**MB**		**RG**		**LG**		**SG**		**CP**	
		md	**%**	**md**	**%**	**md**	**%**	**md**	**%**	**md**	**%**	**md**	**%**
A	Inspect battery ignition systems	3	45	3	6	3	30	3	26	3	45	3	49
B	Inspect high-tension systems	3	65	3	15	3	54	3	50	3	78	2	65
C	Remove and install excitor box	2	66	3	20	2	54	2	41	1	46	1	73
D	Remove or install ignitor plug	3	72	3	22	3	63	3	45	3	38	2	82
E	Repair or replace high tension ignition system components	2	67	3	20	2	58	3	54	2	77	1	70
F	Repair or replace ignition components	3	78	3	20	2	63	3	54	3	79	1	78
G	Troubleshoot ignition problems	2	74	3	13	2	52	2	53	2	84	1	79
H	Inspect booster starting systems	3	38	3	3	3	13	2	11	2	34	3	11
I	Remove and install starter	2	68	3	20	3	66	3	46	2	76	1	90

The task "Inspect high tension systems" at major airline, line facilities is reported as "3." The key to

the frequency, criticality and difficulty to learn measures are listed in **Table 6**. Technicians perform this task at a major airline, line facility on a monthly basis. The percent response for this task at a major airline, line facility is 65%.

Table 6. Definition of the Rating Scales

Frequency: Frequency provides an indication of how often a task is performed.

	Value	Definition
Min.	1	Perform a task *less than quarterly*.
	2	Perform a task *quarterly*.
	3	Perform a task *monthly*.
	4	Perform a task *weekly*.
Max.	5	Perform a task *daily*.

Criticality to Flight Operations: 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 or crew and the operation of the aircraft.

	Value	Definition
Min.	1	*Negligible*. There is little effect on the operation of the aircraft.
	2	*Low*. The system or function affected 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.
	3	*Average*. Failure to perform this task correctly may result in a flight incident.
	4	*High*. There are maintenance manual warnings and/or cautions associated with this task. There is possible injury to people or damage to equipment.
Max.	5	*Extremely High.* There is great potential for a condition threatening the safety of the aircraft or human life.

Difficulty to Learn: Difficulty to learn 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.

	Value	Definition
Min.	1	*Not Difficult.* The task can be completed following straight-forward directions. No special skill or knowledge is required.
	2	*Somewhat Difficult.* The task can be mastered with a minimal amount of practice. On-the-job training is useful.
	3	*Moderately Difficult.* The task requires the ability to transfer existing knowledge to new situations. Basic, formal training is useful.

	4	*Increasingly Difficult.* The completion of this task requires the subjective judgment of the technician. In-depth training is useful.
Max.	5	*Very Difficult.* Proficiency at this task is shown only after considerable experience and practice. Specialized training is required. The task is complex and involves multiple steps.

Survey Results by Subject Area

Airframe or Structure

Cabin Atmosphere Control

Task Function	air conditioning	pressurization	oxygen
Check, test, service, inspect	A, B, C	F	I, J, K
Repair, remove, replace, modify and calibrate	D	G	L
Troubleshoot	E	H	

FrequencyùCabin Atmosphere Control

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Functional check air conditioning and pressurization systems	4	84	3	30	3	62	3	52	2	65	2	88
B	Operational check air conditioning system	4	85	3	28	3	51	3	51	2	68	2	87
C	Service and inspect air/vapor cycle cooling system	3	69	3	21	2	45	3	47	2	55	2	79
D	Repair air/vapor cycle conditioning system	3	69	3	19	3	42	2	45	1	34	1	74
E	Troubleshoot and repair air/vapor cycle conditioning system	3	72	3	20	3	51	2	42	1	56	1	80
F	Operational check pressurization system	3	81	3	36	3	61	3	53	2	63	1	90
G	Repair or replace pressurization system components	3	82	3	35	3	63	3	54	1	67	1	88
H	Troubleshoot cabin pressurization system and/or ECS system	3	83	3	22	3	57	3	50	2	67	1	87
I	Hydrostatically test high pressure oxygen cylinders	1	17	1	4	2	6	2	13	1	8	1	15
J	Inspect passenger and crew oxygen system components	5	75	3	24	3	62	3	49	3	67	2	90
K	Service passenger oxygen system	4	74	3	19	4	60	4	53	3	60	4	88
L	Replace regulator, masks or oxygen bottles	3	78	3	25	2	47	2	47	2	53	1	85

CriticalityùCabin Atmosphere Control

Task Description		ML	MB	RG	LG	SG	CP
A	Functional check air conditioning and pressurization systems	3	3	2	3	2	3
B	Operational check air conditioning system	3	3	2	2	2	2
C	Service and inspect air/vapor cycle cooling system	3	3	2	2	2	2
D	Repair air/vapor cycle conditioning system	3	3	2	2	2	3
E	Troubleshoot and repair air/vapor cycle conditioning system	3	3	2	3	2	2
F	Operational check pressurization system	3	3	3	3	3	3
G	Repair or replace pressurization system components	3	3	3	3	3	3
H	Troubleshoot cabin pressurization system and/or ECS system	3	3	3	3	3	3
I	Hydrostatically test high pressure oxygen cylinders	4	4	4	3	4	4
J	Inspect passenger and crew oxygen system components	3	3	3	3	3	3
K	Service passenger oxygen system	3	4	3	3	2	3
L	Replace regulator, masks or oxygen bottles	3	4	3	3	3	3

DifficultyùCabin Atmosphere Control

Task Description		ML	MB	RG	LG	SG	CP
A	Functional check air conditioning and pressurization systems	3	3	3	3	3	3
B	Operational check air conditioning system	3	3	2	2	2	2
C	Service and inspect air/vapor cycle cooling system	3	2	2	2	2	3
D	Repair air/vapor cycle conditioning system	3	3	3	3	3	3
E	Troubleshoot and repair air/vapor cycle conditioning system	3	3	3	3	3	3
F	Operational check pressurization system	3	3	2	3	3	3
G	Repair or replace pressurization system components	3	3	2	3	3	3
H	Troubleshoot cabin pressurization system and/or ECS system	4	3	3	3	4	3
I	Hydrostatically test high pressure oxygen cylinders	3	3	3	3	3	3
J	Inspect passenger and crew oxygen system components	2	3	2	2	2	3
K	Service passenger oxygen system	2	2	1	2	2	2
L	Replace regulator, masks or oxygen bottles	2	2	2	2	2	2

Cleaning and Corrosion Control

Task Function	cleaning	corrosion control	painting/ finishing
Check, test, service, inspect	**A, B, C**	**D, E, F**	
Repair, remove, replace, modify and calibrate		**G**	**H, I, J**
Troubleshoot			

FrequencyùCleaning and Corrosion Control

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Clean electronic equipment cooling filters	3	70	3	14	3	36	2	31	1	60	2	64
B	Clean or remove paint from coatings or from parts or skin using stripping agents or chemical bath	1	21	2	14	2	30	2	30	2	53	1	46
C	Clean or remove surface deposits or materials	3	39	4	38	3	49	3	45	3	62	2	74
D	Identify delamination or disbonding of carbon composites	3	51	3	38	3	36	3	42	1	24	1	56
E	Identify types of corrosion such as fretting, interangular, granular, etc.	3	37	4	46	3	52	3	53	3	65	1	64
F	Inspect for general corrosion, corrosion under lap joints, etc.	3	61	4	38	3	62	4	56	3	81	3	90
G	Remove corrosion and repair surrounding area	2	30	4	53	2	46	3	53	2	73	1	68
H	Paint control surfaces	1	23	2	9	1	27	1	16	1	40	1	26
I	Paint parts or surfaces	2	36	4	36	3	43	3	40	3	65	1	61
J	Prepare surface and prime	1	33	4	26	3	37	3	33	2	67	1	56

CriticalityùCleaning and Corrosion Control

	Task Description	ML	MB	RG	LG	SG	CP
A	Clean electronic equipment cooling filters	2	2	2	2	2	2
B	Clean or remove paint from coatings or from parts or skin using stripping agents or chemical bath	3	2	2	2	2	3
C	Clean or remove surface deposits or materials	2	2	2	2	2	2
D	Identify delamination or disbonding of carbon composites	3	3	3	3	3	3
E	Identify types of corrosion such as fretting, interangular, granular, etc.	3	3	3	3	3	3
F	Inspect for general corrosion, corrosion under lap joints, etc.	3	3	3	3	3	3
G	Remove corrosion and repair surrounding area	3	3	3	3	3	3
H	Paint control surfaces	2	2	2	3	2	2
I	Paint parts or surfaces	2	2	2	2	2	2
J	Prepare surface and prime	2	2	2	2	2	2

DifficultyùCleaning and Corrosion Control

	Task Description	ML	MB	RG	LG	SG	CP
A	Clean electronic equipment cooling filters	1	1	1	1	1	1
B	Clean or remove paint from coatings or from parts or skin using stripping agents or chemical bath	3	2	2	2	1	2
C	Clean or remove surface deposits or materials	2	2	1	2	1	1
D	Identify delamination or disbonding of carbon composites	3	3	3	3	2	3
E	Identify types of corrosion such as fretting, interangular, granular, etc.	3	3	3	3	3	4
F	Inspect for general corrosion, corrosion under lap joints, etc.	3	2	2	2	2	3
G	Remove corrosion and repair surrounding area	3	3	3	2	2	3
H	Paint control surfaces	2	2	2	3	3	3
I	Paint parts or surfaces	2	2	2	2	2	2
J	Prepare surface and prime	2	2	2	2	2	2

Fuel System

Task Function	storage	distribution	related systems	accessories
Check, test, service, inspect	**A, B, C, D**	**H, I**	**L**	
Repair, remove, replace, modify and calibrate	**E, F**	**J**	**M**	**N, O, P, Q**
Troubleshoot	**G**	**K**		

FrequencyùFuel System

	Task Description	ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Analyze fuel tank for microbiological contamination	1	26	2	10	2	36	3	37	2	26	2	49
B	Check fuel tanks for water	5	80	3	26	5	62	3	45	4	79	4	87
C	Identify and control bacteria in fuel tanks	1	31	1	8	2	28	2	40	1	29	2	61
D	Service each fuel tank sump to remove water and inspect tank valve	5	63	3	17	4	46	3	38	4	63	4	69
E	Repair bladder type fuel tank leaks	1	29	1	8	1	14	1	26	2	36	1	21
F	Repair integral fuel tank leaks	1	43	3	22	2	49	3	45	1	55	1	56
G	Troubleshoot fuel tank leaks	2	57	3	20	2	50	3	46	2	70	1	77
H	Functional test fuel distribution system	3	73	3	27	3	54	3	49	3	73	2	79
I	Inspect fuel distribution components (pumps, valves, controls)	3	63	3	22	3	59	3	48	3	74	2	79
J	Replace fuel distribution system components	2	64	2	24	2	52	2	48	2	65	1	80
K	Troubleshoot fuel distribution system	2	67	2	17	2	52	2	48	2	65	1	83
L	Test fuel transfer system	3	65	3	18	3	44	3	47	2	65	2	80
M	Defuel aircraft	2	57	3	20	3	57	3	48	2	73	1	85
N	Remove and install fuel filter	3	67	3	21	3	63	4	50	3	79	2	90
O	Remove and install fuel pump	2	66	3	20	2	56	2	42	2	64	1	85
P	Repair or replace fuel system plumbing	1	54	2	25	2	54	2	50	2	73	1	78
Q	Rig shut off valves	1	37	3	7	2	34	2	23	1	46	1	49

CriticalityùFuel Systems

	Task Description	ML	MB	RG	LG	SG	CP
A	Analyze fuel tank for microbiological contamination	3	3	3	3	3	3
B	Check fuel tanks for water	3	3	3	3	4	3
C	Identify and control bacteria in fuel tanks	3	3	3	3	3	3
D	Service each fuel tank sump to remove water and inspect tank valve	3	3	3	3	3	3
E	Repair bladder type fuel tank leaks	4	3	3	3	3	3
F	Repair integral fuel tank leaks	4	3	3	3	3	3
G	Troubleshoot fuel tank leaks	3	3	3	3	3	3
H	Functional test fuel distribution system	3	3	3	3	3	3
I	Inspect fuel distribution components (pumps, valves, controls)	3	3	3	3	3	3
J	Replace fuel distribution system components	3	3	3	3	3	3
K	Troubleshoot fuel distribution system	3	3	3	3	3	3
L	Test fuel transfer system	3	3	3	3	3	3
M	Defuel aircraft	2	2	2	2	2	2
N	Remove and install fuel filter	3	3	3	3	3	3
O	Remove and install fuel pump	4	4	4	3	3	3
P	Repair or replace fuel system plumbing	4	3	3	3	3	3
Q	Rig shut-off valves	4	4	4	4	3	3

