

Chapter 3

SUPERVISORY TASK ANALYSIS: AIRCRAFT MAINTENANCE ENVIRONMENT

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3.1 INTRODUCTION

To improve the safety and quality of aircraft maintenance, it is important to understand the tasks and activities performed by those leaders and supervisors closest to work being performed. While detailed task analyses of the inspection and maintenance technicians are available,¹ the supervisory functions have been largely neglected. The supervisor has responsibilities for organization, effective communication, quality control as well as providing technical expertise whenever necessary. A task analysis of the supervisory function may lead to a better understanding of the requirements of this function which in turn may lead to job-aids that can support this function.

This study examined the tasks and activities of lead mechanics and foremen in two major aircraft maintenance facilities. The lead mechanics on routine and non-routine maintenance work were selected for study since their tasks tend to be fast paced, varied and comprehensive. These lead mechanics (LMs) act as a focal point carrying out the directives from their supervisor, coordinating and communicating with other LMs, and solving the needs and problems of their crew.

Are the difficulties that supervisors face found across the airline industry? If so, such difficulties may be used to identify some innovation or job aid that will alleviate or eliminate the problems. The result of this study is general recommendations to facilitate the leadership tasks and activities of first and second line supervisors within the aircraft maintenance environment.

3.2 METHODOLOGY

A task analysis technique was employed to understand the activities of the first and second line supervisors in the aircraft maintenance environment. There are a variety of methods available for conducting a task analysis, each with its own advantages and disadvantages. These methods include charting and network techniques, decomposition methods, hierarchical task analysis, link analysis, etc. Techniques for the collection of data for a task analysis include questionnaires, interviews (group and individual), work participation, observations, and diaries.² No one procedure is right for all cases, and generally a combination of data gathering techniques produces the best results by providing the flexibility to meet the conditions and constraints.

A hierarchical task analysis technique was used in this study, and the work involved was broken down into three major steps. The first step was to become familiar with the environment, technologies, and characteristics of the job being analyzed. This was accomplished through informal familiarization site visits. The second step was the collection of the task data. The final step involved the organization and analysis of the data. The following sections will discuss each of these steps in detail.

3.2.1 Familiarization site visits

Familiarization site visits were conducted to observe various levels of supervision -- over three shifts and across several types of maintenance activities. The familiarization site visits were scheduled to start two hours before the shift change and continued until two hours after. Thus, in two visits, observations were made on all three shifts. When circumstances permitted, both the shift foreman and the lead mechanic were observed at the same time. In a majority of the time, however, resources had to be divided so that both the levels of supervision could be observed simultaneously. A concept of "shadowing" was used to observe and ask questions without interfering with normal activity. During the two familiarization visits, two common maintenance activities were observed: a letter check or heavy maintenance visit (HMV), and a service check.

In order to achieve an adequate cross section of aircraft maintenance supervisory tasks, two large certified repair stations were selected over several smaller operations. The larger facilities afforded a broader spectrum of operational protocols and tasks. The following provides a brief description of each company.

Company 1

This company operates several certified repair station facilities throughout the domestic United States. The company and the maintenance groups work under an organized labor contract covering all maintenance positions except foreman and above. A review of the organization showed that the actual controlling supervisory role begins with the position of foreman, and not at the lead mechanic level. This separation is done primarily to the interpretations and precedents established by the labor contract. The lead mechanic is considered a working member of the [AMT](#) group, and as such his/her role was delegated to that of an overseer and councilor to the AMTs and facilitator and manpower coordinator for the foreman. The position above foreman was the operations manager who had overall responsibility for the production efforts of the hangar complexes (four production bays) operating with a total of fifteen bay managers. Each production bay's effort was controlled by a centralized work center located at hangar floor level adjacent to the associated hangar bay. The coordination and continuity of work flow was managed by a work center planner and work center clerk. Both parties answered to the foreman.

The facility is dedicated to supporting all aircraft series within a single type aircraft. The aircraft are processed to the [HMV](#) level, although general maintenance, modification, and repairs could be performed on any aircraft type within the company's fleet.

Company 2

Company 2 operates several certified repair station facilities throughout the domestic United States. Unlike Company 1, this organization does not operate under an organized labor contract. The organizational structure showed that the lead mechanic is considered an actual [AMT](#) supervisor. The lead mechanic directly assigns work to the specific AMTs. This assignment regime is based upon the AMT's experience, talents and skills. The foreman assigns the number of AMTs to the lead mechanic to complete assigned tasks.

The facility is certified to perform the letter check scheme of progressive maintenance and several lower order inspections upon multiple aircraft types. To manage the operation, a single shift foreman was assigned to each eight hour shift (except during a relief foreman's overlap). The foreman supervises nine to twelve aircraft skill lead mechanics and their crews. The shift foreman responds to a single (day shift) general foreman who is accountable for the overall facility operation. Lead mechanics are designated to monitor production, quality, and efficiency of their crew. In addition, the lead mechanics oversee and coordinate training.

3.2.2 Data Collection

For the purposes of data collection it was decided to focus on the aircraft maintenance foreman and lead mechanics within the first shift for Company 1, and within the first and second shifts for Company 2. This decision was made for the following reasons:

1. As previously mentioned, at Company 2 the aircraft maintenance Lead Mechanic had the primary responsibility for the aircraft and coordination with the Hydraulic and Avionics Lead Mechanics.
2. The second shift (1500-2300 hrs.) was exposed to a myriad of operational variables which include: (1) work turned over from previous shifts, (2) acquisition of new work, and (3) time constraints due to the need for aircraft availability.
3. The second shift had its own culture which in part reflected the culture of the first and third shifts.
4. The importance of observing the shift turnover between the identified supervisory levels was considered a critical task area.

The data gathering method selected for this research was a combination of diary and observation procedures. These methods were selected for several reasons. First, there was a large amount of data to collect (a minimum of eight working hours). Second, the supervisor's job is dynamic and unstructured. Third, the environments were noisy. Finally, first hand information could be obtained through demonstration of tasks and activities.

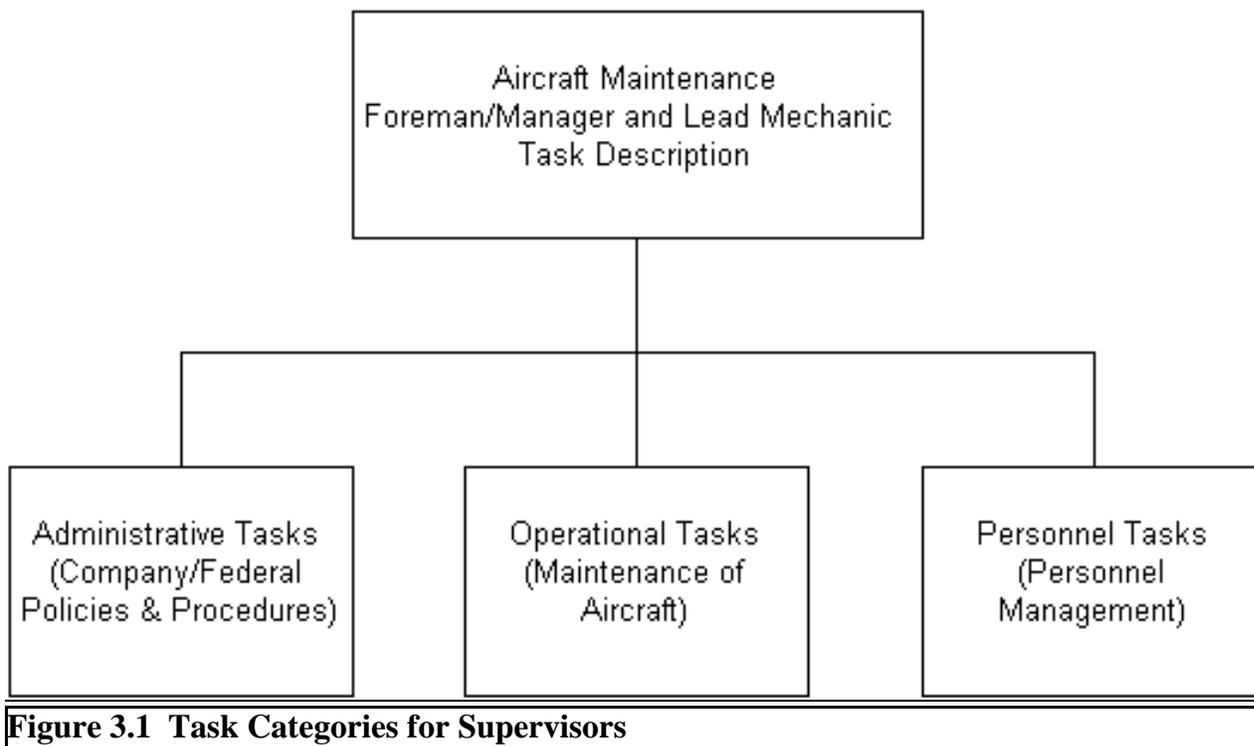
The foreman and a lead mechanic second shift were selected to be "shadowed." A meeting was held with the lead mechanic and foreman prior to the beginning of their shift, and the purpose of the research and the data gathering procedures which would be followed was explained. Every effort was made to not interfere with work activity. Questions concerning task procedures were asked during lulls in the work activities.

3.2.3 Organization and analysis

Once the diary of activities was obtained, it was analyzed and organized to categorize the various tasks and subtasks. The categorization facilitated a detailed task description which allowed for an analysis of the tasks with respect to supervisory skills. The following section gives a task description of the tasks and subtasks performed by the maintenance foreman and the lead mechanic.

3.3 TASK DESCRIPTIONS

The tasks for each supervisor are divided into three major categories: a) Administrative, which includes all tasks dealing with the required paperwork and information flow, b) Operations, or those tasks dealing with the movement, repair and/or modification of the aircraft, and c) Personnel, which includes those tasks that require the interaction of the supervisor with the [AMTs \(Figure 3.1\)](#). Companies 1 and 2 are different in many respects, and as such, some tasks described below are germane to only one company. However, conversations with other repair stations revealed that the tasks are generally common to supervisors throughout the airline industry. It is interesting to note that a majority of the Foreman's and Lead Mechanic's tasks involve the handling and processing of information. The following is a discussion of the tasks and activities by each level of supervision.



