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A COMPARATIVE ANALYSIS OF THE EFFICIENCY AND EFFECTIVENESS OF THE F-14 TOMCAT OVERHAUL PROCESS

by

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June 1998

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ABSTRACT

The objective of this thesis is to examine the process and managerial policies used for F-14 Standard Depot Level Maintenance (SDLM) and compare it to the processes and managerial policies for overhaul of the F/A-18 and for the United Airlines 737. Efficiencies discovered in the F/A-18 and 737 overhaul processes that can be applied to reduce the F-14 SDLM Turn Around Time (TAT) are identified.

The F-14 community faces the possibility of having insufficient numbers of aircraft to satisfy fleet requirements due to excessive SDLM TAT. A 50% reduction in TAT would yield an increase of 10 to 11 aircraft available for use per year. A TAT reduction of 10% is required by the fourth quarter of Fiscal Year 1998 in order to alleviate the premature retirement of approximately 10% of the inventory (21 F-14 aircraft).

This research identifies areas for potential F-14 SDLM TAT improvement pertaining to planning, pre-induction requirements, and the component management policies at NADEP Jacksonville, Florida.

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I. INTRODUCTION

A. BACKGROUND

Global considerations impact virtually all strategic decisions. The U.S. National Security strategy requires a quick and efficient response to all threats against both the United States and its allies. Carrier Battle Groups and associated assets are critical elements to providing air supremacy in modern day littoral regions. Naval aviation readiness is directly linked to the availability of both aircraft and their components through cost efficient and timely repair.

The Naval Aviation Maintenance Program (NAMP) provides an integrated system for performing aeronautical equipment maintenance and related support functions. It was established by the Chief of Naval Operations (CNO) and implemented by the Chief, Bureau of Aeronautics, on 26 October 1959. The objective of the NAMP is to meet and exceed aviation readiness and safety standards established by CNO. This is accomplished by optimizing the use of manpower, materials, facilities and financial resources in accordance with policy guidance and technical direction provided by the NAMP and other related directives. The methodology for meeting the objective is continuous process improvement. Because of the dynamic nature of the program, the NAMP has been periodically revised to incorporate improved methods and techniques, such as the concept of three levels of maintenance.

The NAMP is founded upon a "three-level" maintenance concept and is the authority governing the management of all three levels. These levels are the Organizational level, the Intermediate level, and the Depot level of aviation maintenance. The NAMP provides the management tools required for efficient and economical use of personnel and material resources in performing maintenance at any of the three levels. It also provides the basis for establishing standard organizations, procedures, and responsibilities for the accomplishment of all maintenance on naval aircraft, associated material, and equipment.

The division of maintenance into three levels allows management to:

(1) Classify maintenance functions by levels;

(2) Assign responsibility for maintenance functions to a specific level;

(3) Assign maintenance tasks consistent with the complexity, depth, scope, and range of work to be performed;

(4) Accomplish any particular maintenance task or support service at a level that ensures optimum economic use of resources; and

(5) Collect, analyze, and use data to assist all levels of NAMP management.

Organizational level (O-level) maintenance is performed by an operating unit on a day-to-day basis in support of its own operations. The maintenance mission is to maintain assigned aircraft and aeronautical equipment in a full mission capable status while continually improving the local maintenance process. While Intermediate level or Depot level activities may do O-level maintenance, it is usually accomplished by squadron maintenance personnel.

O-level maintenance functions generally can be grouped under the categories of:

(1) Inspections;

(2) Servicing;

(3) Handling;

(4) On-equipment corrective and preventive maintenance including on-equipment repair, removal, and replacement of defective components;

(5) Incorporation of Technical Directives within prescribed limitations; and

(6) Record keeping and reports preparation.

Intermediate level (I-level) maintenance is the responsibility of, and performed by, designated maintenance activities in support of user organizations. The I-level maintenance mission is to enhance and sustain the combat readiness and mission capability of supported activities by providing quality and timely material support at the nearest location with the lowest practical resource expenditure. I-level maintenance consists of both on and off equipment material support and may be grouped as follows:

(1) Performance of maintenance on aeronautical components and related support equipment;

(2) Calibration of designated equipment;

(3) Processing aircraft components from stricken aircraft;

(4) Providing technical assistance to supported units;

(5) Incorporation of technical directives;

(6) Manufacture of selected aeronautical components, liquids, and gases; and

(7) Performance of on-aircraft maintenance when required.