DifficultyùFuel Systems

Task Description		ML	MB	RG	LG	SG	CP
A	Analyze fuel tank for microbiological contamination	2	2	2	2	2	1
B	Check fuel tanks for water	1	1	1	1	1	1
C	Identify and control bacteria in fuel tanks	2	2	2	2	2	2
D	Service each fuel tank sump to remove water and inspect tank valve	2	2	2	2	2	1
E	Repair bladder type fuel tank leaks	4	3	4	3	3	4
F	Repair integral fuel tank leaks	4	3	3	3	3	3
G	Troubleshoot fuel tank leaks	3	3	3	2	2	2
H	Functional test fuel distribution system	3	3	2	2	2	2
I	Inspect fuel distribution components (pumps, valves, controls)	3	3	2	2	2	2
J	Replace fuel distribution system components	3	3	3	2	2	3
K	Troubleshoot fuel distribution system	3	3	3	3	3	3
L	Test fuel transfer system	3	2	2	2	2	2
M	Defuel aircraft	2	2	1	2	1	2
N	Remove and install fuel filter	2	2	2	2	2	2
O	Remove and install fuel pump	4	3	3	3	3	3
P	Repair or replace fuel system plumbing	3	3	2	2	3	3
Q	Rig shut-off valves	3	3	3	3	3	3

Landing Gear

Task Function	tires	brakes	main/nose gear	retractable gear	anti-skid systems
Check, test, service, inspect	A, B	E	G, H, I, J, K	P, Q	U
Repair, remove, replace, modify and calibrate	C, D	C	L, M, N, O	R	V
Troubleshoot		F		S, T	W

FrequencyùLanding Gear

	Task Description	ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Check pressure of tires	5	81	4	28	5	66	4	55	4	82	5	88
B	Service tires	5	79	3	25	5	62	3	53	4	78	4	82
C	Remove and replace tires or brakes	4	83	3	28	4	66	3	53	4	75	3	85
D	Replace tire or wheel assemblies	4	79	3	25	4	61	3	54	3	80	3	88
E	Functional test brake system	4	74	3	23	4	64	4	54	4	73	2	85
F	Troubleshoot brake system	3	72	2	17	2	50	3	46	3	70	1	77
G	Visually inspect landing gear, wheel wells and doors	5	75	3	21	5	62	4	54	4	77	4	85
H	Service shock struts	3	78	3	23	3	59	3	53	3	79	2	83
I	Detailed inspection of landing gear assemblies and subassemblies	5	57	3	18	4	57	3	49	4	75	2	77
J	Lubricate landing gear components (bearings, hinges, pivots, up/down locks, etc.)	3	70	3	25	4	66	4	52	3	80	3	85
K	Service nose gear assemblies	3	70	3	22	3	53	3	50	3	73	1	82
L	Rig nose gear steering	1	54	2	19	2	49	2	45	2	57	1	77
M	Overhaul, repair or replace landing gear	1	42	2	20	2	49	2	50	2	72	1	63
N	Repair landing gear wiring and switches	2	47	2	9	2	55	2	52	2	83	1	82
O	Modify or alter landing gear assembly	1	25	2	9	1	24	1	29	1	27	1	26
P	Functional test emergency gear extension system	1	50	3	23	3	58	3	54	3	79	2	83
Q	Functional test retractable gear	1	65	3	24	3	65	4	54	3	73	2	82
R	Repair or replace landing gear control and actuating system components	2	68	2	20	2	52	3	47	2	70	1	78
S	Troubleshoot retractable gear system	2	66	2	16	3	52	3	46	2	76	1	78
T	Troubleshoot landing gear control and actuating systems	2	68	3	23	2	60	3	56	2	75	1	85
U	Functional test anti-skid system	3	78	3	21	3	54	3	65	1	51	2	87
V	Repair or replace anti-skid system components	3	75	2	18	2	54	2	59	2	30	1	84
W	Troubleshoot anti-skid system	2	73	2	14	2	55	2	56	1	31	1	74

CriticalityùLanding Gear

	Task Description	ML	MB	RG	LG	SG	CP
A	Check pressure of tires	3	3	3	3	2	3
B	Service tires	3	3	3	3	3	3
C	Remove and replace tires or brakes	4	3	4	3	3	3
D	Replace tire or wheel assemblies	4	3	3	3	3	3
E	Functional test brake system	4	4	4	3	3	3
F	Troubleshoot brake system	3	3	3	3	3	3
G	Visually inspect landing gear, wheel wells and doors	3	3	3	3	3	3
H	Service shock struts	3	3	3	3	3	3
I	Detailed inspection of landing gear assemblies and subassemblies	4	4	4	4	4	3
J	Lubricate landing gear components (bearings, hinges, pivots, up/down locks, etc.)	3	3	3	3	3	3
K	Service nose gear assemblies	3	3	3	3	3	3
L	Rig nose gear steering	4	4	4	3	3	3
M	Overhaul, repair or replace landing gear	4	4	4	4	4	4
N	Repair landing gear wiring and switches	3	3	4	3	3	3
O	Modify or alter landing gear assembly	4	4	4	4	4	4
P	Functional test emergency gear extension system	4	4	4	4	4	4
Q	Functional test retractable gear	4	4	4	4	4	3
R	Repair or replace landing gear control and actuating system components	4	4	4	3	4	3
S	Troubleshoot retractable gear system	4	4	4	3	3	3
T	Troubleshoot landing gear control and actuating systems	4	4	4	4	4	4
U	Functional test anti-skid system	3	3	3	3	3	3
V	Repair or replace anti-skid system components	3	3	3	3	3	3
W	Troubleshoot anti-skid system	3	3	3	3	3	3

DifficultyùLanding Gear

	Task Description	ML	MB	RG	LG	SG	CP
A	Check pressure of tires	1	1	1	1	1	1
B	Service tires	2	2	1	1	1	1
C	Remove and replace tires or brakes	3	2	2	2	2	2
D	Replace tire or wheel assemblies	2	2	2	2	2	2
E	Functional test brake system	3	3	2	2	2	2
F	Troubleshoot brake system	3	3	3	3	3	3
G	Visually inspect landing gear, wheel wells and doors	2	2	2	2	2	2
H	Service shock struts	3	2	2	2	2	3
I	Detailed inspection of landing gear assemblies and subassemblies	3	3	3	3	3	3
J	Lubricate landing gear components (bearings, hinges, pivots, up/down locks, etc.)	2	1	1	1	1	2
K	Service nose gear assemblies	3	2	2	2	2	3
L	Rig nose gear steering	4	3	3	3	3	3
M	Overhaul, repair or replace landing gear	4	4	4	3	3	4
N	Repair landing gear wiring and switches	3	3	3	3	3	3
O	Modify or alter landing gear assembly	4	4	3	4	4	4
P	Functional test emergency gear extension system	3	3	2	3	3	3
Q	Functional test retractable gear	3	3	3	3	3	3
R	Repair or replace landing gear control and actuating system components	3	3	3	3	3	3
S	Troubleshoot retractable gear system	4	3	3	3	3	3
T	Troubleshoot landing gear control and actuating systems	4	4	3	3	3	3
U	Functional test anti-skid system	3	3	3	2	3	3
V	Repair or replace anti-skid system components	3	3	3	3	3	3
W	Troubleshoot anti-skid system	3	3	3	3	3	3

Structures: Doors, Windows, and Wings

Task Function	doors	windows	wings	equipment/furnishings
Check, test, service, inspect	**A, B, C**	**C**	**G**	**H**
Repair, remove, replace, modify and calibrate	**D, E**	**F**		
Troubleshoot				

FrequencyùStructures: Doors, Windows, and Wings

Task Description	ML		MB		RG		LG		SG		CP	
	md	%	md	%	md	%	md	%	md	%	md	%
A Inspect access door latches and hinge attachments	4	73	3	28	4	59	3	49	3	78	3	85
B Inspect cargo and passenger doors	5	78	4	28	4	67	3	48	4	73	2	85
C Service doors, windows, and movable components with appropriate lubricant	3	64	3	28	4	54	3	48	3	79	3	85
D Replace doors	1	45	2	23	2	45	1	37	1	52	1	37
E Rig doors and emergency evacuation systems	2	58	3	28	2	48	3	42	2	56	1	62
F Repair, replace or polish windows or windscreens	2	70	3	28	2	53	2	49	2	69	1	85
G Visually inspect wing structure	5	76	4	23	4	62	3	48	4	78	3	91
H Operational test escape slides and liferafts	2	48	2	13	1	16	1	15	1	9	1	23

CriticalityùStructures: Doors, Windows, and Wings

Task Description	ML	MB	RG	LG	SG	CP
A Inspect access door latches and hinge attachments	3	3	3	3	3	3
B Inspect cargo and passenger doors	4	3	3	3	3	3
C Service doors, windows, and movable components with appropriate lubricant	3	2	2	2	2	2
D Replace doors	4	4	4	3	3	3
E Rig doors and emergency evacuation systems	4	4	4	3	3	3
F Repair, replace or polish windows or windscreens	4	3	3	3	3	3
G Visually inspect wing structure	3	4	3	3	3	3
H Operational test escape slides and liferafts	4	4	4	3	5	3

DifficultyùStructures: Doors, Windows, and Wings						
Task Description	**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A Inspect access door latches and hinge attachments	2	3	2	2	2	2
B Inspect cargo and passenger doors	3	3	2	2	2	2
C Service doors, windows, and movable components with appropriate lubricant	2	2	1	1	1	2
D Replace doors	3	3	3	3	3	3
E Rig doors and emergency evacuation systems	4	4	3	3	3	3
F Repair, replace or polish windows or windscreens	3	2	3	3	3	3
G Visually inspect wing structure	2	3	2	2	2	2
H Operational test escape slides and liferafts	3	2	2	2	2	2

Structural Repairs and Welding

Task Function	sheet metal	specific materials	welding	soldering
Check, test, service, inspect				
Repair, remove, replace, modify and calibrate	**A, B, C, D, E, F, G, H, I, J**	**K, L, M, N, O**	**P, Q, R**	**S, T**
Troubleshoot				

FrequencyùStructural Repairs and Welding

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Drill or ream structure or component	2	35	4	41	3	48	3	49	3	71	1	68
B	Fabricate replacement brackets, panels, or small parts	2	37	4	42	2	41	3	50	3	72	1	64
C	Prepare and install patch (composite, fabric, metal)	2	40	4	35	3	31	2	44	2	70	1	54
D	Repair minor sheet metal defects or damage to control surfaces	2	35	3	30	3	36	2	46	2	70	1	68
E	Repair skin	1	33	3	28	3	30	2	44	2	63	1	51
F	Repair small cracks by stop drilling	2	55	3	41	3	51	3	56	3	78	2	78
G	Repair structure or component by riveting	2	38	4	41	3	42	3	52	3	69	1	72
H	Replace loose or missing fasteners	3	66	4	45	4	56	3	56	3	81	2	80
I	Repair or replace sheetmetal frame sections and fittings, fairings, or stringers	2	25	3	33	2	24	2	43	2	49	1	49
J	Fabricate flexible or rigid lines and attach connectors	1	43	2	13	2	40	2	36	2	66	1	49
K	Repair carbon composites	1	21	3	11	2	12	2	28	1	10	1	15
L	Replace or rejuvenate fabric covered and doped surfaces	-	-	-	-	1	8	1	14	1	27	-	-
M	Repair, replace, or construct wood structures	-	-	-	-	-	-	-	-	1	5	-	-
N	Repair or replace honeycomb structure	1	27	3	22	3	27	2	35	1	22	1	36
O	Repair or replace plastics and fiberglass	1	31	3	30	3	37	2	42	2	65	1	63
P	Perform repairs by brazing	1	15	1	3	1	13	1	12	1	23	1	22
Q	Perform repairs using gaseous welding	1	14	1	3	1	11	1	13	2	31	1	17
R	Perform repairs using arc or spot welding	1	14	1	3	1	6	1	13	2	20	1	15
S	Repair or install a device by soldering	2	41	3	13	3	56	4	55	3	78	2	85
T	Repair or install a part by soldering	1	24	1	3	3	32	3	32	3	62	1	66