3.3.1 Foreman

The aircraft maintenance foremen are generally promoted to their positions from the ranks of lead mechanic. The technical knowledge and skills necessary to perform the supervisory functions were derived from experiences attained as a mechanic and were further refined in a wider scope as lead mechanic. Depending on the physical size of the maintenance facility, the areas of responsibilities included overseeing the [AMTs](#) and lead mechanics engaged in maintenance of a single aircraft to that of varied maintenance functions of multiple aircraft of various types and models. Aircraft delivery times were the major goal of all the second level supervisors observed, and the effective use of a work center and supporting personnel provided the supervisors with the monitoring and management tools necessary for the effective control of the maintenance activities towards that end.

Administration

Administrative tasks involve the management of paper work, information, and office related activities performed by the foreman. Although the work varies from day to day, the administrative tasks encompass a myriad of computer (electronic) paperwork and physical activities through a shift. The category of administrative related tasks include eleven major tasks: 1) process aircraft maintenance alerts, hangar maintenance alerts and other general information, 2) post crew assignments, 3) process various logs, 4) report to general foreman, 5) participate in shift meetings, 6) assume shift/hangar manager tasks as required, 7) assign tasks to lead mechanics, 8) receive and perform tasks from management, 9) approve payroll, 10) monitor compliance with standards and procedures, and 11) perform miscellaneous office tasks ([Section 3.9.1](#)). The following is a brief description of the tasks.

[Process aircraft maintenance alerts, hangar maintenance alerts and other general information](#)

Aircraft Maintenance Alerts (AMAs) and Hangar Maintenance Alerts (HMAs) contain critical information pertaining to the maintenance and hangar operations. They are a result of maintenance information received from several sources, both internally and externally ([FAA](#), [NTSB](#), aircraft and engine manufacturers, and other air agencies). This information may or may not be relevant to the specific work area to which the supervisor is currently assigned, but it is considered required reading by all supervisors. This information, in addition to being posted for required reading by all maintenance personnel, may also be presented in a briefing format to assigned lead mechanic and [AMTs](#) (especially when the information affects the groups activities).

Post crew assignments

The supervisor updates, maintains, and reviews a current list of lead mechanics and [AMTs](#) that are scheduled to report for duty on that shift. From the attendance list, the supervisor assigns both lead mechanics and [AMTs](#) to various maintenance tasks. Generally, the lead mechanics are specifically assigned to one or more particular aircraft with a complement of mechanics which the supervisor envisions as necessary to complete the maintenance.

Process various logs

Each supervisor periodically initiates, reviews, updates and completes several logs that are procedurally required by corporate policies. The logs not only record events that occur during the shift, but also assist the supervisor with the performance of various tasks. The logs address all events that occur during the shift (e.g., [OJIs](#), success or failure to meet schedules, manpower and work load allocations, and interdepartmental communications). The log entries may also include items that pertain to parts, support shop availability, interdepartmental communication (engineering, management, factory representative, etc.), and safety/[HAZMAT](#) issues. In addition to maintaining the logs, the supervisor periodically completes reports concerning overtime usage and aircraft status.

Participate in shift meetings

The supervisor is required to attend several meetings during the work shift. During these meetings, the supervisor addresses aircraft and equipment status as well as production and workload problems. The meetings also provide a forum for the supervisor to interact and coordinate with other skills.

Assume shift/hangar manager tasks as required

At times, the supervisor may be required to acquire the overall control of the entire facility. This additional responsibility will entail the overseeing of all maintenance activities within the entire complex. The designated supervisor will have temporary control over all skill and aircraft maintenance foreman.

Assign tasks to lead mechanics

A lead mechanic may be designated as a substitute for and by the on-duty supervisor. The assignment provides two specific benefits for the supervisor -- work load relief and supervisory training for the lead mechanic. The work assigned to the lead mechanic may encompass duties that require supervisory authority and/or decision making, and as such these credentials are handed down to the lead mechanic to expedite and to learn.

Receive and perform tasks from management

The supervisor, in addition to his normal duties, periodically receives from upper management various additional tasks and assignments. As the supervisor's tasks encompass so much of the overall activities, technical knowledge, and personnel-related interaction within the maintenance complex he is looked upon as a vital resource for upper management's needs.

Approve payroll

At most larger maintenance facilities, payroll is performed through electronic entries. These systems, however, still require supervisory sign off approval. This function becomes a periodic task that is not delegated to a lead mechanic, and, therefore, its review and approval is exclusively handled by the supervisor.

Monitor compliance with standards and procedures

Since company and federal policies are critical to the continuation of federal licensing, the maintenance of overall compliance is generally the responsibility of the attending supervisor. The enforcement and assurance of these mandates are constantly monitored by the effective supervisor.

Perform miscellaneous office tasks

The nature of the overall administrative tasks provide several miscellaneous tasks that occupy the supervisor's time in answering the telephone, e-mail, and inquiries, copying forms, and other general office housekeeping activities.

Personnel

The Foreman has six major tasks which involve personnel: 1) perform disciplinary actions (or rewards as circumstances dictate), 2) counsel lead mechanics and [AMTs](#), 3) assignment of personnel ([AMTs](#) and [LMs](#)) to aircraft and monitor their work, 4) provide guidance, assistance, and training to lead mechanics, 5) conduct periodic performance reviews, and 6) meet with labor representatives as needed ([Section 3.9.2](#)). The following describes the tasks in greater detail.

Perform disciplinary actions (or rewards as circumstances dictate)

The foreman is also tasked with the responsibility of disciplining individuals. Although the [AMT](#) culture is endowed with a high degree of accountability and responsibility, there are times when intervention is required to assure adherence to policies and procedures. The foreman, depending upon the work environment (no labor agreement), is required to participate in corrective action relative to the [AMT's](#) or lead mechanic's conduct. Generally, when an event occurs, the foreman initially "speaks" to the offender outlining the error or offense that was identified. Usually this is sufficient, and no further action is required. It should be noted that the lead mechanic, in the case of an offending [AMT](#), usually completes this level of correction. If a failure to achieve correction is experienced, then the foreman is brought in. In the aforementioned disciplinary action, "speaking" may result in a letter outlining the event and any discussions that occurred. This document is signed by all parties involved (foreman, lead mechanic, and [AMT](#)), and is placed in the employee's personnel file for a predetermined period of time. If at the conclusion of the designated period the issue has been resolved, the letter is removed and no further action is taken. The issue becomes closed without record. However, if there is no resolution, the issue is reopened, re-discussed, and reviewed. If no possible resolution is apparent, a permanent letter is placed in the employee's file, denoting the event, additional review, and conversion of the temporary letter to permanency. This sequence may be followed as often as the foreman decides. Continuation of this procedure may result in attaining a "short" suspension of work (without compensation) for the offender or longer and subsequent suspensions, all documented, until termination.

Facilities operating under a negotiated labor contract have specific and detailed procedures pertaining to discipline. Generally speaking, the first level of nonunion supervision upon noting an "event" discusses the issue with a designated representative of the labor organization. This may result with the representative discussing the issue with the offender and attempting resolution (with no further action), or with the offender, first level nonunion supervision, and the labor representative discussing the issue collectively to achieve a collective and endorsed resolution. Failing success in attaining a satisfactory resolution, a grievance procedure may be instituted by the claimant against the offense. The grievance may be resolved by mutual agreement between the parties involved, or, if necessary, by arbitration. Failure of the offender to comply with a arbitrated resolution could result in suspension or termination proceedings.

Counsel lead mechanics and AMTs

Although not directly observed, interviews with the foremen revealed that counseling their lead mechanics and [AMTs](#) on personal matters was a task that they routinely performed. Individuals occasionally have personal problems (e.g., financial, marital, family, etc.) that may affect their work. It is important that the supervisors are aware of these problems so that they can take any actions necessary. Sometimes, an individual will approach the foreman with the problem, while at other times the foreman will approach the individual after observing an unusual or uncharacteristic work performance.

Conduct crew briefings

Periodically it may become necessary for the supervisor to address specific issues concerning corporate, departmental, or federal policies and/or procedures. In order to effectively disseminate the information, the supervisor uses a crew briefing meeting. The briefings may also concern local policy issues that the supervisor feels is important. The briefings showed a positive two-way flow of information between all parties.

Provide guidance, assistance and training to lead mechanics

The [AMT](#) culture has historically provided a progressive training system for supervisory personnel through the application of an apprentice/mentor relationship. As AMTs are guided and encouraged to prepare for advancement to lead mechanic (predominately in organizations without labor agreements), lead mechanics are identified for potential advancement to foreman. Once identified, the foreman incorporates a training element into the lead mechanic's assignments. This training may involve decision making relative to personnel assignments, work planning and assessments, and interdepartmental activities that parallel the foreman's normal duties.

Conduct periodic performance reviews

Performance evaluation is a task that is performed at regular intervals as specified by the organization. Because evaluation forms are used, this task could have been included in the administrative category. However, the majority of the activities associated with this task involves interactions between the foreman and the lead mechanic/[AMT](#). Actual evaluation procedures vary depending on the circumstances. Therefore, a more detailed breakdown of evaluation activities was not made.

Meet with labor representatives as needed

The maintenance foremen whose organization is operating under an organized labor contract are required to interface with labor representatives concerning the application of various work rules and personnel issues. Many of the issues are generally resolved with mutual and amicable discussion. This subtask does require contractual knowledge, understanding, and interpretation along with (in many cases) authoritative diplomacy. Although, this additional knowledge and comprehensive understanding would not be necessary in noncontractual facilities, interpersonal relationship skills remain an important and fundamental requirement throughout all of the supervisor's tasks.

Operations

Within the category of operations, the foreman has the major tasks of: 1) receiving aircraft, 2) assigning aircraft and personnel to the lead mechanic, 3) receiving aircraft status from the lead mechanics, 4) monitoring work performance, 5) updating crew and aircraft assignments throughout the shift, and 6) coordinating out-of-town trips ([Section 3.9.3](#)). Interwoven throughout the major operations tasks is the coordination with the shift manager/operations manager, other skill foreman and other departments within the organization. This coordination allows for the timely flow of vital information both vertically and horizontally throughout the organization. All information concerning the work status, maintenance problems, and delivery times go through the foreman or his appointed substitute. The following describes the six major tasks in more detail.

Receiving aircraft

The supervisor, upon reviewing the planned work for both inbound aircraft and those scheduled for departure, must remain attentive to the facility's capabilities and committed production schedules. The anticipated arrival of new work, scheduled departure of completed work, and delays of planned work necessitate forward (in hours and days) planning. This is considered an operational task that bears heavily upon the success and effectiveness of the supervisor's duty. The ability to rethink and replan the activities and assignments when anticipated events change provides the overall operation effectiveness.