Depot level (D-level) maintenance is performed at naval aviation industrial establishments to ensure continued flying integrity of airframes and flight systems during subsequent operational service periods. D-level maintenance is also performed on material requiring major overhaul or rebuilding of parts, assemblies, subassemblies, and end items. It includes manufacturing parts, modifying, testing, inspecting, sampling, and aircraft reclamation. D-level maintenance supports O-level and I-levels of maintenance by providing engineering assistance and performing maintenance beyond their capabilities. D-level maintenance functions may be grouped as follows:

(1) Standard Depot Level Maintenance (SDLM) of aircraft;

(2) Rework, repair and modification of engines, components, and support equipment;

(3) Calibration of instruments and other equipment by Navy calibration laboratories;

(4) Incorporation of technical directives;

(5) Manufacture or modification of parts or kits; and

(6) Technical and engineering assistance by field teams.

The Naval Aviation Depots are responsible to support the organizational and intermediate level activities by providing technical assistance and carrying out those functions that are beyond the responsibility or capability of the "O" or "I" level activities through the use of more extensive facilities, skills and materials. Personnel representing the depot carry out depot level services in depots, or in the field. It is in this light that the term "depot" represents both a capability and a facility. (OPNAVINST 4790.2 series)

Naval Aviation Depots provide three general industrial functions:

(1) They are involved with the rework of aviation end items, systems and components;

(2) They are involved in the manufacture of items and component parts otherwise not available or that are cost prohibited; and

(3) They are involved with support services which include professional engineering, technology and calibration services.

Rework of aircraft falls into three distinct categories of maintenance functions, modification functions, and special structural inspections. Maintenance functions are those functions required to maintain or restore the inherent designed service levels of performance, reliability, and material condition. It involves the complete rebuild through reclamation, refurbishment, overhaul, repair, adjustment, servicing, replacement of system consumables, and includes inspection, calibration, and testing. Modification functions are those functions required to change or improve design levels of performance, reliability, and material condition. Special structural inspections are performed by the depot to determine fatigue life computations, technical directive compliance requirements and any inspections that can not be performed by the "O" or "I" levels due to a lack of skills, expertise or equipment. (OPNAVINST 4790.2 series)

Naval Aviation Depot (NADEP) Jacksonville, Florida, is responsible for performing the coverage of F-14 SDLM requirements. The Standard Depot Level Maintenance (SDLM) process is expected to identify material deficiencies and to correct such deficiencies so that the aircraft can be maintained at the organizational or intermediate level with assurance of a high level of operational availability through the next operating service period. Corrections of deficiencies will be at the lowest authorized maintenance level in accordance with OPNAVINST 4790.2G Volume II, Chapter 3. Correction of Depot Level deficiencies will be corrected by the most economical means available. These requirements include a thorough and comprehensive inspection of selected aircraft structures, systems and components by appropriate methods with defect correction, preventive maintenance and modification requirements to ensure serviceability of affected items through the next operating service period. These requirements also include replacement of depot level time-change components exceeding the specified replacement intervals prior to the next scheduled SDLM induction, as well as compliance with all outstanding technical directives.

In the early 1970s, the Grumman F-14 Tomcat began service to the fleet. In the System Maintenance Concept, through Reliability and Maintainability data, operational performance, and system/component design, Grumman Aerospace determined an Operating Service Period (OSP) of 36 months between SDLM visits. The OSP for the Tomcat was updated to 48 months and then again to 56 months in the early 1980s.

In an effort to save money by deferring depot level maintenance until the material condition of the aircraft warranted induction to SDLM, the Aircraft Service Period Adjustment (ASPA) program was developed by the Naval Aviation Logistics Center (NAVAVNLOGCEN) in 1983. ASPA involves an on-site inspection conducted by depot level engineers to determine if SDLM is necessary. By adjusting the criteria for SDLM induction from "on-schedule" to "on-subjective-condition," depot induction deferrals have become the rule rather than the exception. Today, the average time between SDLM's is 8 years (56 month OSP + ASPA 4 average).

As a result of "rightsizing" the military infrastructure, the Base Realignment and Closure Committee (BRAC), decided in 1993 to close NADEP Norfolk, Virginia. The F-14 SDLM process transitioned to NADEP Jacksonville, Florida, inducting the first F-14 Tomcat on October 1, 1994. This change to the depot location has undoubtedly increased the variability that currently plagues the SDLM process. The effect of a "learning curve" has been prevented from becoming fully optimized due to various changes to the flow, work content and demand.