CriticalityùStructural Repairs and Welding

	Task Description	ML	MB	RG	LG	SG	CP
A	Drill or ream structure or component	3	3	3	3	3	3
B	Fabricate replacement brackets, panels, or small parts	3	3	3	3	3	3
C	Prepare and install patch (composite, fabric, metal)	3	3	3	3	3	3
D	Repair minor sheet metal defects or damage to control surfaces	4	3	4	3	3	3
E	Repair skin	4	3	3	3	3	3
F	Repair small cracks by stop drilling	3	3	2	2	2	3
G	Repair structure or component by riveting	3	3	3	3	3	3
H	Replace loose or missing fasteners	3	3	3	3	2	3
I	Repair or replace sheetmetal frame sections and fittings, fairings, or stringers	4	4	4	3	3	3
J	Fabricate flexible or rigid lines and attach connectors	4	3	3	3	3	3
K	Repair carbon composites	3	3	3	3	3	3
L	Replace or rejuvenate fabric covered and doped surfaces	-	-	3	3	3	-
M	Repair, replace, or construct wood structures	-	-	-	-	3	-
N	Repair or replace honeycomb structure	4	3	3	3	3	3
O	Repair or replace plastics and fiberglass	3	3	3	3	2	3
P	Perform repairs by brazing	4	3	2	3	3	3
Q	Perform repairs using gaseous welding	3	3	3	3	3	3
R	Perform repairs using arc or spot welding	3	3	3	3	3	3
S	Repair or install a device by soldering	3	3	3	3	3	3
T	Repair or install a part by soldering	3	3	3	3	3	3

DifficultyùStructural Repairs and Welding							
Task Description		**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A	Drill or ream structure or component	3	3	3	3	3	3
B	Fabricate replacement brackets, panels, or small parts	3	3	3	3	3	3
C	Prepare and install patch (composite, fabric, metal)	3	3	3	3	3	3
D	Repair minor sheet metal defects or damage to control surfaces	4	3	3	3	3	3
E	Repair skin	4	3	3	3	3	3
F	Repair small cracks by stop drilling	2	2	2	2	1	2
G	Repair structure or component by riveting	3	3	3	3	3	3
H	Replace loose or missing fasteners	2	2	2	2	1	2
I	Repair or replace sheetmetal frame sections and fittings, fairings, or stringers	4	3	3	3	3	4
J	Fabricate flexible or rigid lines and attach connectors	3	3	3	3	2	3
K	Repair carbon composites	4	4	4	4	5	4
L	Replace or rejuvenate fabric covered and doped surfaces	-	-	3	3	3	-
M	Repair, replace, or construct wood structures	-	-	-	-	4	-
N	Repair or replace honeycomb structure	4	3	3	3	4	4
O	Repair or replace plastics and fiberglass	3	3	3	3	2	3
P	Perform repairs by brazing	4	3	3	3	3	3
Q	Perform repairs using gaseous welding	4	3	3	3	3	3
R	Perform repairs using arc or spot welding	4	3	4	3	3	4
S	Repair or install a device by soldering	3	2	2	2	2	3
T	Repair or install a part by soldering	2	2	3	2	2	3

Avionics

Autoflight

Task Function	autopilot	autothrottle	autoland
Check, test, service, inspect		C	E
Repair, remove, replace, modify and calibrate	A		F
Troubleshoot	B	D	

FrequencyùAutoflight

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Rig or check autopilot flight control actuators and servos.	2	52	2	15	2	38	3	53	2	54	1	65
B	Troubleshoot autopilot	4	49	3	14	3	26	3	40	2	46	1	76
C	Operational test autothrottle	2	48	3	6	2	17	3	17	1	3	1	30
D	Troubleshoot autothrottle	2	52	2	17	2	25	1	22	1	20	1	35
E	Operational check flight control and landing systems	4	61	4	32	3	56	4	53	4	62	2	98
F	Replace automatic flight control, autopilot or all-weather landing systems components	3	48	3	19	2	45	3	41	2	53	1	67

CriticalityùAutoflight

Task Description		ML	MB	RG	LG	SG	CP
A	Rig or check autopilot flight control actuators and servos.	4	4	4	4	3	4
B	Troubleshoot autopilot	4	4	3	4	3	3
C	Operational test autothrottle	3	3	4	3	2	3
D	Troubleshoot autothrottle	3	4	4	4	3	3
E	Operational check flight control and landing systems	4	4	4	4	4	3
F	Replace automatic flight control, autopilot or all-weather landing systems components	4	4	4	4	3	3

DifficultyùAutoflight							
Task Description		**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A	Rig or check autopilot flight control actuators and servos.	4	4	3	3	3	3
B	Troubleshoot autopilot	4	5	4	4	4	4
C	Operational test autothrottle	3	3	3	3	1	3
D	Troubleshoot autothrottle	4	4	4	4	4	3
E	Operational check flight control and landing systems	4	4	3	3	3	3
F	Replace automatic flight control, autopilot or all-weather landing systems components	4	4	4	3	3	3

Communications

Task Function	voice/data communication	ACARS	accessories
Check, test, service, inspect	**A, B**	**E**	**G**
Repair, remove, replace, modify and calibrate	**C**		**H, I**
Troubleshoot	**D**	**F**	

FrequencyùCommunications

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Operational test of cockpit voice recorder	4	65	3	17	4	58	3	43	1	27	1	64
B	Test communication systems	2	71	4	60	4	32	4	49	4	49	4	42
C	Repair or replace voice or data communication system components	3	51	3	31	2	39	3	39	2	32	1	61
D	Troubleshoot voice or data communication systems	3	51	3	30	3	28	3	40	1	35	1	59
E	Operational test ACARS (Airborne Communication and Reporting System) link function	3	48	3	11	1	14	3	19	2	9	1	22
F	Troubleshoot ACARS (Airborne Communication and Reporting System)	3	43	2	11	2	21	3	20	1	13	1	14
G	Inspect and check static discharge wicks	5	81	3	34	4	75	3	56	3	85	3	95
H	Replace or repair antennas	2	51	2	27	2	43	2	48	1	68	1	64
I	Repair or replace static discharger wicks and mounts	3	76	2	27	3	64	3	63	3	88	2	89

CriticalityùCommunications

Task Description		ML	MB	RG	LG	SG	CP
A	Operational test of cockpit voice recorder	2	2	2	2	2	2
B	Test communication systems	3	3	3	3	3	3
C	Repair or replace voice or data communication system components	3	3	3	3	2	3
D	Troubleshoot voice or data communication systems	3	3	3	3	3	3
E	Operational test ACARS (Airborne Communication and Reporting System) link function	2	2	3	3	3	3
F	Troubleshoot ACARS (Airborne Communication and Reporting System)	2	2	3	3	3	3
G	Inspect and check static discharge wicks	2	2	2	2	2	2
H	Replace or repair antennas	3	3	3	3	2	3
I	Repair or replace static discharger wicks and mounts	2	2	2	2	2	2

DifficultyùCommunications							
Task Description		**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A	Operational test of cockpit voice recorder	2	2	1	2	2	2
B	Test communication systems	3	3	3	2	2	2
C	Repair or replace voice or data communication system components	3	3	3	3	3	3
D	Troubleshoot voice or data communication systems	3	3	3	3	3	3
E	Operational test ACARS (Airborne Communication and Reporting System) link function	2	3	3	3	2	3
F	Troubleshoot ACARS (Airborne Communication and Reporting System)	3	3	3	3	4	4
G	Inspect and check static discharge wicks	2	1	1	1	1	2
H	Replace or repair antennas	2	2	2	2	2	2
I	Repair or replace static discharger wicks and mounts	2	2	1	2	1	2

Navigation

Task Function	flight data	flight instruments and accessories	flight management
Check, test, service, inspect	**A, B**	**G, H, I, J**	**S, T, U, V**
Repair, remove, replace, modify and calibrate	**C, D, E**	**K, L, M, N, O**	**W, X**
Troubleshoot	**F**	**P, Q, R**	**Y, Z**

FrequencyùNavigation

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Certify pitot and static system	2	34	3	17	3	29	3	34	3	29	1	38
B	Leak check pitot static system	2	48	3	30	3	41	3	38	3	45	1	63
C	Remove and install air data computer	3	40	3	12	2	19	3	40	1	21	1	67
D	Repair or replace central air data collection and distribution components	2	37	3	15	3	17	3	31	1	13	1	44
E	Replace pitot/static components	2	48	3	18	2	47	2	47	2	68	1	67
F	Troubleshoot central air data collection and distribution system	3	39	3	14	2	25	2	31	1	11	1	46
G	Test electronic instrumentation systems	3	38	3	12	4	20	3	36	3	26	2	56
H	Functional test **EFIS** (Electronic Flight Instrumentation System)	4	51	3	13	4	28	3	40	2	13	2	63
I	Perform **EFIS** (Electronic Flight Instrumentation System) test	4	52	3	11	3	17	3	38	2	19	3	68
J	Service fluid in compass system	1	16	1	5	1	12	1	18	1	41	1	20
K	Remove and replace flight instruments (airspeed indicator, altimeter, VSI, etc.)	3	49	3	30	3	46	3	52	2	66	1	76
L	Repair or replace electronic system components	4	62	4	15	3	58	4	52	3	80	2	87
M	Swing (calibrate) compass system	1	32	1	14	1	35	2	42	2	68	1	41
N	Repair or replace vacuum driven flight instrument components	1	28	2	9	2	29	2	37	3	70	1	49
O	Repair or replace vacuum pumps, hoses, and connectors	2	22	1	6	2	18	2	31	3	74	1	21
P	Troubleshoot vacuum system	1	26	2	8	2	32	2	38	2	72	1	36
Q	Troubleshoot vacuum driven flight instruments	1	25	3	7	2	21	2	29	3	61	1	46
R	Troubleshoot flight instruments	3	43	3	12	3	25	3	41	3	58	2	76
S	Test navigation systems	4	44	3	13	4	25	4	39	3	32	2	59
T	Check navigation system annunciators for operation	4	52	4	12	4	31	4	43	3	47	3	76
U	Functional check flight management system	3	37	3	11	3	15	3	35	1	15	2	44
V	Certify transponder and altitude reporting equipment	3	27	3	9	4	21	4	35	3	30	1	26
W	Repair or replace components associated with DME, transponder, radar or other pulse systems	3	39	3	12	3	28	3	40	2	41	1	69

FrequencyùNavigation

	Task Description	ML		MB		RG		LG		SG		CP	
X	Repair or replace sensitive position sensing devices (examples: gimble gyroscopes, laser ring gyros)	2	35	3	13	2	23	2	27	2	33	1	66
Y	Troubleshoot radar system	3	43	3	12	3	28	3	34	2	20	1	63
Z	Troubleshoot dependent reference systems such as **VOR** and **ILS**	3	35	3	12	3	21	3	34	3	35	1	49

CriticalityùNavigation

	Task Description	ML	MB	RG	LG	SG	CP
A	Certify pitot and static system	4	4	4	4	3	3
B	Leak check pitot static system	4	4	4	3	3	4
C	Remove and install air data computer	4	3	4	3	3	3
D	Repair or replace central air data collection and distribution components	4	4	3	3	3	4
E	Replace pitot/static components	4	4	4	3	3	4
F	Troubleshoot central air data collection and distribution system	4	4	3	4	3	3
G	Test electronic instrumentation systems	3	3	3	3	3	3
H	Functional test **EFIS** (Electronic Flight Instrumentation System)	4	4	3	3	3	3
I	Perform **EFIS** (Electronic Flight Instrumentation System) test	3	4	3	3	3	3
J	Service fluid in compass system	3	3	3	3	2	2
K	Remove and replace flight instruments (airspeed indicator, altimeter, VSI, etc.)	4	4	4	3	3	3
L	Repair or replace electronic system components	3	3	4	3	3	3
M	Swing (calibrate) compass system	3	3	3	3	2	3
N	Repair or replace vacuum driven flight instrument components	3	3	3	3	3	3
O	Repair or replace vacuum pumps, hoses, and connectors	3	3	3	3	3	3
P	Troubleshoot vacuum system	3	3	3	3	3	3
Q	Troubleshoot vacuum driven flight instruments	4	3	3	3	3	3
R	Troubleshoot flight instruments	4	4	3	3	3	3
S	Test navigation systems	4	3	3	3	3	4
T	Check navigation system annunciators for operation	3	3	3	3	3	3
U	Functional check flight management system	3	3	4	3	3	3
V	Certify transponder and altitude reporting equipment	4	4	4	4	3	3
W	Repair or replace components associated with DME, transponder, radar or other pulse systems	3	3	3	3	3	3
X	Repair or replace sensitive position sensing devices (examples: gimble gyroscopes, laser ring gyros)	4	4	4	3	3	3
Y	Troubleshoot radar system	3	3	3	3	2	3
Z	Troubleshoot dependent reference systems such as **VOR** and **ILS**	3	4	4	3	3	3