Assigning aircraft and personnel to the lead mechanic

Through coordination with the shift manager/operations manager, the foreman receives and reviews information on aircraft currently in the maintenance facility as well as aircraft scheduled to arrive during the shift. By combining this information with personnel availability from the crew sheet, the foreman assigns the necessary number of [AMTs](#) with their lead mechanics to the various aircraft. At this point, the foreman may also assign specific tasks primarily to the lead mechanics as well as the AMTs. These specific tasks include such things as the transportation of mechanics and related personnel to aircraft outside of the immediate maintenance facility (i.e., to another airport to conduct scheduled, unscheduled or emergency maintenance), the transportation and movement of aircraft to and within the maintenance facility, and other tasks as required by the foreman. These additional tasks can include nontechnical work such as assisting the foreman in performing miscellaneous office procedures.

Throughout the shift, the foreman monitors the [AMTs](#) and lead mechanics under his/her control. Typically this involves a walk through inspection of the work being performed. The foreman/manager not only observes the quality of work being performed, but also notes items such as unsafe acts, use of nonstandard procedures, mishandling of equipment, etc. Though usually done at the beginning of the shift, the task of monitoring the work of the lead mechanics and AMTs is performed throughout the shift at the discretion of the foreman/manager. The task of monitoring has no set procedure. Rather, it is based on the knowledge and experience of the supervisor, and varies from person to person. As a result, the monitoring task is not broken down into subtasks or activities.

Receiving aircraft status from the lead mechanics

The observed supervisors had established and tasked personnel within the operation to maintain a constant feedback of production events and aircraft status. Although many decisions were handled by the lead mechanics without the supervisor's advice, the decisions and results were presented to the supervisor in a timely manner. The importance of this feedback defined two critical factors for the supervisor. First, it allowed for effective planning or replanning for the supervisor. Second, it demonstrated the lead mechanic's training, capabilities, and limitations to the supervisor for later evaluation.

Monitoring work performance

At both facilities the supervisor would periodically journey throughout the work areas. This was done for several reasons: 1) to review and update his reports as to the progress of critical operations, 2) to compare the planned schedule against the actual, allowing for possible reevaluation, and 3) to provide his personal presence at the work sight. It also allowed the supervisor to learn and understand the current complexities and technical aspects of new work and work environments which would provide improvement and accuracy in his future planning

Updating crew and aircraft assignments throughout the shift

Due to the dynamic nature of an aircraft maintenance environment, the supervisor relies heavily upon information flow and feedback from the work areas to control scheduling. Priorities and demands oftentimes change during the work period, and supervisors demonstrated both the flexibility of their personnel and capabilities of their organizations to change assignments, resources and focus as the situation demanded.

Coordinate out of town trips

Occasionally an aircraft may develop a mechanical problem that requires landing at an airport that may not be served by that operator. Or, the aircraft may be located at an airport that, although served by the operator, may not have the maintenance facilities nor capabilities required to return it to service. Both of the analyzed facilities were capable and qualified to support field maintenance. The request for field support is forwarded to the supervisor along with information pertaining to the type of aircraft, mechanical problem, location, and aircraft status. The supervisor responds by taking the necessary action to gather the required staffing, tools and equipment, and replacement parts. The scheduled and relative times, necessary arrangements, clearances and paperwork are all executed by the supervisor to effect a prompt resolution. In addition, the activities of several interrelated internal departments and external agencies ([DOT/FAA/NTSB](#)) must be coordinated by the supervisor to insure a timely and successful off-site maintenance activity.

3.3.2 Lead Mechanic

The aircraft maintenance lead mechanic is generally selected or promoted from the ranks of the aircraft maintenance technicians. As with the foreman, the technical knowledge and skills required to perform the supervisory functions were derived from experiences as a mechanic. The major goal of the lead mechanic is the timely delivery of the aircraft. The completion of this goal is dependent on the effective use of his/her personnel and acquired technical skills. The following describes the major task categories, tasks and subtasks performed by the lead mechanic.

Administrative

Administrative tasks for the lead mechanic were defined as procedural tasks that do not directly affect personnel or the maintenance of the aircraft. Five major tasks were identified: 1) checking the [AMAs](#) and [HMAs](#) upon arrival at work, 2) checking in with the foreman upon arrival at work, 3) updating the time and attendance sheets for [AMTs](#), 4) scheduling physical exams for the AMTs, and 5) assuming the foreman's tasks when the foreman is not present ([Section 3.9.4](#)). The following is a brief description of each of these tasks.

[Checking the AMAs and HMAs upon arrival at work](#)

Aircraft Maintenance Alerts (AMAs) and Hangar Maintenance Alerts (HMAs) are publications that provide information that is critical to the maintenance of the aircraft or hangar operations. The AMAs and HMAs are posted for all personnel to read and review. One of the lead mechanic's tasks involves reading the AMAs/HMAs and signing them to attest that they have been read. Although this task may be done at any time during the shift, lead mechanics typically read and sign the AMAs and HMAs at the beginning of their shift.

[Checking in with the foreman upon arrival at work](#)

Checking in with the foreman at the beginning of the shift was identified as a separate nonformalized task under the administrative category. Although the lead mechanic was usually assigned an aircraft and personnel during this task (and thus potentially could fall under either the personnel or operational categories), it was considered administrative since it did not necessarily involve people or aircraft. The check in procedure confirms for the foreman/manager that the lead mechanic was present and available for assignment.

[Updating the time and attendance sheets for AMTs](#)

At one repair station, the lead mechanic was tasked with updating the time and attendance sheets of the [AMTs](#). This task involves collecting individual time and attendance sheets, and compiling them onto a master sheet to be submitted to the payroll office. Lead mechanics may elect to perform this task in a single session at the end of a pay period, or may choose to update the master sheet throughout the pay period as time permits.

[Scheduling physical exams for the AMTs](#)

In order to move or operate any and all powered equipment (e.g., tugs, cranes, aircraft, etc.), each [AMT](#) in demonstrating their proficiency, must also receive and pass a medical examination. For an aircraft taxi license, there are two exams that are required: (1) a yearly physical examine which is conducted off-site in a physician's office, and (2) a semiannual audio and visual test which is typically done on site at the nurse's station. It is the task of the lead mechanic to arrange for the AMTs to have these physical examinations. The task is a fairly simple one consisting of evaluating current and future manpower needs (to determine if the aircraft ready time would slip due to temporary loss of an AMT), and calling the appropriate office to schedule an appointment.

[Assuming the foreman's tasks when the foreman is not present](#)

The most demanding administrative task required of a lead mechanic is to assume the duties of the foreman. There are occasions when the foreman is temporarily absent (illness, training, or other assigned duties). In these cases, the foreman will assigned his duties to an available lead mechanic. These appointed duties are described in the discussion of the foreman's tasks.

Personnel

In the personnel related task category, seven major tasks were identified ([Section 3.9.5](#)): 1) provide counseling, 2) provide discipline and rewards, 3) provide training, 4) conduct qualification checks, 5) assign work to [AMTs](#), 6) evaluate performance, and 7) hold crew meetings. The following is a brief description of each of these tasks.

[Provide counseling](#)

Although not performed on a consistent basis, providing personal counseling is an important task of the lead mechanic. This task is similar to that performed by the foreman, but since the [AMTs](#) are closer to the lead mechanic, the [AMTs](#) usually approach the lead mechanic first. The lead mechanic tends to be limited in the help that they can provide, but quite often, just having someone in authority to talk with is helpful to the person with a personal problem. Work-related counseling is another counseling task performed by the lead mechanic, and is sometimes referred to as coaching. If an [AMT's](#) work quality slips or if an [AMT's](#) work habits deteriorate, it becomes the task of the lead mechanic to counsel the [AMT](#) on how to improve performance. Lead mechanics sometimes consider counseling as a precursor to disciplinary action.

[Provide discipline and rewards](#)

When a mechanic fails to comply with work standards, or ignores the counseling efforts of the lead mechanic to help improve performance, it becomes necessary for the lead mechanic to discipline the [AMT](#). Most lead mechanics take pride in the fact that they can handle problems without resorting to disciplinary action; however, when forced to do so, the lead mechanic follows the procedures established by the organization. Usually, the first level of an official disciplinary action (beyond work counseling) is the "verbal warning." Not only does the lead mechanic tell the offending [AMT](#) that he is being given a "verbal warning," but also the lead mechanic must record the date, time and purpose of the warning. If the [AMT](#) still does not comply with established standards, the lead mechanic will initiate a "written warning." The "written warning" is the second level of disciplinary action available to the lead mechanic. The lead mechanic has no disciplinary action available past "written warning." If the offending [AMT](#) still refuses to comply with the organization's rules and regulation, the lead mechanic will turn the problem over to the foreman to handle. Unlike discipline, the task of rewarding an [AMT](#) who performs above and beyond expectations tends to be unofficial. Because the lead mechanic has authority over job assignments, the lead mechanic will typically assign lighter duties to those individuals who deserve a reward.

[Provide training](#)

Providing training is a major task under the personnel-related tasks category. Providing training consists of determining training needs of the [AMT](#), giving on-the-job training (OJT), and providing instructions on the use of mechanized equipment. The performance of the first task (determining training needs) will vary depending on the current skill level of the [AMT](#) and presence of new technology. A lead mechanic may determine that an individual needs a refresher course in a particular maintenance operation, or, if there has been a technological change or improvement in the aircraft, schedule the appropriate training.

[Conduct qualification checks](#)

As previously mentioned, a mechanic must also be qualified to use any powered equipment. The most difficult qualification to obtain is the taxi check. The process of qualifying to taxi an aircraft starts with riding in the copilot seat to learn the procedures. The mechanic will eventually move to the pilot seat and taxi under the supervision of a qualified individual. Once the mechanic shows that he is capable of taxiing the aircraft, the lead mechanic will conduct a qualification check. The qualification check is considered a separate task.

[Assign work to AMTs](#)

Another task performed by the lead mechanic is the assignment of work to individual mechanics. The lead mechanic receives one or more aircraft and a list of the personnel available to him. The lead mechanic must then assign the mechanics to the various tasks that need to be completed. The assignment task involves technical knowledge of the work to be accomplished, an understanding of the abilities of the mechanics on the crew, delivery time constraints, previous work assignments, reward and discipline concerns, and any special directives from the foreman or upper management.