Finally, a major force that has also degraded the process is the excessive NAVICP surcharge on parts or the extreme cost of replacement parts when the depot has limited Aviation Depot Level Repair (AVDLR) dollars available. This has resulted in depots hiding demand and requirements from NAVICP through the use of in-house repairs. This practice has resulted in:

- No NAVICP visibility, resulting in no economies of scale procurements;
- In-house repair backlog;
- Unknown total demand;
- Increased cannibalization; and
- Hidden overhead and administrative costs.

B. PURPOSE OF RESEARCH

The purpose of this research is to analyze and compare the process of Standard Depot Level Maintenance (SDLM) of the F-14 aircraft to both the F/A-18 Programmed Depot Maintenance (PDM) process and to United Airlines commercial aircraft overhaul procedures. Presently, the F-14 Turnaround Time (TAT) for SDLM at NADEP Jacksonville, Florida is 14 to 16 months. The excessive TAT can be attributed to a number of factors including:

(1) The Operative Service Period (OSP) has grown from 36 months to 56 months.

(2) The Aircraft Service Period Adjustment (ASPA) had deferred SDLM inductions for an average of 4 years.

(3) F-14 depot level repair relocated from NADEP Norfolk, Virginia to NADEP Jacksonville, Florida.

(4) Depot avoidance of NAVICP surcharge through the use of in-house repairs.

This research examines how a SDLM Master Plan and the idea of "requisitioning versus repair" at the depot could effect the variability of labor, materials, time and money resulting in greater efficiency and effectiveness of the F-14 overhaul process. An analysis of processes and practices used at NADEP North Island, California, and the United Airlines Maintenance Facility in San Francisco, California will be applicable not only to the F-14 aircraft, but to other naval aircraft overhaul processes.

C. SCOPE OF RESEARCH

This thesis is a comparative analysis of the overhaul processes and procedures at each NADEP. Each current production process is diagrammed and measured. Areas for process improvements at NADEP Jacksonville, Florida, are identified, and potential improvements analyzed with their impact on cost, system availability, and inventory requirements forecasted. The lessons learned are summarized for future aircraft programs and other areas for DOD use.

Additionally, process improvements based on industry best practices are analyzed for possible incorporation into the F-14 overhaul process. These process improvements are prioritized by their ability to decrease the process variability, to have positive effects on TAT, and to be effectively implemented within the structure of NADEP. These process improvements are identified through the analysis of data from actual commercial industry applications. This provides a quantifiable measurement of the system currently utilized by NADEP.

D. METHODOLOGY

The F-14 SDLM repair process and data are documented through the study of current NADEP procedures and interviews with NADEP Jacksonville, Florida, personnel. A comparative analysis was conducted through research and interviews with technical experts from NADEP North Island, and United Airlines. Additional interviews included individuals from the Naval Air Systems Command (NAVAIR) and the Navy Inventory Control Point (NAVICP). The literature review includes trade publications, DOD and industry technical manuals, and periodicals.

The researchers identify areas for improvement within the current F-14 SDLM process. Incorporating and analyzing maintenance data from other industry "best practices" shows specific improvements and serves as the basis for process improvement forecasts. The researchers extend the information derived from this data to forecast possible improvements in NADEP Jacksonville's TAT.

E. THESIS ORGANIZATION

Chapter II provides a background of how the SDLM process has changed over the years by defining it, explaining why it has changed, and explaining the hoped-for benefits of reduced TAT.

Chapter III examines and compares the processes and management practices at NADEP Jacksonville, Florida, with NADEP North Island, California, and United Airlines.

Chapter IV is a comparative analysis of the three overhaul processes using historical and projected amounts of materials, labor, total costs and time.

Chapter V presents a clear and concise summary of the conclusions and recommendations that are drawn from the research. Additionally, an evaluation of the efficiency, effectiveness and benefits of workable solutions of the SDLM process at NADEP Jacksonville, Florida, is provided. Finally, this chapter presents suggestions for areas of further research.

II. STANDARD DEPOT LEVEL MAINTENANCE (SDLM)

A. BACKGROUND

Naval Aviation Depots provide three general industrial functions: Rework, Manufacture and Support Services. First, they are involved with the rework of aviation end items, systems and components. Second, they are involved in the manufacture of items and component parts not otherwise available or that are cost prohibitive. Third, they are involved with support services which include professional engineering, technology, and calibration services. As this thesis research focuses on the rework process of the F-14 Tomcat, there is a need to provide a definition of rework.