DifficultyùNavigation

	Task Description	ML	MB	RG	LG	SG	CP
A	Certify pitot and static system	3	3	3	3	3	3
B	Leak check pitot static system	3	3	3	3	3	4
C	Remove and install air data computer	3	2	3	2	2	3
D	Repair or replace central air data collection and distribution components	3	3	3	3	3	3
E	Replace pitot/static components	3	3	3	3	2	3
F	Troubleshoot central air data collection and distribution system	4	3	3	4	3	4
G	Test electronic instrumentation systems	3	3	3	3	3	3
H	Functional test **EFIS** (Electronic Flight Instrumentation System)	3	3	3	3	3	3
I	Perform **EFIS** (Electronic Flight Instrumentation System) test	3	3	3	3	3	3
J	Service fluid in compass system	3	2	2	2	2	2
K	Remove and replace flight instruments (airspeed indicator, altimeter, VSI, etc.)	3	3	2	3	2	3
L	Repair or replace electronic system components	3	3	3	3	3	3
M	Swing (calibrate) compass system	3	3	3	3	2	3
N	Repair or replace vacuum driven flight instrument components	3	3	3	3	2	3
O	Repair or replace vacuum pumps, hoses, and connectors	3	3	3	2	2	2
P	Troubleshoot vacuum system	3	3	3	3	3	3
Q	Troubleshoot vacuum driven flight instruments	3	3	3	3	3	3
R	Troubleshoot flight instruments	4	4	3	3	3	4
S	Test navigation systems	4	3	3	3	3	4
T	Check navigation system annunciators for operation	3	3	2	3	2	3
U	Functional check flight management system	4	3	3	3	3	3
V	Certify transponder and altitude reporting equipment	4	3	4	3	3	5
W	Repair or replace components associated with DME, transponder, radar or other pulse systems	3	3	3	3	3	3
X	Repair or replace sensitive position sensing devices (examples: gimble gyroscopes, laser ring gyros)	4	3	3	3	3	3
Y	Troubleshoot radar system	4	3	3	4	4	4
Z	Troubleshoot dependent reference systems such as **VOR** and **ILS**	3	4	4	4	3	3

Electrical Power and Aircraft Lighting

Task Function	generators	switching and distribution	wiring	lights	batteries	accessories	related systems
Check, test, service, inspect	**A, B**	**F**	**I**	**N**	**Q**		**X**
Repair, remove, replace, modify and calibrate	**C, D**	**G**	**J, K, L**	**O**	**R**	**S, T, U, V, W**	**Y**
Troubleshoot	**E**	**H**	**M**	**P**			**Z**

FrequencyùElectrical Power and Lights

	Task Description	ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Operational check DC and AC generating systems	4	82	3	21	4	74	3	47	3	81	2	93
B	Service IDG (Integrated Drive Generator oil level	4	79	3	26	3	22	2	21	1	10	1	17
C	Replace aircraft generator	2	76	2	12	3	69	3	46	3	77	1	87
D	Replace CSD (Constant Speed Drive) or IDG (Integrated Drive Generator)	2	77	2	12	2	38	1	17	1	16	1	23
E	Troubleshoot AC/DC power generation system	3	64	3	18	3	65	2	39	2	74	1	90
F	Functional test electrical switching and distribution	4	74	4	16	4	65	4	52	4	90	2	98
G	Replace buss switching and control devices	2	53	3	13	2	52	2	30	2	70	1	76
H	Troubleshoot electrical distribution and switching	3	59	3	13	3	62	3	41	3	78	1	95
I	Inspect wire bundles	3	61	4	27	3	66	4	66	4	92	3	95
J	Perform wiring modifications	1	40	3	13	2	48	3	49	2	85	1	79
K	Repair damaged wiring and connectors	3	63	4	25	3	72	3	68	3	95	2	98
L	Repair or replace aircraft electrical wiring connectors	3	59	4	15	3	67	3	57	3	96	2	95
M	Troubleshoot aircraft electrical wiring and connectors	3	65	4	15	3	70	3	54	3	91	2	95
N	Operational test of cabin emergency lighting	5	79	4	21	4	69	3	57	2	41	3	92
O	Repair or replace exterior aircraft lighting	4	87	3	22	4	68	3	66	4	96	3	95
P	Troubleshoot exterior lighting systems	4	80	3	21	4	71	3	57	3	86	2	95
Q	Operational check aircraft battery charging systems	4	78	3	35	3	68	3	44	4	85	2	90
R	Maintain batteries	3	57	3	11	3	48	3	29	4	83	3	76
S	Install racks, controls, connections, antennas and associated electrical components	3	51	3	31	2	47	3	59	2	67	1	67
T	Repair printed circuit board	1	23	2	6	2	26	3	36	1	42	1	37
U	Replace electrical circuit protection devices	2	56	3	13	2	54	3	44	2	84	1	93
V	Replace solid state inverters	1	42	2	10	2	50	2	36	1	67	1	87
W	Replace transformers, rectifiers, and electrical filters	2	45	2	12	2	42	2	30	2	63	1	56

FrequencyùElectrical Power and Lights													
Task Description		**ML**		**MB**		**RG**		**LG**		**SG**		**CP**	
		md	**%**	**md**	**%**	**md**	**%**	**md**	**%**	**md**	**%**	**md**	**%**
X	Operational check standby power or emergency generation system	4	74	3	36	3	58	3	46	3	36	2	87
Y	Perform failure analysis on electrical power systems	3	67	3	12	3	55	3	36	3	67	2	80
Z	Troubleshoot electrically operated mechanical components (example: electric landing gear actuator)	4	84	4	38	4	76	3	63	4	88	3	95

CriticalityùElectrical Power and Lights

	Task Description	ML	MB	RG	LG	SG	CP
A	Operational check DC and AC generating systems	4	3	3	3	3	3
B	Service IDG (Integrated Drive Generator oil level	3	3	3	3	3	3
C	Replace aircraft generator	4	3	3	3	3	3
D	Replace CSD (Constant Speed Drive) or IDG (Integrated Drive Generator)	3	3	3	3	4	4
E	Troubleshoot AC/DC power generation system	3	4	3	3	3	3
F	Functional test electrical switching and distribution	4	3	3	3	3	3
G	Replace buss switching and control devices	4	3	3	4	3	3
H	Troubleshoot electrical distribution and switching	4	4	3	3	3	3
I	Inspect wire bundles	3	3	3	3	3	3
J	Perform wiring modifications	4	3	3	3	3	3
K	Repair damaged wiring and connectors	4	3	3	3	3	3
L	Repair or replace aircraft electrical wiring connectors	4	3	3	3	3	3
M	Troubleshoot aircraft electrical wiring and connectors	4	4	3	3	3	3
N	Operational test of cabin emergency lighting	3	3	3	3	2	2
O	Repair or replace exterior aircraft lighting	2	3	2	2	2	2
P	Troubleshoot exterior lighting systems	2	3	2	2	2	2
Q	Operational check aircraft battery charging systems	3	3	3	3	3	3
R	Maintain batteries	3	3	3	3	3	3
S	Install racks, controls, connections, antennas and associated electrical components	3	3	3	3	3	3
T	Repair printed circuit board	4	3	3	3	3	4
U	Replace electrical circuit protection devices	4	3	3	3	3	3
V	Replace solid state inverters	3	3	3	3	3	3
W	Replace transformers, rectifiers, and electrical filters	4	3	3	3	3	3
X	Operational check standby power or emergency generation system	3	3	3	3	3	3
Y	Perform failure analysis on electrical power systems	4	4	3	3	3	4
Z	Troubleshoot electrically operated mechanical components (example: electric landing gear actuator)	4	4	4	4	4	4

DifficultyùElectrical Power and Lights

	Task Description	ML	MB	RG	LG	SG	CP
A	Operational check DC and AC generating systems	3	3	2	3	3	3
B	Service IDG (Integrated Drive Generator oil level	2	2	2	2	2	2
C	Replace aircraft generator	3	3	2	2	2	2
D	Replace CSD (Constant Speed Drive) or IDG (Integrated Drive Generator)	3	3	3	3	3	3
E	Troubleshoot AC/DC power generation system	4	4	4	3	3	4
F	Functional test electrical switching and distribution	3	3	3	3	3	3
G	Replace buss switching and control devices	3	3	3	3	2	3
H	Troubleshoot electrical distribution and switching	4	4	3	3	3	4
I	Inspect wire bundles	3	2	2	2	2	2
J	Perform wiring modifications	4	3	3	3	3	4
K	Repair damaged wiring and connectors	3	3	2	3	2	3
L	Repair or replace aircraft electrical wiring connectors	3	3	3	3	2	3
M	Troubleshoot aircraft electrical wiring and connectors	4	4	3	3	3	4
N	Operational test of cabin emergency lighting	2	2	1	2	1	2
O	Repair or replace exterior aircraft lighting	2	2	1	2	1	1
P	Troubleshoot exterior lighting systems	2	2	2	2	2	2
Q	Operational check aircraft battery charging systems	2	2	2	3	2	2
R	Maintain batteries	2	2	2	2	2	3
S	Install racks, controls, connections, antennas and associated electrical components	3	3	3	3	2	3
T	Repair printed circuit board	4	4	4	4	4	4
U	Replace electrical circuit protection devices	3	3	2	2	2	3
V	Replace solid state inverters	3	2	3	2	2	2
W	Replace transformers, rectifiers, and electrical filters	3	2	3	2	2	2
X	Operational check standby power or emergency generation system	3	3	2	3	2	3
Y	Perform failure analysis on electrical power systems	4	4	3	3	3	4
Z	Troubleshoot electrically operated mechanical components (example: electric landing gear actuator)	4	4	4	3	3	4

Flight Controls

Task Function	flight controls	components
Check, test, service, inspect	**A, B, C, D, E**	**J, K, L**
Repair, remove, replace, modify and calibrate	**F, G, H**	**M, N, O, P, Q**
Troubleshoot	**I**	

FrequencyùFlight Controls

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Check control surface balance	1	34	2	16	1	48	2	42	1	63	1	41
B	Check flight control travel	3	67	3	28	3	58	3	52	3	78	1	80
C	Inspect flight control surface for damage	5	77	4	31	4	64	4	49	4	78	4	85
D	Operational test flight controls and actuators	3	72	4	29	4	56	4	48	4	70	2	82
E	Operational test lift dumpers, air brakes, or spoilers	3	72	4	26	3	42	3	48	3	45	2	83
F	Adjust, align or rig flight control components	2	63	3	32	3	58	3	51	3	76	1	85
G	Balance control surfaces	1	30	2	16	1	46	2	41	1	61	1	41
H	Change flight control surfaces	1	61	3	31	2	59	3	51	2	74	1	49
I	Troubleshoot flight control systems	3	77	3	25	3	60	3	61	2	80	1	87
J	Inspect cable routing, pulleys, turnbuckles or flight control components	3	68	3	28	3	59	3	51	4	80	2	90
K	Inspect flight control cables for tension, fraying, nicks or crimps	3	69	3	30	3	60	3	52	4	78	2	85
L	Inspect hinge bearings for condition and excessive play	3	66	3	32	4	62	3	52	4	80	2	85
M	Change primary flight control servos or actuators	2	76	3	30	2	61	2	64	1	72	1	82
N	Fabricate control cables	1	29	2	22	1	38	1	19	1	35	1	15
O	Lubricate required flight control components (hinges, rollers, pinions, gears)	3	67	4	32	3	64	4	53	4	80	3	88
P	Remove and install flight control trim motors	1	67	2	22	2	51	2	59	1	63	1	81
Q	Repair or replace attach point or tracks for control surfaces	1	45	3	24	2	46	2	43	1	60	1	44