Evaluate performance

Once the mechanics have been assigned to their jobs, the lead mechanic has the task of monitoring the work being performed. Although similar, the monitoring of work conducted under the category of personnel-related tasks is different than monitoring tasks performed under the category of operational related tasks. Monitoring of work under personnel-related tasks is associated with quality as opposed to production levels. Repairs made by an [AMT](#) may be adequate for airworthiness, yet be of poor quality. Through monitoring, the lead mechanic ensures high quality workmanship. There is no set structure to the monitoring task, rather the lead mechanic observes the AMTs at work, then uses his/her technical knowledge and expertise to recognize: 1) the level of work quality, 2) whether the equipment is being used properly, 3) the physical safety of both the aircraft and the personnel, and 4) if proper hazardous material handling procedures are being followed.

Hold crew meetings

Holding crew meetings is another task of the lead mechanic. These meetings are held at the discretion of the lead mechanic, but usually occur when there is no adverse impact on aircraft delivery time. During these meetings, the lead mechanic may discuss any number of concerns to include: future work, ways to improve quality, and technical or interpersonal relationship problems.

Operations

Operational tasks consume a majority of the lead mechanic's time and effort. This is not unexpected since the maintenance lead mechanic has final responsibility for the airworthiness of the aircraft. The category of operations-related tasks has seven major tasks ([Section 3.9.6](#)): 1) receiving aircraft, 2) conducting preflight checks, 3) releasing aircraft, 4) monitoring work production, 5) coordinating out-of-town maintenance trips, 6) conducting administrative work directly related to the aircraft, and 7) obtaining parts for the maintenance of the aircraft. The following is a briefly description of each of the major tasks.

Receiving aircraft

The lead mechanic may receive an aircraft in two ways: by a turnover from a previous shift or as an arrival of an aircraft during the shift. Likewise, the lead mechanic may release an aircraft through a turnover to a subsequent shift or by finishing all maintenance and releasing the aircraft back into service. Turnovers occur at the beginning and end of each shift, and are usually conducted in the following manner. The lead mechanics meet at the aircraft being discussed so that specific problems may be pointed out, the releasing lead will review the work that has been accomplished, current status, and any problems that have occurred. The receiving lead will ask questions for clarification, and then check paper work to ensure that the work that has been accomplished has been signed off and that all the remaining paperwork is in order. When receiving an aircraft during a shift, the lead mechanic has the subtasks of securing the aircraft from the line, preparing the hangar area to receive the aircraft, parking the aircraft in the proper location and preparing the paperwork package for the arriving aircraft. If an aircraft is to be released during the shift, the lead mechanic must complete all the necessary paperwork for release, make a final inspection of the aircraft, sign and turn in the airworthiness release, and finally, notify the organization of the aircraft's availability.

Conducting preflight checks

There are occasions when a preflight check must be conducted prior to the release of the aircraft. This task involves coordinating with other skills, checking out a preflight handbook, moving the aircraft to the preflight test site, conducting the tests, and releasing the aircraft for service.

Releasing aircraft

The tasks involved with releasing an aircraft are closely associated with receiving an aircraft.

Monitoring work production

As previously mentioned, the lead mechanic monitors the work of the [AMTs](#) both for production as well as for quality. Within the tasks of monitoring work under the operations related category, the lead mechanic moves between work sites to evaluate production, determines aircraft status to relate to the foreman, and facilitates the work being done by the AMTs. Facilitation of work includes various subtasks such as ordering parts, lending a helping hand and providing technical expertise.

Coordinate out-of-town maintenance trips

A field maintenance event, which normally is tasked to the supervisor, may be delegated to a lead mechanic. The delegation may occur due to workload or to provide a training element for the lead mechanic. In either case, the assigned lead mechanic will coordinate and establish the entire agenda. Additionally, the designated lead mechanic may in fact become the supervisor in the field to lead and conduct the work as part of his/her supervisory training.

Conducting administrative work directly related to the aircraft

Throughout the process of conducting maintenance on the aircraft, the lead mechanic is tasked with administrative work. Since these administrative tasks are directly related to the maintenance of the aircraft, they are grouped under the operations related task category. The administrative paperwork is broken down into the subtasks of: initiating and updating the shift log, updating the aircraft log (in most cases the [AMT](#) updates the aircraft log; however, the lead mechanic is responsible for the completed log) and initiating and updating compliance (check) sheets. As a final administrative task, the lead mechanic must routinely report the status of the aircraft to the shift foreman/manager.

Obtaining parts for the maintenance of the aircraft

Ordering parts is a major task for the lead mechanic. It is also fairly complicated, involving many subtasks and activities. It is not within the scope of this report to detail all the decisions and processes involved with ordering parts for the aircraft. There are, however, three major subtasks involved with ordering parts. First, the part number must be determined. There are a number of ways this may be accomplished if the part number is not readily available. Second, an order for the part must be placed with the appropriate subsystem. Finally, once a part is secured, it must be delivered to the appropriate work site.

3.4 TASK ANALYSIS

With the understanding that the supervisor has responsibilities for organization, effective communication, and quality control as well as for providing technical expertise, each of the major tasks in this study was analyzed with respect to a select set of leadership skills. Leadership has been studied and analyzed in many different ways, but the research can be classified according to the primary focus: leadership traits, leadership skills, behavior, power and influence, or situation factors.³ This study focuses on the skills related to effective leadership. The use of the word "skill" implies an ability which can be developed through training and practice. It is not enough that a person has the appropriate traits of a leader, but that person must also have good leadership skills to be effective.

In an early taxonomy of leadership skills, Katz⁴ identified three basic developmental leadership skills:

- 1) Technical skills - an understanding of and proficiency in methods, processes, procedures and/or techniques associated with a specific kind of activity.
- 2) Human skills - an ability to work effectively as a group member building cooperative efforts towards a common goal.
- 3) Conceptual skills - the ability to see and understand the organization as a whole; to include how the various functions depend on one another, and thus how to coordinate and integrate all the activities towards a common goal.

Mann⁵ also identified three similar supervisory skills: technical skills, human relation skills and administrative skills. In addition, Mann noted that the mix of these skills varied depending on the supervisory level within the organization. First level supervisors tend to have a larger amount of technical skills with less human relation and conceptual skills. Higher level supervisors, on the other hand, have more human relation and conceptual skills as opposed to technical skills.

The skills/competencies identified by Katz⁴ and Mann⁵ are reflected in the three main task categories identified in the aircraft maintenance environment: administrative-related tasks, personnel-related tasks and operations-related tasks. In order to analyze the tasks within each category, however, specific skills for effective leadership needed to be identified. Yukl and Van Fleet³ suggest that specific skills for effective leadership should include: analytical abilities, persuasiveness, speaking ability, memory for detail, empathy and tact. In the American Assembly of Collegiate Schools of Business (AACSB) Outcome Measurement Project Report,⁶ nine skills and personal characteristics (SAPC) were identified and defined. The nine SAPCs in the research are:

- | | |
|-----------------------------|--------------------------|
| 1) Analytical | 6) Oral communication |
| 2) Computer | 7) Planning/organizing |
| 3) Decision | 8) Risk taking |
| 4) Initiative | 9) Written communication |
| 5) Leadership/interpersonal | |

Mullin, Shaffer and Grelle⁷ summarized a number of taxonomies of the basic management skills essential to good leadership. These taxonomies are displayed in [Table 3.1](#) where it can be noted that there are many similarities between leadership skills taxonomies.

Table 3.1 Taxonomies of Basic Management Skills⁷

| 1959 | 1988 | 1988 Development | 1984 | 1989 Big Eight | 1989 |
|-----------------|-------------------|------------------|--------------------------|------------------|-----------------|
| Gordon & Howell | Porter & McKibbin | Dimensions Inc. | Cameron & Whetten | Accounting Firms | Albanese |
| PROBLEM-SOLVING | ANALYTICAL | ANALYSIS | CREATIVE PROBLEM-SOLVING | INTELLECTUAL | Decision-making |
| | | | | Problem-solving | |

| | | | | | |
|---|---|--|---------------------------------------|---|-----------------------------|
| DECISION-MAKING | DECISION MAKING | JUDGEMENT | | Creative | |
| Analysis | | | GROUP DECISION MAKING | Unstructured | Creative Problem Solving |
| Judgment | RISK TAKING | | | Problem anticipation | Developing Self awareness |
| | | | SELF AWARENESS | Inductive thought | Goal setting & planning |
| | | | Ethical issues | Judgment | Organizing |
| ORGANIZATIONAL | PLANNING/ ORGANIZING | PLANNING & ORGANIZING | IMPROVING EMPLOYEE PERFORMANCE | Value-based reasoning | Controlling |
| Information flow | | | | Organization of work to meet priorities | Conducting Group Meetings |
| Division of labor | | DELEGATION CONTROL | DELEGATION & JOINT DECISION MAKING | | Managing Time |
| Plan, delegate, coordinate | | | | | Leading |
| INTERPERSONAL RELATIONSHIPS | LEADERSHIP/ Interpersonal | LEADERSHIP | MANAGING CONFLICT | INTERPERSONAL | Acquiring Power & Influence |
| | | Individual | | Influence | Managing Emp. Performance |
| | | Group | | Delegation | |
| Strong personal motivation (attitude that contributes indirectly to skills) | Initiative (attitude that contributes indirectly to skills) | Disposition to lead (attitude that contributes indirectly to skills) | MANAGING PERSONAL STRESS | Motivation | Managing Group Process |
| | | | GAINING POWER & INFLUENCE | Conflict resolution | Developing Subordinates |
| | | | | | Appraising Emp. Performance |
| COMMUNICATION | COMMUNICATION | COMMUNICATION | ESTABLISHING SUPPORTIVE COMMUNICATION | COMMUNICATION | Communication |
| Oral & nonverbal | Oral | Oral: | | Presentation | Oral |
| Verbal, numerical | Written | Communication | | formal/informal | Written |
| Idea formulation | | Presentation | | oral/written | |
| Generating/transmitting | | Written | | Listening | Active Listening |
| receiving/interpreting | Computer Skills | | | obtain & organize | |

non-quantitative &
 quantitative
 information & data

information

Based on the aforementioned research, seven leadership skills were identified that impacted the effective performance of the supervisor. [Table 3.2](#) provides a list of the skills along with a definition and example of the use of the skill within the aircraft maintenance environment. An analytical methodology similar to that used to analyze maintenance technicians in inspection⁸ was used in this study.