Rework is comprised of both maintenance and modification functions. Maintenance functions are those functions required to maintain or restore the inherent designed service levels of performance, reliability, and material condition. These functions span the complete rebuild of the aircraft through reclamation, refurbishment, overhaul, repair, adjustment, servicing, and replacement of system consumables. They also include inspection, calibration, and testing of those systems. Modification functions are those functions required to change or improve design levels of performance, reliability, and material condition. It also includes alteration, conversion, engineering changes, and modernization of aircraft. (OPNAVINST 4790.2 series)

The first F-14 Tomcat requiring Standard Depot Level Maintenance (SDLM) was inducted into the Naval Aviation Depot (NADEP), Norfolk, Virginia in 1975. In 1982, the F-14 SDLM effort was expanded to include NADEP North Island, California, as a second F-14 aircraft overhaul site. In 1991, F-14 depot maintenance process was reverted back to a single site location and conducted in Norfolk, Virginia. NADEP North Island, California, completed its last SDLM overhaul on 26 April 1992. In 1993, the Base Realignment and Closure Committee (BRAC) decided to close NADEP Norfolk, Virginia. The F-14 SDLM process was subsequently transitioned to NADEP Jacksonville, Florida, where the first F-14 Tomcat was inducted on October 1, 1994. NADEP Jacksonville, Florida, completed their first F-14 SDLM on 16 January 1996.

B. SDLM MASTER PLAN

Each Type/Model/Series aircraft in the Navy inventory is assigned an Operational Service Period, (OSP) per OPNAVINST 3110.11T. The OSP defines the minimum time period between SDLM and "provides the basis for planning, programming, and budgeting for a particular aircraft." (OPNAVINST 3110.11T) In the case of the F-14, the initial OSP was 36 months. After this initial OSP was reached, aircraft were inducted into the overhaul process. Inspections of the first few aircraft provided reliability, maintainability and operational performance data which resulted in the recommendation of extending the F-14 OSP from 36 to 48 months. The same results occurred again at the 48 month OSP, which resulted in a second OSP adjustment in the late 1970s to the current time frame of 56 months.

In 1982, the Naval Aviation Logistics Center was driven by a desire to avoid inducting aircraft of sound material condition into the overhaul process in an effort to save valuable fiscal resources. Consequently, the Department of the Navy instituted the Aircraft Service Period Adjustment, (ASPA) program. This program involved an in-depth inspection, conducted by depot level industrial engineers, to determine if a SDLM was warranted. The purpose of this evaluation was to provide a means of determining the need to induct an aircraft for depot level maintenance, based on material condition, flight time, Period End Date (PED) and other factors. By adjusting the criteria for SDLM induction from "on-schedule" to "on subjective-condition," depot induction deferrals through the ASPA inspection became the rule rather than the exception.

Today, the results of this ASPA program plague the F-14 community. On average, an F-14 aircraft operates in the fleet for approximately 8 years before it is inducted into SDLM. As an example, through this increased operation in the fleet, the depot is experiencing an increasing number of delamination problems on the flight control surfaces of the aircraft. This problem is above and beyond the current SDLM specifications and has consequently increased the TAT of the aircraft at the depot. Another major consequence of the ASPA program is the resulting complexity of the planning and scheduling process for F-14 aircraft inductions to SDLM. There is a high degree of variability and uncertainty regarding the labor and material required as well as the number of aircraft inducted into SDLM each year. Finally, the actual total costs associated with SDLM process has averaged 25.1 percent higher than the estimated total costs due to the uncertainty of the condition of each aircraft inducted.

Deferring F-14 Standard Depot Level Maintenance resulted in a tremendous backlog of rework that not only possessed the aforementioned problems, but also created a scheduling and capacity problem that could not be easily overcome by NADEP Jacksonville, Florida. As a result, a revised SDLM Master Plan as shown in Appendix A was created in an effort to identify those aircraft that met the criteria for potential continued service through the year 2008 versus those aircraft whose structural and material condition would not be of benefit to the sustained readiness requirements for the fleet. Although ASPA inspections are still conducted at fleet units, the results of the inspections are utilized only to identify safety of flight discrepancies and not to identify candidates for SDLM induction.

C. THE SDLM SPECIFICATION

The SDLM specification is a document that establishes the overhaul requirements for naval aircraft. This specification establishes the Standard Depot Level Maintenance (SDLM) requirements for the Navy F-14A, F-14B, and F-14D series aircraft. The requirements of SDLM are determined based on systematic analysis of airframe, systems and component design, their operational performance and

Reliability and Maintainability (R&M) data. The SDLM process is expected to identify material deficiencies and to correct such deficiencies so that the aircraft can be maintained at the organizational or intermediate level with assurance of a high level of operational availability through the next Operating Service Period. The SDLM specification is divided into six separate sections. They are:

(1) General Instructions;

(2) SDLM Requirements;

(3) SDLM Functional Flight Check and Government Acceptance;

(4) Component Removal and Replacement;

(5) Maintenance Requirements Card Inspections Not Accomplished at SDLM; and

(6) SDLM Reports.