CriticalityùFlight Controls

	Task Description	ML	MB	RG	LG	SG	CP
A	Check control surface balance	5	4	4	4	4	4
B	Check flight control travel	4	4	4	4	3	3
C	Inspect flight control surface for damage	4	4	4	3	3	3
D	Operational test flight controls and actuators	4	4	4	4	3	3
E	Operational test lift dumpers, air brakes, or spoilers	3	4	4	3	3	3
F	Adjust, align or rig flight control components	5	5	5	4	5	4
G	Balance control surfaces	5	4	4	4	4	4
H	Change flight control surfaces	5	4	5	5	4	4
I	Troubleshoot flight control systems	4	4	4	4	4	4
J	Inspect cable routing, pulleys, turnbuckles or flight control components	4	4	4	4	4	4
K	Inspect flight control cables for tension, fraying, nicks or crimps	4	4	5	4	4	3
L	Inspect hinge bearings for condition and excessive play	4	3	4	3	3	3
M	Change primary flight control servos or actuators	5	4	4	4	4	4
N	Fabricate control cables	5	4	5	5	4	5
O	Lubricate required flight control components (hinges, rollers, pinions, gears)	3	3	3	3	3	3
P	Remove and install flight control trim motors	4	4	4	4	3	3
Q	Repair or replace attach point or tracks for control surfaces	5	4	4	4	4	4

DifficultyùFlight Controls							
Task Description		**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A	Check control surface balance	4	3	3	3	3	3
B	Check flight control travel	3	3	3	2	2	3
C	Inspect flight control surface for damage	3	3	2	2	2	2
D	Operational test flight controls and actuators	3	3	2	2	2	3
E	Operational test lift dumpers, air brakes, or spoilers	3	3	3	2	2	3
F	Adjust, align or rig flight control components	4	4	4	3	3	3
G	Balance control surfaces	4	3	3	3	3	3
H	Change flight control surfaces	4	3	3	3	3	3
I	Troubleshoot flight control systems	4	4	4	3	3	4
J	Inspect cable routing, pulleys, turnbuckles or flight control components	3	3	3	3	2	3
K	Inspect flight control cables for tension, fraying, nicks or crimps	3	3	3	2	2	2
L	Inspect hinge bearings for condition and excessive play	3	3	2	2	2	2
M	Change primary flight control servos or actuators	4	3	3	3	3	3
N	Fabricate control cables	4	3	3	3	3	3
O	Lubricate required flight control components (hinges, rollers, pinions, gears)	2	1	2	1	1	2
P	Remove and install flight control trim motors	3	3	3	3	3	3
Q	Repair or replace attach point or tracks for control surfaces	4	3	3	3	3	4

Indicating, Recording, and Warning Systems

Task Function	**warning systems**	**engine indicating**	**fuel quantity indicating**	**landing gear**	**auxiliary systems**
Check, test, service, inspect	**A, B, C, D**		**H**		
Repair, remove, replace, modify and calibrate		**E**	**I, J, K**	**N**	**P, Q**
Troubleshoot		**F, G**	**L, M**	**O**	**R, S**

FrequencyùIndicating, Recording, and Warning Systems

	Task Description	ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Functional test aircraft warning systems	4	87	4	32	4	73	4	73	4	93	3	100
B	Operational check caution and warning systems	4	66	4	14	5	56	3	48	4	74	3	87
C	Perform stall warning test	4	60	3	14	4	65	3	55	4	87	2	90
D	Operational check crew alerting systems (examples: **EFIS**, **EICAS**, ECAM)	4	66	3	13	4	32	3	34	2	11	3	51
E	Repair or replace engine indicating components	3	71	3	21	3	61	3	49	2	70	1	83
F	Troubleshoot electronic engine indicating systems	3	57	3	16	3	57	3	35	2	41	1	72
G	Troubleshoot engine indicating problems	3	72	3	20	3	64	3	50	2	76	1	80
H	Perform fuel quantity test	3	65	3	15	2	61	3	45	2	76	1	79
I	Calibrate capacitance type fuel quantity indication systems	2	44	3	15	2	37	2	42	1	54	1	59
J	Repair or replace fuel measurement components	2	61	2	15	2	42	2	40	2	63	1	72
K	Repair or replace fuel system warning devices	2	49	2	8	2	43	2	37	1	42	1	67
L	Troubleshoot capacitance-based fuel indicating system	2	56	2	17	2	41	2	43	1	58	1	79
M	Troubleshoot float-based fuel indicating system	2	28	2	8	1	16	2	33	2	64	1	23
N	Repair or replace landing gear position indication and warning components	2	64	2	13	2	58	2	53	2	78	1	81
O	Troubleshoot landing gear position indication and warning systems	2	65	2	16	2	60	3	61	2	76	1	86
P	Repair or replace electronic display components	3	51	3	15	3	50	3	32	2	30	1	67
Q	Replace central maintenance system components	2	35	2	4	-	-	-	-	-	-	-	-
R	Troubleshoot intersystem data exchange problems	2	37	3	9	1	18	3	26	1	24	1	36
S	Troubleshoot central maintenance parameter and system computer	3	39	2	5	-	-	-	-	-	-	-	-

CriticalityùIndicating, Recording, and Warning Systems							
Task Description		**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A	Functional test aircraft warning systems	4	4	4	3	3	3
B	Operational check caution and warning systems	4	4	4	3	3	3
C	Perform stall warning test	3	4	4	4	3	3
D	Operational check crew alerting systems (examples: **EFIS**, EICAS, ECAM)	3	4	3	3	3	3
E	Repair or replace engine indicating components	3	3	3	3	3	3
F	Troubleshoot electronic engine indicating systems	3	4	3	3	3	3
G	Troubleshoot engine indicating problems	3	4	3	3	3	3
H	Perform fuel quantity test	3	3	3	3	3	3
I	Calibrate capacitance type fuel quantity indication systems	3	3	3	3	3	4
J	Repair or replace fuel measurement components	3	3	3	3	3	3
K	Repair or replace fuel system warning devices	3	3	3	3	3	3
L	Troubleshoot capacitance-based fuel indicating system	3	4	3	3	3	3
M	Troubleshoot float-based fuel indicating system	3	3	3	3	3	3
N	Repair or replace landing gear position indication and warning components	4	4	4	3	3	3
O	Troubleshoot landing gear position indication and warning systems	4	4	4	4	3	3
P	Repair or replace electronic display components	3	3	3	3	3	3
Q	Replace central maintenance system components	3	3	-	-	-	-
R	Troubleshoot intersystem data exchange problems	3	4	3	3	3	3
S	Troubleshoot central maintenance parameter and system computer	3	3	-	-	-	-

Difficultyù Indicating, Recording, and Warning Systems							
Task Description		**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A	Functional test aircraft warning systems	3	3	2	3	2	3
B	Operational check caution and warning systems	3	3	2	3	2	2
C	Perform stall warning test	2	3	2	3	1	3
D	Operational check crew alerting systems (examples: **EFIS**, EICAS, ECAM)	3	3	3	3	2	3
E	Repair or replace engine indicating components	3	3	2	3	2	3
F	Troubleshoot electronic engine indicating systems	3	3	3	3	3	3
G	Troubleshoot engine indicating problems	3	3	3	3	3	3
H	Perform fuel quantity test	3	2	2	3	2	3
I	Calibrate capacitance type fuel quantity indication systems	4	3	3	3	3	4
J	Repair or replace fuel measurement components	3	3	3	3	3	3
K	Repair or replace fuel system warning devices	3	3	3	3	3	2
L	Troubleshoot capacitance-based fuel indicating system	4	4	3	4	4	4
M	Troubleshoot float-based fuel indicating system	3	3	2	3	3	2
N	Repair or replace landing gear position indication and warning components	3	3	3	3	3	3
O	Troubleshoot landing gear position indication and warning systems	3	3	3	3	3	3
P	Repair or replace electronic display components	3	3	2	3	3	3
Q	Replace central maintenance system components	3	3	-	-	-	-
R	Troubleshoot intersystem data exchange problems	4	4	4	4	4	4
S	Troubleshoot central maintenance parameter and system computer	4	4	-	-	-	-

General

Hydraulics and Pneumatics

Task Function	hydraulic system	pneumatic system
Check, test, service, inspect	**A, B, C, D**	**I**
Repair, remove, replace, modify and calibrate	**E, F, G**	**J, K**
Troubleshoot	**H**	**L**

FrequencyùHydraulics and Pneumatics

	Task Description	ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Check for leaks in hydraulic system	5	82	4	30	4	65	4	56	3	76	4	88
B	Functional test hydraulic system	4	79	4	26	4	63	4	54	3	75	3	90
C	Service hydraulic system	4	83	4	27	4	64	4	53	3	79	3	88
D	Service hydraulic accumulator	3	79	3	26	4	52	3	52	2	62	3	90
E	Bleed hydraulic system pressure	4	80	4	27	4	62	4	52	3	69	2	78
F	Repair hydraulic system leaks	3	78	3	25	3	54	3	50	2	73	1	90
G	Repair or replace hydraulic components	3	82	4	36	3	71	3	57	2	76	1	88
H	Troubleshoot pressurized hydraulic system (1,000-3,000 psi)	3	78	3	23	3	54	3	44	2	33	1	85
I	Functional check pneumatic system	3	74	3	21	3	42	3	46	3	52	2	72
J	Repair bleed air ducting system	3	69	3	27	3	52	3	45	1	57	1	61
K	Repair or replace pneumatic system controls, ducts, valves, lines and other components	3	75	3	24	3	44	3	47	2	58	1	77
L	Troubleshoot pneumatic system	3	76	3	26	3	51	3	47	2	60	1	76

Criticalityù Hydraulics and Pneumatics

	Task Description	ML	MB	RG	LG	SG	CP
A	Check for leaks in hydraulic system	3	3	3	3	3	3
B	Functional test hydraulic system	3	3	3	3	3	3
C	Service hydraulic system	3	3	3	3	3	3
D	Service hydraulic accumulator	3	3	3	3	3	3
E	Bleed hydraulic system pressure	3	3	3	3	3	3
F	Repair hydraulic system leaks	3	3	4	3	3	3
G	Repair or replace hydraulic components	4	4	3	3	3	3
H	Troubleshoot pressurized hydraulic system (1,000-3,000 psi)	4	3	4	3	3	3
I	Functional check pneumatic system	3	3	3	3	3	3
J	Repair bleed air ducting system	3	3	3	3	3	3
K	Repair or replace pneumatic system controls, ducts, valves, lines and other components	3	3	3	3	3	3
L	Troubleshoot pneumatic system	3	3	3	3	3	3

DifficultyùHydraulics and Pneumatics

	Task Description	ML	MB	RG	LG	SG	CP
A	Check for leaks in hydraulic system	2	2	2	2	2	2
B	Functional test hydraulic system	3	3	2	2	2	3
C	Service hydraulic system	2	2	1	2	2	2
D	Service hydraulic accumulator	2	2	2	2	2	2
E	Bleed hydraulic system pressure	2	2	2	2	2	2
F	Repair hydraulic system leaks	3	3	3	2	3	3
G	Repair or replace hydraulic components	3	3	3	3	3	3
H	Troubleshoot pressurized hydraulic system (1,000-3,000 psi)	3	3	3	3	3	3
I	Functional check pneumatic system	3	3	2	3	2	3
J	Repair bleed air ducting system	3	3	3	2	3	3
K	Repair or replace pneumatic system controls, ducts, valves, lines and other components	3	3	3	3	3	3
L	Troubleshoot pneumatic system	3	3	3	3	3	3

Inspections

Task Function	inspections	non-destructive testing	inspection of specific materials
Check, test, service, inspect	**A, B, C, D, E, F, G, H, I, J**	**K, L, M, N**	**O, P, Q, R**
Repair, remove, replace, modify and calibrate			
Troubleshoot			