Table 3.2 Definition With Example Of Leadership Skill

| Leadership Skill | Definition | Example |
|--------------------------------------|--|--|
| Technical skills | Those skills necessary to understand and perform maintenance on an aircraft | Conducting and directing corrective maintenance action and activities on an aircraft or related components |
| Procedural/ Administrative skills | Those skills required to correctly perform the various procedures and administrative tasks required by federal or organizational regulations | Releasing or signing the airworthiness or serviceability of an aircraft or related component after maintenance work has been completed |
| Communication skills | Skills necessary to effectively send a message (verbal or nonverbal) to a receiver (or receivers) in order to affect the receiver's behavior | Assigning personnel to aircraft or component maintenance tasks and receiving information pertaining to productivity and obligations |
| Decision-making skills | Skills required to reach the best solution to a problem when the correct answer is unknown | Determining the effective course of maintenance, corrective activity and or personnel assignment to complete aircraft or component maintenance and repair work |
| Coordination skills | Skills necessary to interact in effective agreement with other skills, departments or organization in order to efficiently complete a task | Effective use of all resources and associated maintenance organizations for completion of individual work assignments or aircraft delivery |
| Interpersonal skills | Those skills necessary to interact effectively with others so that the consequences of a person's behavior matches his intentions | Dealing with aggressive personnel in complex personal, technical and authoritative manner |
| Situation awareness skills | Skills necessary to perceive and understand the state of the aircraft system (subsystem) in order to minimize errors, interpret information and to coordinate crew members | Cognizant of maintenance activities and assigned work by dedicated and ancillary work groups that may impact aircraft maintenance assignments including personnel safety |

[Sections 3.9.7](#) and [3.9.8](#) show the task analysis document used for the two supervisory levels (lead mechanic and foreman/manager). As previously described for each supervisory level there are three main categories: administrative related tasks, personnel related tasks and operations related tasks. Each of the major tasks within the categories are listed, and

the use of a particular skill employed in that task is indicated. Subtasks as well as observations are also provided in the documents.

3.5 INTERVENTION STRATEGIES

An evaluation of the task analysis was done by summing the occurrence of each leadership skill within the three task categories for both the lead mechanic and the foreman. For comparison purposes, the numbers were normalized to a scale of 0 to 1. The results (Table 3.3) reveal several possible intervention strategies to assist the aircraft maintenance supervisors in the performance of their job. The following sections will describe potential job aids for the supervisor along with rationale for nondevelopment or development.

Table 3.3 Occurrence of Leadership Skills by Task Category

| Supervisor | Task | | | Skill | | | | |
|---------------|----------------|------|------|-------|------|------|------|------|
| | Category | T | P | Com | D | Coor | I | SA |
| Foreman | Administration | 0.54 | 0.73 | 0.54 | 0.91 | 0.45 | 0.36 | 0.36 |
| | Personnel | 0.33 | 0.67 | 1.0 | 1.0 | - | 0.83 | 0.17 |
| | Operations | 1 | 0.67 | 0.67 | 1 | 0.67 | 0.67 | 0.67 |
| | Total | 0.62 | 0.69 | 0.74 | 0.97 | 0.37 | 0.62 | 0.4 |
| Lead Mechanic | Administration | 0.4 | 0.8 | 0.6 | 0.8 | 0.6 | 0.4 | 0.4 |
| | Personnel | 0.71 | 1.0 | 1.0 | 1.0 | 0.43 | 1.0 | 0.43 |
| | Operations | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.86 | 0.71 |
| | Total | 0.90 | 0.93 | 0.87 | 0.93 | 0.68 | 0.75 | 0.51 |

T: Technical skills, P: Procedural skills, Com: Communication skills, D: Decision making skills,

Coor: Coordination skills, I: Interpersonal relationship skills, SA: Situation awareness skills

3.5.1 Electronic Job Aid

The use of procedural/administrative skills scored high for the lead mechanic (0.93) and moderately high for the foreman (0.69). The lower score for the foreman may have been due to the fact that in both companies, the foreman currently uses a computer to aid him in his work, thus minimizing administrative duties. Many of the administrative tasks observed for the lead mechanic consisted of documentation of current events that occur during the duty period. Events, whether positive or negative to the success of productivity, are listed on the lead mechanic's running log. Upon completion of the assignment (shift or aircraft) this information is filed for review or investigation if after-the-fact aircraft incidents warrant. The possibility of an electronic job aid for event data would simplify the administrative tasks by providing a real time medium with an enhanced database on site. The availability of pertinent reference data, historical references, task assignments, technical instructions, etc. would help minimize the administrative duties required of the lead mechanic. In addition, entries into an electronic log could provide a flexible analytical database that could be used to identify selected and repetitive problems/events occurring during the course of the tasks. This database could then be used to identify areas of concern that may need improvement or restructuring.

This job aid was eliminated from possible development for two reasons. First, a proposal of such an electronic job aid was presented to the lead mechanics of one repair station. The response received was one of appreciation that such a device could assist them to some degree. However, it was felt that such a device would cause a unwanted encumbrance when weighed against the potential benefits a prototype may provide. Additionally, the physical presence of this device would have required it to be exposed to various hostile environments where potential physical damage, and/or accidental abuse/misuse could be incurred. The overall summation from the lead mechanics was that the electronic advantages were outweighed by physical disadvantages. Secondly, a similar (but without log entries capabilities) prototype job aid was currently under development for application within a certified component repair facility ([Chapter 1](#)). The conceptual attributes, though not identical, were sufficiently similar to the envisioned hangar prototype that this effort would be a duplication of effort.

3.5.2 Training Program for Technical Knowledge and Expertise

Technical skills are an important aspect of a lead mechanic's functions. This is reflected in the high technical skills score shown in [Table 3.3](#). In order to understand what manpower and physical resources are required for a maintenance task, the lead mechanic must first have the knowledge and understanding of the technical aspect of the job. Anecdotal evidence revealed that when a lead mechanic does not have an understanding of maintenance tasks, he puts himself at risk with the [AMTs](#). The AMTs tend to lose respect of a supervisor with limited technical expertise as they generally rely upon the lead mechanic's technical background as an educational and labor reducing asset. The technical aspects of the AMT culture fall into three identifiable categories: 1) general/basic aircraft maintenance knowledge (this is generally provided by certified [A&P](#) Technical Schools), 2) aircraft and aircraft system specific knowledge (this knowledge is generally provided by in-house or in-manufacturer's training facilities), and 3) acquired experience (this is usually obtained by familiarity and/or longevity). It is for this reason that lead mechanics are typically promoted up from the ranks of AMTs after demonstrating their technical proficiency and potential leadership capabilities.

Foreman, on the other hand, do not have to apply their strong technical skills in order to perform their functions. As previously mentioned, the mix of leadership skills can vary depending on the level of supervision, and the higher the supervisory level the fewer technical skills are necessary. [Table 3.3](#) gives a total score of 0.62 for the use of technical skills by the foreman.

Obtaining effective technical knowledge and expertise is typically accomplished through classroom instruction and on-the-job training (OJT). The industry has historically provided [AMTs](#) technical training via in-house or in-manufacturer's factory schools when either new equipment is placed in operation, or a significant change is implemented to the current equipment that would warrant a dedicated technical training program. Therefore, a technical training program for this requirement was not justified nor could the current training be improved upon within the scope of this program.

3.5.3 Training Program for Leadership Skills

The use of leadership skills was scored high for both levels of supervision. [Table 3.3](#) shows the importance of communication and decision making skills for both the foreman (0.74 and 0.97 respectively) and the lead mechanic (0.87 and 0.93 respectively). In addition, throughout the data collection process, the lead mechanics and foremen mentioned the need for new supervisors to receive leadership training. Currently, the tyro lead mechanics are placed in supervisory positions, and are expected to learn leadership skills through trial and error. As a result, mistakes are often made and the training may not necessarily address the errors. Due to the strong need of leadership skills, it was decided that the development of a leadership skills training course was within the realm and objective of the Task Analysis.

Leadership skills are skills that may be developed through well designed training programs that involve both the theory of leadership as well as the practical application of leadership skills. The tyro lead mechanic should be scheduled for leadership classes to supplement administrative/procedural classes provided by the organization.

3.6 LEADERSHIP SKILLS TRAINING

The following section will discuss the curriculum of a leadership training course as envisioned for the future direction of the course.

3.6.1 Course Curriculum

The following curriculum will be provided to the supervisors by trained and qualified facilitators. It should be noted that each of the following topics contain contributing elements that overlap each other, and therefore a summation topic should be considered to integrate all the elements as factors within effective leadership.

Communications Skills

Considered as one of the most important elements of effective leadership, the presentation should include *Understanding the Dynamics of Communications*. Simulations should be included that portray the effects or consequences of *Good and Bad Communications*, *Explanations of Hearing vs. Listening*, and *Communication Etiquette*. The session should conclude with the importance and methodology of *Empathic Listening*.

Decision-Making Skills

For a dynamic and effective leader, decision-making is integral to the duties and responsibilities expected and anticipated by the organization. Curriculum materials for this training session should identify *The Importance and Influence of Effective Decisions*. The importance of identifying *How Decisions Are Made*, the *Effects of Right and Wrong Decisions*, and *Emotional vs. Logical Decisions* should also be addressed. At closing, decision-making tools can be provided by presenting *Decision Diagramming*, which allows the candidate to develop systematic methods to analyze and evaluate the decision making process.

Coordination Skills

Coordination of (and between) separate but interrelated groups and teams oftentimes becomes one of the most vital components, that involves effective leadership skills. The supervisor's ability to maintain fluidity of tasks and information between his/her organization and other groups involved in a collective effort should be part of any education event. Information on the *Reading and Understanding of People* and *Understanding Attitudes* would provide the supervisor with vital tools to formulate an effective coordinated and cooperative environment. Simulations and case studies that demonstrate *Defining Human Nature* and *Dealing with People* would provide the supervisors with insight as to the coping techniques necessary to effectively steer the necessary events into a productive direction.

Interpersonal Relationships Skills

The defining of interpersonal relationship skills provides the candidate with an understanding of how he/she needs to work with other people and to allow those individuals to work with the candidates. A subtopic of *Confrontation and Compromise* would also be a part of the session. Demonstrations and related case studies or simulations would provide insight as to the dynamics of group interaction. A successful leader should be shown how development of *Tack* and *Influence* can assist and reinforce the leadership role when situations develop that reduce the effectiveness of positive production.

Situation Awareness

Being cognizant of not only the overall scope of current events, but also that of projecting and understanding the influences and results from those activities is a vital factor that provides a successful leader with the ability to operate effectively. *Situation Awareness* would be demonstrated by simulation and/or case studies where the positive and negative results can be analyzed by the candidates. Factors that have an influential bias within a situation, such as *Stress and Stress Management*, and *Shell and Shell Management*, would be portrayed as influences on the overall awareness of both the designated leader and his/her group or team.