Frequencyù Inspections

	Task Description	ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Inspect body skin and lower body surface	5	67	4	20	4	54	3	44	4	69	3	85
B	Inspect for loose rivets, defects, disbonds, cracks, etc.	5	79	4	42	4	68	4	56	4	82	4	92
C	Perform a detailed dimensional inspection	4	67	4	31	4	57	4	53	3	67	3	73
D	Perform a general interior or exterior visual inspection	5	84	4	38	5	73	4	59	4	82	5	92
E	Perform an intensive visual inspection of a zone or system	4	73	4	25	4	63	4	57	4	72	3	88
F	Inspect aircraft interior areas	5	74	4	22	5	57	4	44	4	80	3	88
G	Inspect components for loose connections	5	82	4	34	5	64	4	58	4	82	4	90
H	Inspect electronic equipment blowers and flow sensors	3	69	3	14	3	35	3	40	2	40	1	85
I	Check clogging indicators on filters	4	76	3	34	4	59	3	46	2	40	5	69
J	Inspect chip detectors and/or filters	4	68	4	21	4	65	3	51	3	68	3	90
K	Perform an x-ray or similar non-destructive inspection of skin or structure	1	34	2	14	2	34	2	32	1	40	1	28
L	Perform a magnetic particle inspection	3	24	3	14	2	18	3	17	1	18	1	18
M	Perform eddy current or ultrasound inspection skin or structure	1	16	2	7	2	22	2	19	1	16	1	33
N	Visually inspect parts or components to detect surface cracks or dye penetrant	2	59	3	49	2	63	3	52	3	75	1	83
O	Inspect fabric covered and doped surfaces	-	-	-	-	-	-	-	-	2	13	-	-
P	Inspect honeycomb and laminated structure	3	68	3	33	3	55	3	49	2	55	2	83
Q	Inspect plastics and fiberglass	4	66	4	30	4	57	4	48	4	79	4	79
R	Inspect wood structure	-	-	-	-	-	-	-	-	1	10	-	-

CriticalityùGeneral Inspections

	Task Description	ML	MB	RG	LG	SG	CP
A	Inspect body skin and lower body surface	3	2	2	2	2	2
B	Inspect for loose rivets, defects, disbonds, cracks, etc.	3	3	3	3	3	3
C	Perform a detailed dimensional inspection	3	3	3	3	3	3
D	Perform a general interior or exterior visual inspection	3	3	3	3	3	3
E	Perform an intensive visual inspection of a zone or system	3	3	3	3	3	3
F	Inspect aircraft interior areas	3	2	2	2	2	2
G	Inspect components for loose connections	3	3	3	3	3	3
H	Inspect electronic equipment blowers and flow sensors	3	3	3	2	2	2
I	Check clogging indicators on filters	3	3	3	3	3	3
J	Inspect chip detectors and/or filters	3	3	3	3	3	3
K	Perform an x-ray or similar non-destructive inspection of skin or structure	4	4	4	4	4	3
L	Perform a magnetic particle inspection	3	3	4	3	3	3
M	Perform eddy current or ultrasound inspection skin or structure	4	3	3	3	3	3
N	Visually inspect parts or components to detect surface cracks or dye penetrant	4	3	3	3	4	3
O	Inspect fabric covered and doped surfaces	-	-	-	-	3	-
P	Inspect honeycomb and laminated structure	3	3	3	3	3	3
Q	Inspect plastics and fiberglass	3	3	3	3	2	3
R	Inspect wood structure	-	-	-	-	4	-

DifficultyùGeneral Inspections							
Task Description		**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A	Inspect body skin and lower body surface	3	2	2	2	2	2
B	Inspect for loose rivets, defects, disbonds, cracks, etc.	3	2	2	2	2	2
C	Perform a detailed dimensional inspection	3	3	2	3	3	3
D	Perform a general interior or exterior visual inspection	2	2	2	2	2	1
E	Perform an intensive visual inspection of a zone or system	3	3	2	3	3	3
F	Inspect aircraft interior areas	2	2	1	2	2	2
G	Inspect components for loose connections	2	2	2	2	2	2
H	Inspect electronic equipment blowers and flow sensors	3	2	2	2	2	2
I	Check clogging indicators on filters	2	2	1	2	2	1
J	Inspect chip detectors and/or filters	2	2	2	2	2	2
K	Perform an x-ray or similar non-destructive inspection of skin or structure	4	3	3	4	4	4
L	Perform a magnetic particle inspection	3	2	2	3	3	1
M	Perform eddy current or ultrasound inspection skin or structure	4	4	3	3	4	4
N	Visually inspect parts or components to detect surface cracks or dye penetrant	3	2	3	3	3	3
O	Inspect fabric covered and doped surfaces	-	-	-	-	2	-
P	Inspect honeycomb and laminated structure	3	3	2	3	2	3
Q	Inspect plastics and fiberglass	2	2	2	2	2	2
R	Inspect wood structure	-	-	-	-	3	-

Fire Protection

Task Function	fire protection	accessories	smoke detection
Check, test, service, inspect	**A, B, C, D**	**G, H**	**J**
Repair, remove, replace, modify and calibrate		**I**	**K**
Troubleshoot	**E, F**		

FrequencyùFire Protection

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Functional test fire protection system	5	81	4	14	4	60	3	40	3	38	2	85
B	Inspect engine fire loop	3	74	4	18	3	71	3	65	2	74	2	87
C	Inspect fire extinguishing system	5	79	4	13	4	66	3	41	3	69	2	87
D	Operational check fire detection system	3	65	4	15	3	58	3	41	2	64	2	78
E	Troubleshoot fire detection circuits	4	68	3	11	3	60	3	38	3	55	2	85
F	Troubleshoot fire extinguishing and control systems	5	80	4	14	4	60	3	43	3	61	2	90
G	Inspect extinguishers and fire bottles	2	71	3	34	3	65	3	57	2	56	1	78
H	Inspect fire detection elements for connections and security	3	76	2	23	2	63	2	44	1	32	1	65
I	Repair or replace fire detection/protection components	4	80	3	22	4	63	3	47	2	40	2	67
J	Test passenger or cargo smoke detection system	3	70	3	16	2	55	2	54	1	51	1	84
K	Replace smoke detection components	3	65	2	15	3	49	3	44	1	48	1	76

CriticalityùFire Protection

Task Description		ML	MB	RG	LG	SG	CP
A	Functional test fire protection system	4	4	4	4	4	3
B	Inspect engine fire loop	3	3	3	4	3	3
C	Inspect fire extinguishing system	3	3	3	3	3	3
D	Operational check fire detection system	3	3	3	4	3	3
E	Troubleshoot fire detection circuits	3	4	3	4	3	3
F	Troubleshoot fire extinguishing and control systems	3	4	4	4	3	3
G	Inspect extinguishers and fire bottles	3	3	4	4	4	4
H	Inspect fire detection elements for connections and security	3	3	3	4	3	3
I	Repair or replace fire detection/protection components	4	3	3	4	3	3
J	Test passenger or cargo smoke detection system	3	4	4	4	3	3
K	Replace smoke detection components	3	4	4	4	3	3

DifficultyùFire Protection							
Task Description		**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A	Functional test fire protection system	3	2	2	2	2	2
B	Inspect engine fire loop	2	3	2	2	2	2
C	Inspect fire extinguishing system	2	2	2	1	1	1
D	Operational check fire detection system	3	3	3	4	3	3
E	Troubleshoot fire detection circuits	2	2	2	2	2	2
F	Troubleshoot fire extinguishing and control systems	2	2	2	2	2	2
G	Inspect extinguishers and fire bottles	3	3	3	2	2	2
H	Inspect fire detection elements for connections and security	2	2	2	2	2	2
I	Repair or replace fire detection/protection components	3	2	2	2	2	2
J	Test passenger or cargo smoke detection system	3	3	3	3	3	3
K	Replace smoke detection components	3	3	3	3	3	3

Anti-icing and De-icing

Task Function	ice control systems	accessories
Check, test, service, inspect	**A, B, C, D, E**	
Repair, remove, replace, modify and calibrate	**F, G**	**J, K**
Troubleshoot	**H, I**	

FrequencyùAnti-icing and De-icing Systems

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Functional check electrical ice, rain or fog removal systems	3	63	3	13	3	63	3	49	3	75	2	83
B	Functional check pneumatic ice or fog removal systems	2	58	3	13	3	51	3	47	3	61	2	69
C	Inspect air scoops and leading edge ice control systems	4	67	3	15	4	64	3	48	3	69	3	76
D	Inspect windshield ice or rain removal systems	4	62	3	16	4	54	3	45	3	65	2	85
E	Functional check prop heat	-	-	-	-	4	54	3	20	3	71	3	35
F	Repair or replace de-ice boot	-	-	-	-	3	58	2	16	2	57	1	28
G	Replace electrical de-ice boots	1	18	1	3	3	39	2	50	2	59	1	30
H	Troubleshoot propeller heat	-	-	-	-	3	48	2	16	3	66	1	28
I	Troubleshoot ice, rain or fog removal systems	3	67	2	13	3	68	3	60	2	81	1	82
J	Repair or replace windshield ice, rain or fog removal system components	2	74	2	17	3	60	2	59	2	74	1	77
K	Repair or replace scoops and leading edge anti-ice components	2	42	2	16	3	56	2	44	2	40	1	51

CriticalityùAnti-icing and De-icing Systems

	Task Description	ML	MB	RG	LG	SG	CP
A	Functional check electrical ice, rain or fog removal systems	3	3	4	3	3	3
B	Functional check pneumatic ice or fog removal systems	3	3	4	3	3	3
C	Inspect air scoops and leading edge ice control systems	3	3	3	3	3	3
D	Inspect windshield ice or rain removal systems	3	3	3	3	3	3
E	Functional check prop heat	-	-	3	3	3	3
F	Repair or replace de-ice boot	-	-	3	3	3	3
G	Replace electrical de-ice boots	4	3	4	3	3	3
H	Troubleshoot propeller heat	-	-	3	3	3	3
I	Troubleshoot ice, rain or fog removal systems	3	3	4	3	3	3
J	Repair or replace windshield ice, rain or fog removal system components	3	3	3	3	3	3
K	Repair or replace scoops and leading edge anti-ice components	3	3	4	3	4	3

DifficultyùAnti-icing and De-icing Systems

	Task Description	ML	MB	RG	LG	SG	CP
A	Functional check electrical ice, rain or fog removal systems	3	2	2	2	2	2
B	Functional check pneumatic ice or fog removal systems	3	3	2	2	2	2
C	Inspect air scoops and leading edge ice control systems	2	2	2	2	2	2
D	Inspect windshield ice or rain removal systems	2	2	2	2	2	2
E	Functional check prop heat	-	-	2	2	2	2
F	Repair or replace de-ice boot	-	-	3	3	3	3
G	Replace electrical de-ice boots	4	3	3	3	3	3
H	Troubleshoot propeller heat	-	-	3	3	3	2
I	Troubleshoot ice, rain or fog removal systems	3	3	3	3	3	3
J	Repair or replace windshield ice, rain or fog removal system components	3	3	3	3	3	3
K	Repair or replace scoops and leading edge anti-ice components	3	3	2	3	3	3

Powerplant

Engines

Task Function	turbine	reciprocating	APU	related systems
Check, test, service, inspect	A, B, C, D, E	A, B, C P, Q, R	U, V	X,Y
Repair, remove, replace, modify and calibrate	F, G, H, I, J, K, L, M	G,H.L S	W	Z
Troubleshoot	N, O	T		