Combining Leadership Skills

The culmination of each identifiable topic and related subtopic would be combined into a integrated simulation where elements of each acquired skill can be exercised and applied. The simulation, relative to the groups particular environment or culture, should portray familiar events with adequate technical facets to provide a real-time dramatization. This simulation should provide adequate times for the group to enact with the event, analyze the factors demonstrated, and identify both the positive and negative elements of the event.

3.6.2 Future Development of Leadership Training

It is envisioned that the development of the leadership training course will start with construction of a prototype course focused on one specific leadership skill. A highly interactive multimedia computer-based training program will be designed and built to supplement the leadership skills instruction provided by a qualified trainer. In addition, real life problems and situations will be obtained through interviews with a variety of experienced supervisors, and the situations will form the basis for case studies and classroom discussions. To ensure that the prototype leadership training course addresses the needs of the aviation community, the designers will work in close cooperation with aircraft repair stations. The course development will be based on the classical iterative software/instruction development methodology that follows the cycle of design, test, measure and redesign.⁹

3.7 ACKNOWLEDGMENTS

Special acknowledgment is given to the lead mechanics and foremen/managers of Delta Airlines and Northwest Airlines for allowing us to ask questions and observe them as they perform their many tasks.

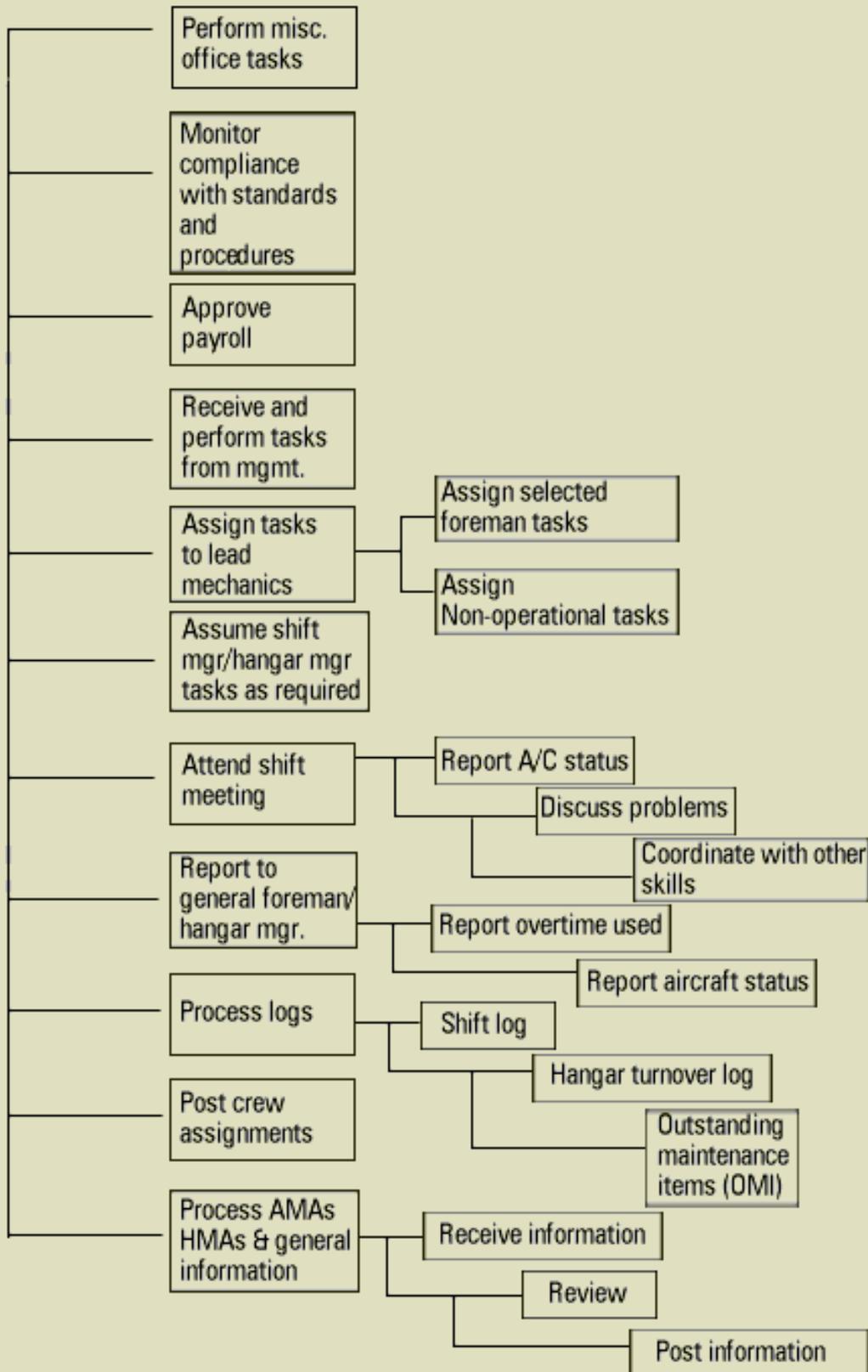
3.8 REFERENCES

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3.9 APPENDICES

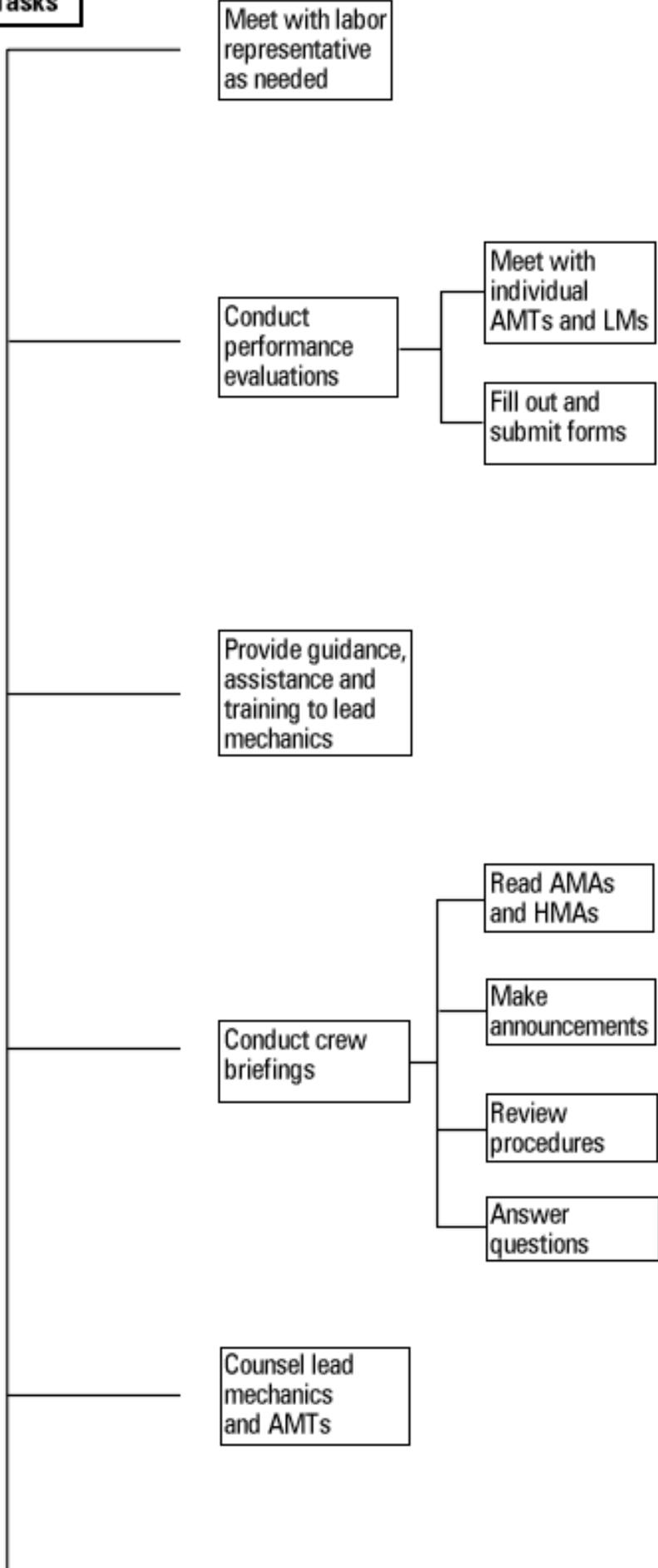
3.9.1 Appendix A Foreman - Administrative Related Tasks