FrequencyùEngines

	Task Description	ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Inspect engine and components for security and leaks	4	77	4	21	4	65	4	50	4	75	3	90
B	Inspect engine mounts	3	57	3	25	4	65	3	50	3	79	3	88
C	Operational check engine	4	70	4	13	4	57	4	44	4	77	3	80
D	Inspect fan blades for FOD (Foreign Object Damage)	5	75	4	17	4	55	4	47	4	33	4	90
E	Service turbine engine	5	66	4	16	4	52	4	42	3	39	4	76
F	Blend fan blades	2	56	3	16	2	16	2	34	1	14	1	41
G	Perform borescope inspection	2	25	2	6	3	25	3	35	2	43	1	61
H	Perform internal repairs to engine	1	21	4	11	2	21	3	29	2	43	1	33
I	Refinish composite blades	1	20	1	7	3	8	1	7	1	15	1	8
J	Replace jet engine	2	63	3	14	2	18	3	39	1	20	1	49
K	Replace turboprop engine	-	-	-	-	2	50	2	21	1	19	1	42
L	Replace or clean engine components	3	57	4	21	4	58	3	40	3	74	2	85
M	Replace or overhaul hot section	2	9	4	13	2	33	3	32	1	18	1	46
N	Troubleshoot jet engine	4	75	3	15	3	23	3	34	1	19	1	83
O	Troubleshoot turboprop engine	-	-	-	-	3	50	3	19	3	34	1	28
P	Inspect opposed piston engine	-	-	-	-	-	-	3	10	4	71	2	8
Q	Inspect radial piston engine	-	-	-	-	-	-	1	5	1	24	5	5
R	Service piston engine	-	-	-	-	-	-	2	12	4	67	4	11
S	Perform internal repairs to opposed piston engines	-	-	-	-	-	-	1	7	2	40	2	11
T	Troubleshoot opposed piston engine	-	-	-	-	-	-	1	9	3	59	3	8
U	Operational check APU (Auxiliary Power Unit)	4	84	3	31	4	30	3	39	2	19	2	74
V	Service and operate APU (Auxiliary Power Unit)	5	79	3	34	4	32	2	39	3	19	3	77
W	Repair or replace APU (Auxiliary Power Unit)	3	72	2	30	2	37	2	33	1	19	1	61
X	Service gear reduction section	3	31	3	6	3	26	3	17	1	7	1	13
Y	Operational test thrust reversers	3	75	3	30	2	4	3	38	2	20	2	82
Z	Repair or replace thrust reversers	2	56	3	15	2	2	3	33	1	14	1	74

CriticalityùEngines

	Task Description	ML	MB	RG	LG	SG	CP
A	Inspect engine and components for security and leaks	4	4	4	3	3	3
B	Inspect engine mounts	5	4	4	4	3	3
C	Operational check engine	4	4	4	4	3	3
D	Inspect fan blades for FOD (Foreign Object Damage)	4	3	4	3	3	3
E	Service turbine engine	4	3	3	3	3	3
F	Blend fan blades	4	3	4	3	3	3
G	Perform borescope inspection	5	4	4	3	3	4
H	Perform internal repairs to engine	4	4	5	4	4	4
I	Refinish composite blades	5	4	3	4	4	3
J	Replace jet engine	5	5	5	5	4	4
K	Replace turboprop engine	-	-	5	5	4	5
L	Replace or clean engine components	4	3	4	3	3	3
M	Replace or overhaul hot section	3	5	4	5	4	4
N	Troubleshoot jet engine	5	4	4	4	4	4
O	Troubleshoot turboprop engine	-	-	-	4	3	4
P	Inspect opposed piston engine	-	-	-	3	3	3
Q	Inspect radial piston engine	-	-	-	3	3	3
R	Service piston engine	-	-	-	3	3	3
S	Perform internal repairs to opposed piston engines	-	-	-	4	4	5
T	Troubleshoot opposed piston engine	-	-	-	3	3	3
U	Operational check APU (Auxiliary Power Unit)	3	3	2	3	3	2
V	Service and operate APU (Auxiliary Power Unit)	3	3	3	3	3	2
W	Repair or replace APU (Auxiliary Power Unit)	3	3	3	3	2	3
X	Service gear reduction section	4	4	4	4	4	3
Y	Operational test thrust reversers	3	4	3	3	3	3
Z	Repair or replace thrust reversers	4	4	3	3	3	3

DifficultyùEngines

Task Description		ML	MB	RG	LG	SG	CP
A	Inspect engine and components for security and leaks	3	3	3	2	2	3
B	Inspect engine mounts	3	3	2	3	2	3
C	Operational check engine	4	4	3	4	3	4
D	Inspect fan blades for FOD (Foreign Object Damage)	2	2	2	2	2	2
E	Service turbine engine	2	2	2	2	2	3
F	Blend fan blades	3	3	3	2	3	3
G	Perform borescope inspection	4	4	3	3	3	4
H	Perform internal repairs to engine	4	4	4	4	4	5
I	Refinish composite blades	4	4	3	3	4	4
J	Replace jet engine	4	4	4	4	3	4
K	Replace turboprop engine	-	-	4	4	4	4
L	Replace or clean engine components	3	3	3	2	3	3
M	Replace or overhaul hot section	3	4	4	4	4	5
N	Troubleshoot jet engine	4	4	4	4	4	4
O	Troubleshoot turboprop engine	-	-	-	4	4	4
P	Inspect opposed piston engine	-	-	-	3	3	1
Q	Inspect radial piston engine	-	-	-	3	3	3
R	Service piston engine	-	-	-	3	3	3
S	Perform internal repairs to opposed piston engines	-	-	-	3	4	4
T	Troubleshoot opposed piston engine	-	-	-	3	4	2
U	Operational check APU (Auxiliary Power Unit)	3	3	3	3	3	2
V	Service and operate APU (Auxiliary Power Unit)	2	2	2	3	2	3
W	Repair or replace APU (Auxiliary Power Unit)	3	3	3	3	4	3
X	Service gear reduction section	3	3	2	3	4	2
Y	Operational test thrust reversers	3	3	2	2	2	3
Z	Repair or replace thrust reversers	3	3	4	3	3	3

Fuel Control and Lubrication

Task Function	fuel control	lubrication	accessories
Check, test, service, inspect	**A**	**E, F, G**	**H, I**
Repair, remove, replace, modify and calibrate	**B, C**		**J**
Troubleshoot	**D**		

FrequencyùFuel Control and Lubrication

Task Description	ML		MB		RG		LG		SG		CP	
	md	%	md	%	md	%	md	%	md	%	md	%
A Functional test fuel control system	3	56	3	11	3	46	3	36	3	60	1	69
B Repair or replace fuel control components	2	63	3	18	3	52	3	40	2	61	1	71
C Remove and install fuel control unit	2	61	2	17	2	53	2	32	1	29	1	75
D Troubleshoot fuel control problems	3	60	3	14	3	60	3	39	2	57	1	82
E Drain and flush oil tank	2	51	3	16	2	47	3	38	3	60	2	61
F Drain and replace oil in piston engine	-	-	-	-	-	-	2	13	4	67	4	16
G Service engine and scavenger oil	5	78	4	18	4	68	4	41	4	68	4	80
H Service scavenge filter	3	60	3	17	3	44	3	28	2	37	1	54
I Replace engine filters	4	40	4	16	3	67	4	48	4	73	2	85
J Replace turbine and jet oil filter elements	3	74	3	20	3	58	3	45	3	34	2	90

CriticalityùFuel Control and Lubrication

Task Description	ML	MB	RG	LG	SG	CP
A Functional test fuel control system	4	4	4	4	3	3
B Repair or replace fuel control components	4	4	4	3	4	4
C Remove and install fuel control unit	4	4	4	4	4	4
D Troubleshoot fuel control problems	4	4	4	4	4	4
E Drain and flush oil tank	3	3	3	3	3	3
F Drain and replace oil in piston engine	-	-	-	3	3	3
G Service engine and scavenger oil	3	3	3	3	3	3
H Service scavenge filter	3	3	3	3	3	3
I Replace engine filters	3	3	3	3	3	3
J Replace turbine and jet oil filter elements	3	3	3	3	3	3

DifficultyùFuel Control and Lubrication

Task Description	ML	MB	RG	LG	SG	CP
A Functional test fuel control system	3	3	3	3	3	3
B Repair or replace fuel control components	3	3	3	3	3	4
C Remove and install fuel control unit	4	3	4	3	4	4
D Troubleshoot fuel control problems	4	4	4	4	4	4
E Drain and flush oil tank	2	2	2	2	2	2
F Drain and replace oil in piston engine	-	-	-	2	2	2
G Service engine and scavenger oil	2	2	1	1	2	2
H Service scavenge filter	2	2	2	2	2	2
I Replace engine filters	2	2	2	2	2	2
J Replace turbine and jet oil filter elements	2	2	2	2	2	2

Ignition and Starting

Task Function	ignition	starting
Check, test, service, inspect	A, B	H
Repair, remove, replace, modify and calibrate	C, D, E, F	I
Troubleshoot	G	

FrequencyùIgnition and Starting

Task Description	**ML**		**MB**		**RG**		**LG**		**SG**		**CP**	
	md	**%**	**md**	**%**	**md**	**%**	md	%	md	%	md	%
A Inspect battery ignition systems	3	45	3	6	3	30	3	26	3	45	3	49
B Inspect high-tension systems	3	65	3	15	3	54	3	50	3	78	2	65
C Remove and install excitor box	2	66	3	20	2	54	2	41	1	46	1	73
D Remove or install ignitor plug	3	72	3	22	3	63	3	45	3	38	2	82
E Repair or replace high tension ignition system components	2	67	3	20	2	58	3	54	2	77	1	70
F Repair or replace ignition components	3	78	3	20	2	63	3	54	3	79	1	78
G Troubleshoot ignition problems	2	74	3	13	2	52	2	53	2	84	1	79
H Inspect booster starting systems	3	38	3	3	3	13	2	11	2	34	3	11
I Remove and install starter	2	68	3	20	3	66	3	46	2	76	1	90

CriticalityùIgnition and Starting

Task Description	**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A Inspect battery ignition systems	3	3	3	3	3	3
B Inspect high-tension systems	3	3	3	3	3	3
C Remove and install excitor box	3	3	3	3	3	3
D Remove or install ignitor plug	3	3	3	3	3	3
E Repair or replace high tension ignition system components	3	3	3	3	3	3
F Repair or replace ignition components	3	3	3	3	3	3
G Troubleshoot ignition problems	3	4	3	3	3	3
H Inspect booster starting systems	3	3	3	3	3	2
I Remove and install starter	3	3	3	3	3	3

DifficultyùIgnition and Starting						
Task Description	**ML**	**MB**	**RG**	**LG**	**SG**	**CP**
A Inspect battery ignition systems	3	3	2	2	3	2
B Inspect high-tension systems	3	2	2	2	3	2
C Remove and install excitor box	3	2	2	2	2	3
D Remove or install ignitor plug	3	2	2	2	2	3
E Repair or replace high tension ignition system components	3	2	2	2	2	2
F Repair or replace ignition components	3	2	2	2	3	3
G Troubleshoot ignition problems	3	3	3	3	3	3
H Inspect booster starting systems	3	3	2	2	2	2
I Remove and install starter	3	2	2	2	2	3

Propellers

Task Function	propeller assembly	blades	propeller controls
Check, test, service, inspect	A, B, C		K
Repair, remove, replace, modify and calibrate	D, E, F, G	I, J	L
Troubleshoot	H		M

FrequencyùPropellers

Task Description		ML		MB		RG		LG		SG		CP	
		md	%	md	%	md	%	md	%	md	%	md	%
A	Inspect propellers for damage	-	-	-	-	5	60	3	20	4	73	4	38
B	Lubricate propeller	-	-	-	-	3	34	3	15	3	51	2	36
C	Operational check fixed and constant speed propellers	-	-	-	-	3	42	2	12	4	56	3	21
D	Overhaul prop assembly	-	-	-	-	2	15	1	4	1	10	1	5
E	Replace propeller assembly	-	-	-	-	3	54	2	16	2	59	1	28
F	Replace propeller	-	-	-	-	3	58	2	20	2	66	1	36
G	Tear down and build-up prop assembly	-	-	-	-	2	17	1	6	1	9	1	3
H	Troubleshoot constant speed propeller	-	-	-	-	3	27	2	10	2	50	1	23
I	Dress nicks and irregularities in propeller	-	-	-	-	3	34	2	18	3	72	2	38
J	Rig propeller blades	-	-	-	-	3	33	3	9	2	26	2	10
K	Service bleed valve propeller governor	-	-	-	-	3	12	1	6	1	15	1	10
L	Adjust governor	-	-	-	-	2	33	2	16	2	50	1	26
M	Troubleshoot propeller synchronization	-	-	-	-	2	38	1	15	1	44	1	31

CriticalityùPropellers

	Task Description	ML	MB	RG	LG	SG	CP
A	Inspect propellers for damage	-	-	4	3	3	3
B	Lubricate propeller	-	-	3	3	3	3
C	Operational check fixed and constant speed propellers	-	-	4	3	3	3
D	Overhaul prop assembly	-	-	4	5	5	4
E	Replace propeller assembly	-	-	4	3	4	4
F	Replace propeller	-	-	4	4	4	4
G	Tear down and build-up prop assembly	-	-	4	4	4	4
H	Troubleshoot constant speed propeller	-	-	4	3	3	3
I	Dress nicks and irregularities in propeller	-	-	3	3	3	3
J	Rig propeller blades	-	-	4	3	3	4
K	Service bleed valve propeller governor	-	-	4	4	3	3
L	Adjust governor	-	-	4	3	3	4
M	Troubleshoot propeller synchronization	-	-	2	3	3	3

DifficultyùPropellers

Task Description		ML	MB	RG	LG	SG	CP
A	Inspect propellers for damage	-	-	2	2	2	3
B	Lubricate propeller	-	-	2	1	1	2
C	Operational check fixed and constant speed propellers	-	-	3	3	2	3
D	Overhaul prop assembly	-	-	4	4	4	3
E	Replace propeller assembly	-	-	3	3	2	3
F	Replace propeller	-	-	3	3	3	3
G	Tear down and build-up prop assembly	-	-	3	4	4	4
H	Troubleshoot constant speed propeller	-	-	3	3	3	3
I	Dress nicks and irregularities in propeller	-	-	2	2	2	3
J	Rig propeller blades	-	-	3	3	3	3
K	Service bleed valve propeller governor	-	-	3	3	2	3
L	Adjust governor	-	-	3	3	2	3
M	Troubleshoot propeller synchronization	-	-	3	3	3	3

4.5 General Discussion of Task Analysis

Although the surveys were administered consistently, there are some issues that influenced the results. Similarly, the manner in which certain questions are posed in the survey can also affect the responses. These issues need to be taken into account when reviewing the results of the survey.