Aircraft Maintenance
Foreman Task Description
Administrative Related Tasks



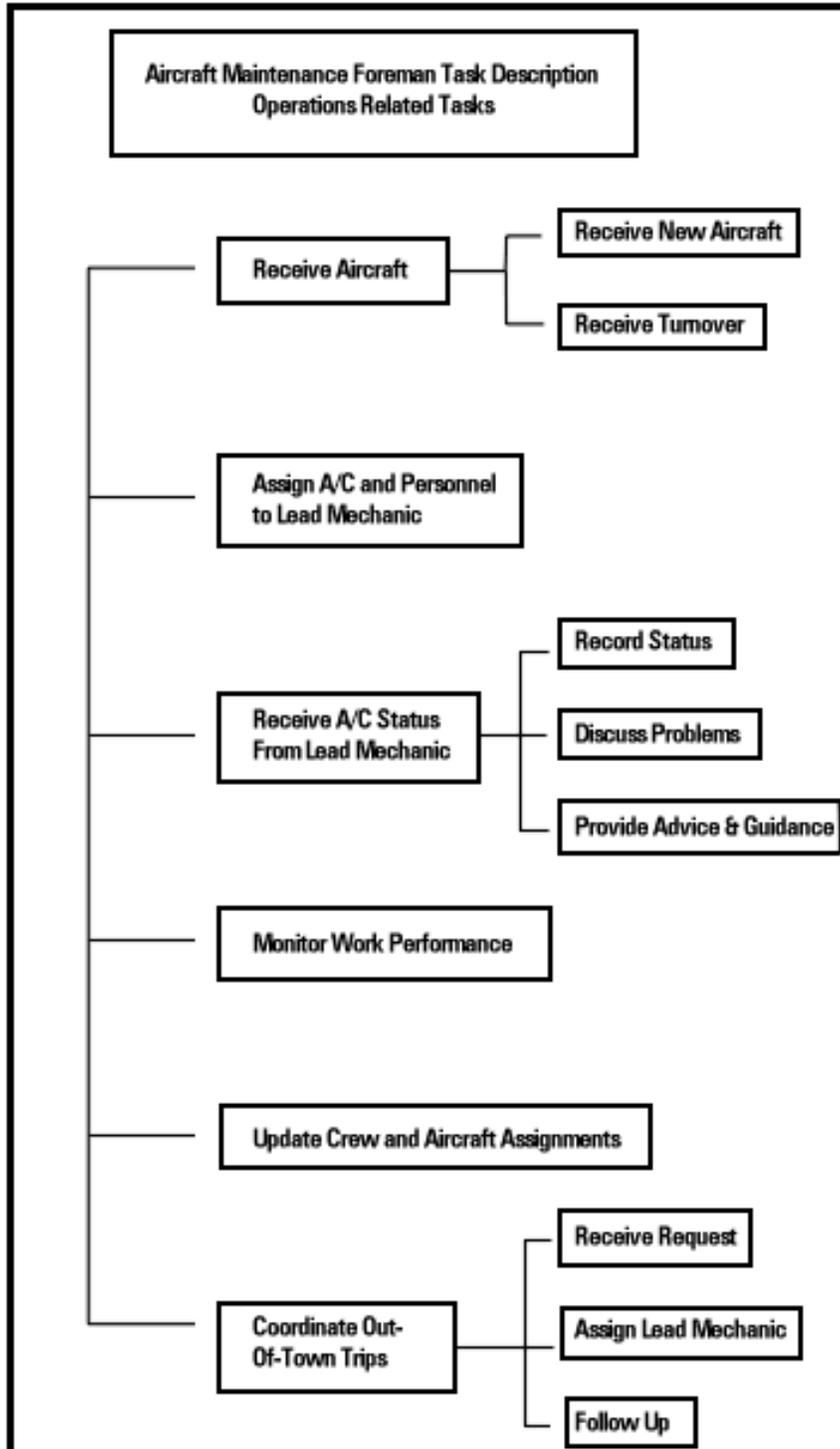
3.9.2 Appendix B Foreman - Personnel Related Tasks

**Aircraft Maintenance
Foreman Task Description
Personnel Related Tasks**

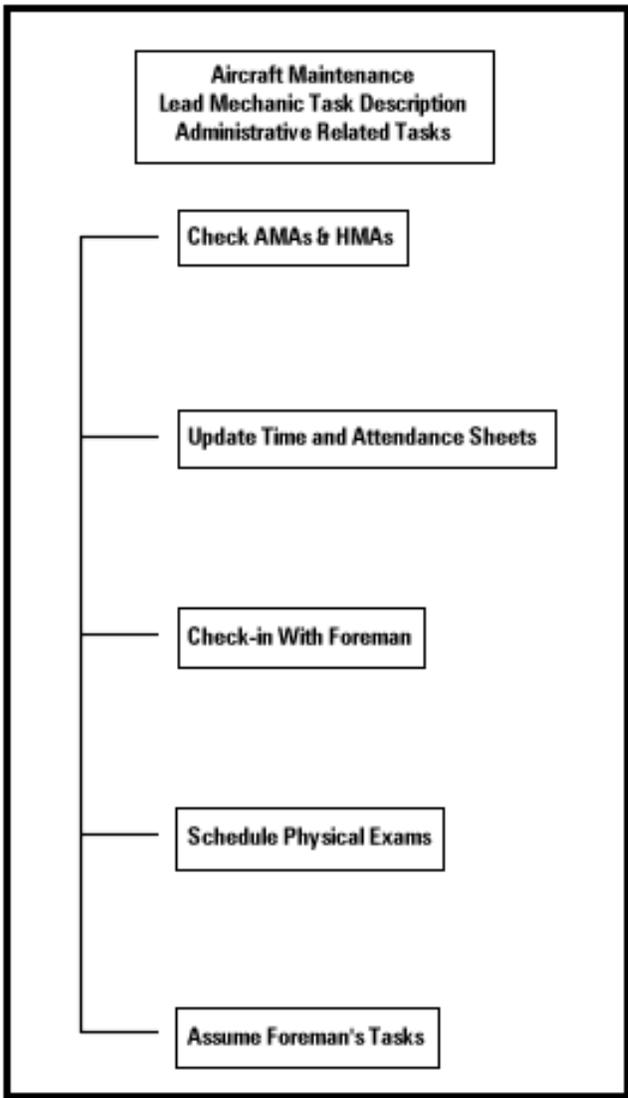


Discipline
and reward

3.9.3 Appendix C Foreman - Operations Related Tasks

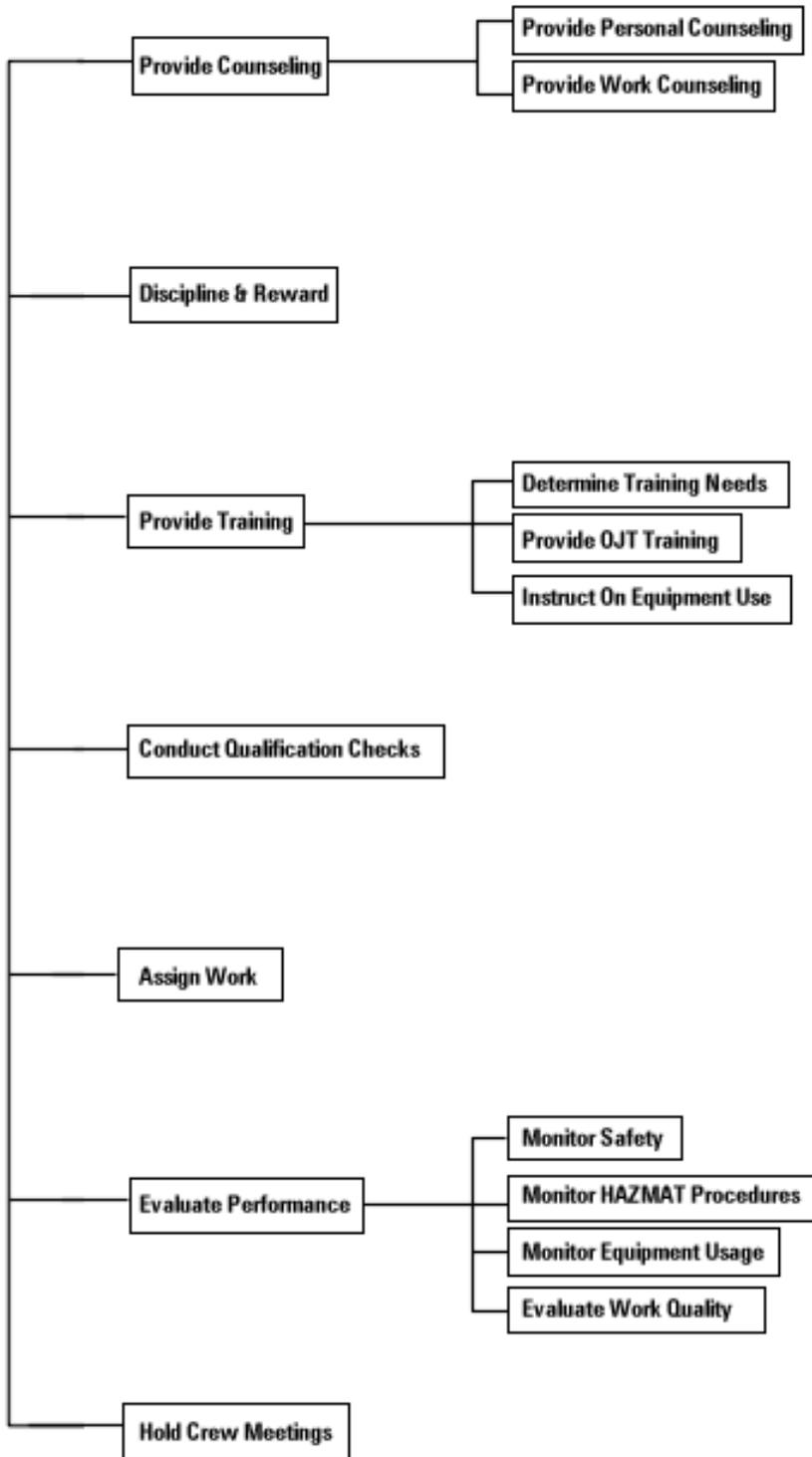


3.9.4 Appendix D Lead Mechanic - Administrative Related Tasks

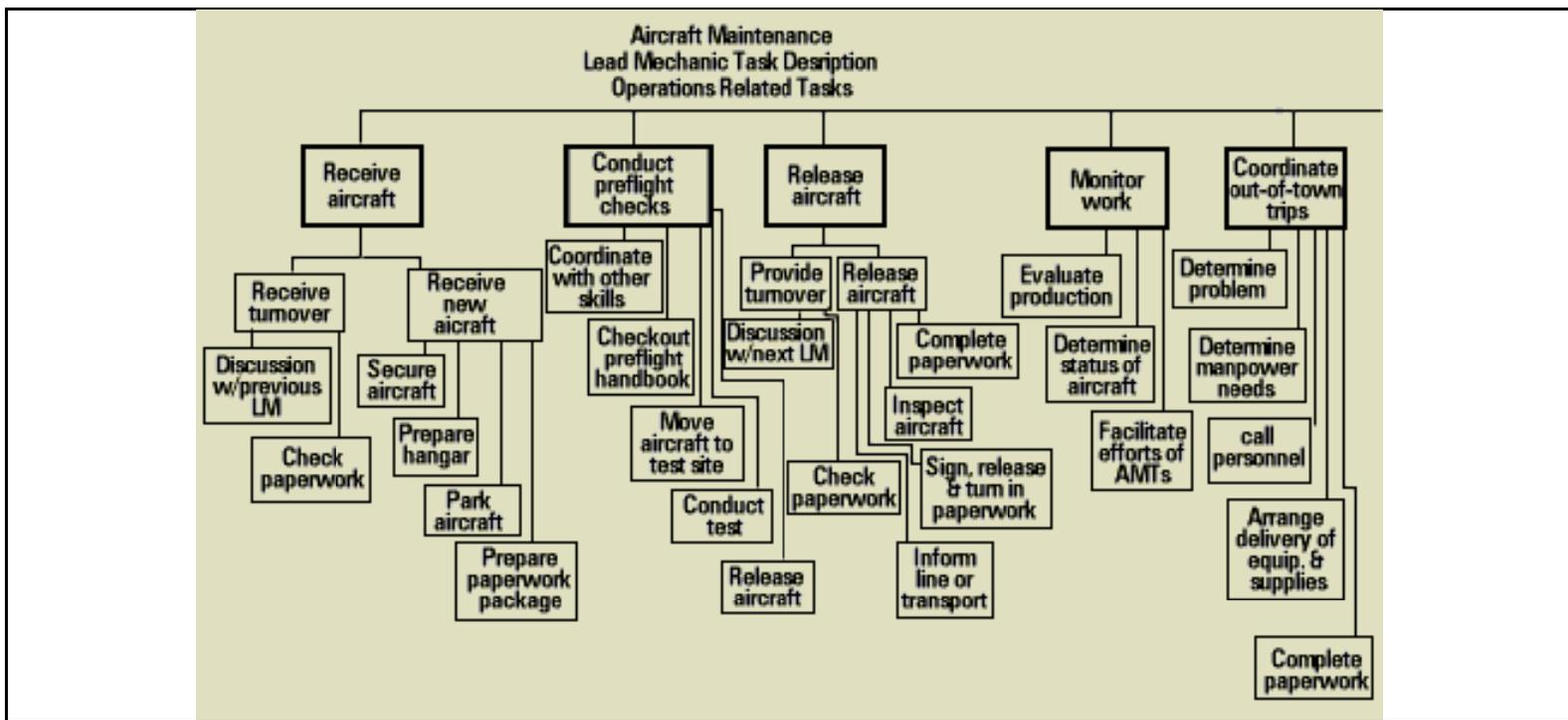


3.9.5 Appendix E Lead Mechanic - Personnel Related Tasks

Aircraft Maintenance
Lead Mechanic Task Description
Personnel Related Tasks



3.9.6 Appendix F Lead Mechanic - Operations Related Tasks



3.9.7 Appendix G - Task Analysis for Foreman

| Task Description | TASK ANALYSIS | | | | | | | SUB-TASKS & OBSERVATIONS |
|--|---------------|---|-----|---|------|---|----|--|
| | SUB-SYSTEMS | | | | | | | |
| | T | P | Com | D | Coor | I | SA | |
| ADMINISTRATION RELATED TASKS | | | | | | | | |
| Process AMAs, HMAs and General Information | X | X | | X | | | | Receive information Review Post information |
| Post crew assignments | | X | | | | | | Initiate, update & complete shift log Initiate, update & complete hangar turnover log Receive, update & turnover OMI's |
| Process logs | X | X | X | X | X | | X | |
| Report to general foreman/hangar manager | X | X | X | X | X | | | Report overtime used Report aircraft status |

T: Technical skills P: Procedural skills COM: Communication skills D: Decision making skills
 COOR: Coordination skills I: Interpersonal relationships skills SA: Situation Awareness skills

| Task Description | TASK ANALYSIS | | | | | | | OBSERVATIONS |
|---|---------------|---|-----|---|------|---|----|--|
| | SUB-SYSTEMS | | | | | | | |
| | T | P | Com | D | Coor | I | SA | |
| Attend shift meeting | X | | X | X | X | X | X | <ul style="list-style-type: none"> Report A/C status Discuss problems Coordinate with other skills Assign selected foreman tasks Assign non-operational tasks |
| Assume shift manager/hangar manager tasks as assigned | X | X | X | X | X | X | X | |
| Assign tasks to lead mechanics as required | | | X | X | | X | | |
| Receive and perform tasks from management | | | X | X | X | X | | |
| Approve payroll | | X | | X | | | | |
| Monitor compliance with standards and procedures | X | X | | X | | | X | |

T: Technical skills P: Procedural skills COM: Communication skills D: Decision making skills
COOR: Coordination skills I: Interpersonal relationships skills SA: Situation Awareness skills

| Task Description | TASK ANALYSIS | | | | | | | OBSERVATIONS |
|---|---------------|---|-----|---|------|---|----|---|
| | SUB-SYSTEMS | | | | | | | |
| | T | P | Com | D | Coor | I | SA | |
| Perform miscellaneous office tasks | | X | | X | | | | <ul style="list-style-type: none"> Read AMAs and HMAs Make announcements Review procedures Answer questions Meet with individual AMTs and lead mechanics Fill out and submit evaluation forms |
| PERSONNEL RELATED TASKS | | | | | | | | |
| Discipline and reward | | X | X | X | | X | | |
| Counsel lead mechanics and AMTs | | | X | X | | X | | |
| Conduct crew briefings | X | | X | X | | | | |
| Provide guidance, assistance and training to lead mechanics | X | X | X | X | | X | | |
| Conduct performance reviews | | X | X | X | | X | | |

T: Technical skills P: Procedural skills COM: Communication skills D: Decision making skills
COOR: Coordination skills I: Interpersonal relationships skills SA: Situation Awareness skills

| Task Description | TASK ANALYSIS | | | | | | | OBSERVATIONS |
|---|---------------|---|-----|---|------|---|----|---|
| | SUB-SYSTEMS | | | | | | | |
| | T | P | Com | D | Coor | I | SA | |
| Meet with labor representatives as needed | | X | X | X | | X | X | <ul style="list-style-type: none"> · Receive new aircraft · Receive turnover · Record status · Discuss problems · Provide advice and guidance · Receive notification · Assign lead mechanic · Handle situations as necessary · Follow up |
| OPERATIONS RELATED TASKS | | | | | | | | |
| Receive aircraft | X | X | X | X | X | X | X | |
| Assign aircraft and personnel to lead mechanics | X | | X | X | X | X | | |
| Receive aircraft status from lead mechanic | X | X | X | X | X | X | X | |
| Monitor work performance | X | | | X | | | X | |
| Update crew and aircraft assignments | X | X | | X | | | | |
| Coordinate out-of-town maintenance trips | X | X | X | X | X | X | X | |

T: Technical skills P: Procedural skills COM: Communication skills D: Decision making skills
COOR: Coordination skills I: Interpersonal relationships skills SA: Situation Awareness skills

3.9.8 Appendix H - Task Analysis for Lead Mechanic

| Task Description | TASK ANALYSIS | | | | | | | SUB TASKS & OBSERVATIONS |
|-------------------------------------|---------------|---|-----|---|------|---|----|--|
| | SUB-SYSTEMS | | | | | | | |
| | T | P | Com | D | Coor | I | SA | |
| ADMINISTRATION RELATED TASKS | | | | | | | | |
| Check and sign AMAs and HMAs | X | | | X | | | X | |
| Update time and attendance sheets | | X | | X | | | | |
| Check in with foreman | | X | X | | X | X | | |
| Schedule physical exams | | X | X | X | X | | | |
| Assume foreman's tasks | X | X | X | X | X | X | X | |
| PERSONNEL RELATED TASKS | | | | | | | | |
| Provide counseling | X | X | X | X | | | X | <ul style="list-style-type: none"> · Provide personal counseling · Provide work counseling |
| Discipline and reward | | X | X | X | | | X | |

T: Technical skills P: Procedural skills COM: Communication skills D: Decision making skills
COOR: Coordination skills I: Interpersonal relationships skills SA: Situation Awareness skills

| Task Description | TASK ANALYSIS | | | | | | | |
|--|---------------|---|-----|---|------|---|----|--|
| | SUB-SYSTEMS | | | | | | | OBSERVATIONS |
| | T | P | Com | D | Coor | I | SA | |
| Provide training | X | X | X | X | X | X | X | <ul style="list-style-type: none"> · Determine training needs · Provide on-the-job training · Instruct on equipment use · Monitor and assure safety · Monitor and assure HAZMAT procedures · Monitor and assure proper equipment use · Evaluate and assure work quality |
| Conduct qualification checks (equipment) | X | X | X | X | | X | | |
| Assign work to AMTs | X | X | X | X | X | X | X | |
| Evaluate performance | X | X | X | X | X | X | X | |
| Hold crew meetings | | X | X | X | | X | | |

T: Technical skills P: Procedural skills COM: Communication skills D: Decision making skills
COOR: Coordination skills I: Interpersonal relationships skills SA: Situation Awareness skills

| Task Description | TASK ANALYSIS | | | | | | | |
|---------------------------|---------------|---|-----|---|------|---|----|---|
| | SUB-SYSTEMS | | | | | | | OBSERVATIONS |
| | T | P | Com | D | Coor | I | SA | |
| Receive aircraft | X | X | X | X | X | X | X | <ul style="list-style-type: none"> · Receive turnover *Discussion w/ previous lead mechanic *Check paperwork · Receive new aircraft *Secure aircraft *Prepare hangar *Park aircraft *Prepare paperwork package · Coordinate with other skills · Check out pre-flight handbook · Move aircraft to test site · Conduct test · Release aircraft |
| Conduct pre-flight checks | X | X | X | X | X | | X | |

T: Technical skills P: Procedural skills COM: Communication skills D: Decision making skills
COOR: Coordination skills I: Interpersonal relationships skills SA: Situation Awareness skills

| Task Description | TASK ANALYSIS | | | | | | | OBSERVATIONS |
|------------------|---------------|---|-----|---|------|---|----|--|
| | SUB-SYSTEMS | | | | | | | |
| | T | P | Com | D | Coor | I | SA | |
| Release aircraft | X | X | X | X | X | X | X | <ul style="list-style-type: none"> ·Receive turnover *Discussion w/ next lead mechanic *Check paperwork ·Release aircraft *Complete paperwork *Inspect aircraft *Sign release and turn in paperwork *Inform line or transport aircraft |
| Monitor work | X | X | X | X | X | X | X | <ul style="list-style-type: none"> ·Evaluate production ·Determine status of aircraft ·Facilitate effort of AMTs |

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| Task Description | TASK ANALYSIS | | | | | | | OBSERVATIONS |
|--|---------------|---|-----|---|------|---|----|--|
| | SUB-SYSTEMS | | | | | | | |
| | T | P | Com | D | Coor | I | SA | |
| Coordinate out-of-town maintenance trips | X | X | X | X | X | X | | <ul style="list-style-type: none"> · Determine problem · Determine manpower requirements · Call personnel · Arrange delivery of equipment and supplies · Complete paperwork |
| Conduct administrative work | X | X | X | X | X | X | X | <ul style="list-style-type: none"> · Update foreman · Initiate, update and/or complete work log · Update aircraft log · Initiate, update and/or complete compliance sheets |
| Obtain parts | X | X | X | X | X | X | | <ul style="list-style-type: none"> · Obtain part number · Order part · Receive part |

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