Percent response is the percentage of technicians in an industry segment that have performed a task in the last calendar year. This measure alone does not indicate how often a particular task is performed since it is possible that a high percentage of technicians may rarely perform that task. Similarly, the frequency data only describes how often the task is performed regardless of the number of technicians who responded. In some cases, a task may have a high frequency reported, but a very low rate of response. By examining both the percent response and frequency data, it is possible to get a much more accurate picture of how often tasks are being performed and into the degree of task specialization within each industry segment.

Frequency and percent response also varies according to the industry segments. The percent response for the major base facilities are typically lower than all of the other industry segments on most tasks. This trend indicates a certain degree of specialization among base technicians. At most base facilities, there are dedicated shops where a technicians may work only on a specific aircraft component or system. As a result, an avionics technician working in the shop of a base facility, will perform a much different set of tasks than an airframe technician working at the same facility. Therefore, technicians will respond to a

narrow set of tasks depending on their area of expertise. Thus, the overall percent response was lower at the base facilities because of this specialization.

The opposite result for the survey data was obtained in the general aviation and corporate segments. At these facilities, the division of labor is not as clear, and most technicians routinely perform a variety of tasks. Accordingly, the percent response for tasks is higher in these segments because of the more general nature of their jobs.

It should also be noted that the respondents were asked to only rate the tasks that he or she performed in their current position at the facility where the survey was administered. This method was developed so that the surveys could provide an accurate account of tasks performed in each segment. However, many respondents indicated that they have had previous work experience or held a second job. Subsequently, this information is not reflected in the survey results.

5. PLANS FOR PHASE III

5.1 Objectives of Phase III

Phase III will build upon the task analysis that was completed in Phase II. The primary objective is to organize the data to highlight the implications for training, both within the schools and within the industry. In this regard, the **AMT** schools can be viewed as providing a form of undergraduate education to be followed up by industry training programs providing a form of post-graduate education. As the aviation industry gives additional attention to post-graduate education, it will, in effect, be helping to develop a perspective on career planning for AMTs.

The second objective that will be addressed in Phase III concerns **FAA**'s responsibility for reviewing current regulations that govern the certification of **AMT**s and AMT schools. As a corollary to curriculum reform, certification requirements need to be re-examined to facilitate the movement toward curriculum review and reform.

To meet this objective, four closely related issues will be examined:

- What are the implications for the schools that are responsible for the initial training of **AMT**s? What revisions to their programs of study would be appropriate and desirable? In addition, in what respects should these schools consider alternative approaches for the evaluation of student performance?
- What are the implications for the aviation industry with respect to programs of continuing education? In particular, how can the **AMT** schools and industry coordinate their efforts in training? The objective should be to examine the need for increased coordination between industry and the schools leading to the implementation of a total systems approach to the training of AMTs.
- What are the implications for **FAA** of possible revisions to **FAR** Part 147 concerning the certification of **AMT** schools? Specifically, what revisions are necessary to ensure compatibility between the training programs and the regulations that govern their certification?
- In dealing with these issues about training and certification, some consideration should be given to the analysis of the data across different segments of the industry. To what extent can a common core of skills that apply across the industry be identified? To the extent that there are differences, what are the implications for the training of **AMT**s?

5.2 Plans for Implementation

Based upon the completion of the data collection phase and analyses of the data, the research team began in spring 1996 to work collaboratively with representatives from the **AMT** schools and industry. These committees will develop plans for revising training programs and to regulations that govern certification. The strategy involves schools and industry in the interpretation of the data and in planning for curriculum change.

A new committee based on representation from the **AMT** schools was formed and convened in the summer 1996. The responsibility of this committee is to review the data in order to propose plans for curriculum revision. This committee will also be expected to consider the possibility of changes in

performance evaluation that would lead to a more realistic assessment of the skills being acquired through a revised AMT curriculum.

The visit committee will continue to represent the aviation industry. This committee will be expected to address a number of issues and eventually to coordinate their plans for continuing training with the plans being made for the first committee representing the **AMT** schools.

Both committees will address the following issues:

- From a realistic perspective, the training of **AMT**s is partly the responsibility of the schools, followed by training provided by the industry. Many people refer to the certification of an AMT who has just completed school as a license to learn. The education of an AMT continues throughout his or her entire career. The advanced education takes place after being hired and involves formal programs of training in a classroom along with on-the-job training. Using the data available from the survey, two sets of performance objectives will be identified. The first set of performance objectives embodies the skill and knowledge that a recent graduate of an AMT school is expected to possess. Moreover, this is the level of skill which companies should expect of newly hired AMTs and could be interpreted as the prerequisites for post-certification training. A second set of performance objectives would define the skill and knowledge of an AMT after some years of experience.

- A second issue considers the extent to which the performance objectives can be applied throughout the industry. One possibility is that the performance objectives appropriate for the **AMT** schools should apply to all AMTs, but the objectives applied to a skilled AMT should be defined separately for different segments of the industry. The implication is not that higher standards apply to a particular segment. Instead, there may be different standards which may involve differing degrees of specialization.

- A third closely related issue involves the development of a set of guidelines to be followed by different segments of the industry related to their training programs. Again, within any segment of the industry, there is considerable variability among companies with respect to their program of training.

- A fourth issue deals with the need to respond to the continuing impact of technological change. The **AMT** schools and the aviation industry should be prepared to adjust to these changing demands. The implication is that performance objectives that guide the design of a curriculum or training should emphasize skills that prepare the student to cope with changes in the industry. This issue applies not only to the training of AMTs but also to industry training.

The committees will meet jointly in the fourth quarter of 1996. A plan to address these issues will be finalized. Further analysis on the survey data that is pertinent to these topics will be performed. A second meeting of both committees is scheduled for the first quarter of 1997.

6. SUMMARY AND CONCLUSIONS

The objective of Phase II was to complete a full-scale job task analysis in order to redefine the task responsibility of **AMT**s. A summary of the activities in Phase II follow.

Task List

A set of 303 tasks was selected for inclusion in the Phase II survey. The task list provided a broad coverage of the tasks performed by **AMT**s. The number of tasks also was a manageable length to include in the survey questionnaire.

Survey Design and Administration

Based on the Phase I results, the background information section was simplified by including only information that seemed to be of primary importance to the task analysis. Frequency, Difficulty to Learn, and Criticality were the three performance measures chosen to qualify each task. A rating scale from one to five for each measure was developed. In designing an interview schedule, the questions included focusing on the organization of the maintenance facility, on the supervision of **AMT**s and the assignment of tasks, and on provisions for advanced training for the AMTs.

Sampling of Facilities and of Technicians

Facilities to be included in the study were identified with the assistance of several industry groups along with local **FSDO**s. A representative sample of both facilities and technicians were sought. A total of 2,434 surveys from 84 facilities were obtained. At smaller facilities, all available technicians were surveyed. At larger facilities, responses were obtained from a representative sample.

Survey Results

The raw data associated with the questionnaire responses have been organized into a database using Microsoft Access. Summary results have been obtained for each task and for the three performance measures associated with each task. Similar results have been obtained, taking into account the differences between the major segments that make up the industry.

Analyses of the data obtained from the interviews are still underway. The main implication is that practices are highly variable although there are similarities that hold within each segment of the industry. This reflects the impact of technological features that are characteristic of one segment but not necessarily of another. In addition, the major airline facilities are likely to make use of several training programs, depending on the type of aircraft and degree of specialization at each facility.

Efforts for Phase III

Two committees have already been formed to assist in the interpretation of the data with respect to the implications for curriculum revision. One committee comprises representatives from the industry and the other from **AMT** schools. The school committee is currently considering how course offerings might be modified and how such changes might be implemented. The committee representing the aviation industry will be meeting this fall. At a later date, we will be scheduling a joint meeting in order to review plans for an integrated program of training that begins with the school programs, to be supplemented by additional efforts which will be the responsibility of the industry.

As the basis for interpretation, the existing data is being compared against the results obtained in the Allen study to examine the changes that have occurred. In addition, results are being organized using the 20 subject matter areas listed in **FAR** Part 147. This form of analysis should be particularly useful for purposes of curriculum evaluation and revision.

APPENDIX A: PARTICIPATING FACILITIES

Major/National Airlines (121)

Alaska Airlines (SEA)
America West Airlines (PHX)
American Airlines (ORD, JFK, TUL)
Delta Airlines (ATL)
Evergreen Airlines (JFK)
Federal Express (MEM, ORD, IND)
Ryan International (DAY)
Southwest Airlines (PHX)
Trans World Airlines (MCI)
United Airlines (SFO, OAK, ORD)

Regional Airlines (121,135)

Allegheny Commuter Airlines (MDT)
Ameriflight (BUR)
Flagship Airlines (BNA)
Horizon Airlines (PDX)
Jetstream International Airlines (DAY)
Express Airlines, I (MEM)

Large General Aviation (145,135, 91)

Cessna Citation Jet Repair Station (ICT)
Duncan Aviation (LNK)
Epps Air Service (ATL)
FFV Aerotech (BNA)
Garrett Aviation (LAX, TOA)
KC Aviation (ATW)
Kaiser Air (OAK)
Learjet (ICT)
Priester Aviation (PWK)
Stambaugh Aviation (MDT)
Stevens Aviation (GSP)
United Beechcraft - Fulton County (FTY)
United Beechcraft - Van Nuys (VNY)

Small General Aviation (145,135,91)

Air Plains (ICT)
Autopilot Central (Sparks) (TUL)
Clark Aviation (MDT)
Cornerstone Aviation (GSP)

Corporate Air Technology (SJC)
Corporate Flight Management (BNA)
Corporate Jets (PHX)
Cutter Aviation (PHX)
Experimental Aircraft Association (OSH)
Midwest Corporate (ICT)
Million Air--Tulsa (TUL)
Mukenschnabl Aviation (DPG)
Navajo Aviation (SFO)
Petersen Aviation (VNY)
Planemaster Services (DPG)
Plummer Aviation (LAX)
Riverside Air Services (LAX)
Shelby Aviation (MEM)
United Beechcraft - Ontario (ONT)
Webco (ICT)
Wells Aircraft (ICT)
Westjet Air Center (RAP)
Wisconsin Aviation (MSN)

Corporate (145,135,91)

Amoco Corporation (MDW)
AMP, Inc. (MDT)
Bank One (PHX)
Chandler Aviation (TUL)
Coca-Cola (ATL)
Conagra (OMA)
Dial Corporation (PHX)
Hershey Foods (MDT)
Hewlett-Packard Corporation (SJC)
Koch Industries (ICT)
Michelin Tire Corporation (GSP)
Milliken Corporate (GSP)
Nations Bank (ATL)
Ray-o-Vac (MSN)
Sears, Roebuck and Company (MDW)
Service Merchandise (BNA)
Soundtrak (OMA)
Southern California Edison (ONT)
Southern Company (ATL)
Sunstrand (RFD)