Section I of the SDLM specification contains general information concerning the purpose and scope of the SDLM process, SDLM intervals, definitions of the terminology used in depot level maintenance and applicable maintenance references.

Section II contains the minimum technical depot level scheduled maintenance requirements. It also contains information concerning unscheduled maintenance requirements which are discovered as a result of visual zonal examinations, operational/functional testing of systems and/or review of aircraft logbooks and records.

Section III provides and identifies SDLM operations, check flight and acceptance requirements, operational checks, weight and balance verifications, aircraft inventory requirements, logs and records verifications and test flight requirements to be accomplished subsequent to the scheduled depot maintenance.

Section IV is a compilation of the scheduled component removal/replacement criteria contained in Section II and provides the authorized disposition of any replaced components.

Section V identifies the Maintenance Requirement Card (MRC) tasks which are not performed during SDLM processing. The purpose of this section is to facilitate rescheduling of an aircraft into the organizational level inspection cycle after SDLM completion.

Section VI describes the various engineering reports which are to be submitted to the F-14 Fleet Support Team (F-14 FST) by the aviation depot or contractor subsequent to government acceptance of each aircraft that has completed SDLM.

D. MODIFICATIONS TO THE SDLM SPECIFICATION

The 1992 SDLM specifications included 154 structural inspections and 104 system performance checks. In 1994, the SDLM specification was reduced to reflect 83 structural inspections and 39 system performance checks. This equates to approximately a 53 percent reduction of the work previously performed. In 1997, the structural checks were increased from 83 to 90 while the systems checks dropped from 39 to 30. However, there were 5 modification procedures added to the specification.

There are two diametrically opposite viewpoints on these reductions. There are those individuals within the naval aviation maintenance community who oppose these changes and those individuals within the same community who favor the changes. Those that are opposed to these reductions consist primarily of squadron and functional wing managers who must now conduct the maintenance actions deleted from the specification. This group's opinion is based on the resulting increased workload that is placed on squadron personnel although the current manning levels can not support the workload. Additionally, these managers have valid concerns about the ability of sailors to perform these maintenance actions without any previous training or experience. This could possibly lead to maintenance errors and potential harm to the aircrew.

Those individuals within the aviation maintenance community that endorse these reductions believe that the majority of these systems checks can be conducted by organizational level expertise and therefore should be conducted at the lowest level possible. Conducting these systems checks at the Depot level not only increases the overall costs and TAT of the SDLM process, but also creates a culture of squadrons routinely deferring maintenance actions that would eventually be accomplished at the depot. Finally, given the current reductions to DOD budgets and downsizing of the late 1980s and early 1990s, depot funding levels can no longer support maintenance actions that should be accomplished at the organizational level. However, as shown in the data, these specification deletions reduced neither the overall costs nor the TAT of the F-14 SDLM process.

E. BENEFITS OF REDUCED TURN AROUND TIME

Improved fleet aviation readiness should be the ultimate goal of any activity regardless of its individual mission. The reduction of NADEP repair (TAT) is paramount in not only maintaining the necessary operational readiness requirements for the fleet, but also in reducing the Navy's total overhaul expenditures. Whether receiving, disassembling, repairing, assembling, or testing, each step in the repair cycle should strive to enhance readiness. The only significant avenue NADEPs have in enhancing fleet readiness is through reducing their repair TAT. Consequently, any incremental reduction in repair TAT realized through reducing unnecessary procedures or through process pipeline improvements will result in a direct benefit to the fleet.

The benefits of reducing the TAT of the F-14 overhaul process are extensive and beneficial for not only the NADEP, but also for the fleet commanders. Reducing repair TAT equates to additional utilization of the aircraft by fleet components as the aircraft consequently spend less time in the repair cycle. This reduction also yields an increased capacity for the depot which affords them the opportunity to acquire additional workload and maintain their technology base. Decreasing TAT also reduces the overall repair cost per aircraft. These savings can then be applied towards additional aircraft overhaul and repair. Finally, an increase in capacity affords the opportunity for more inductions which results in more available work for the production personnel and will subsequently improve morale. Therefore, the reduction of TAT for the F-14 SDLM process benefits not only the fleet commanders, but also those directly involved with the process.

III. PROCESS COMPARISON

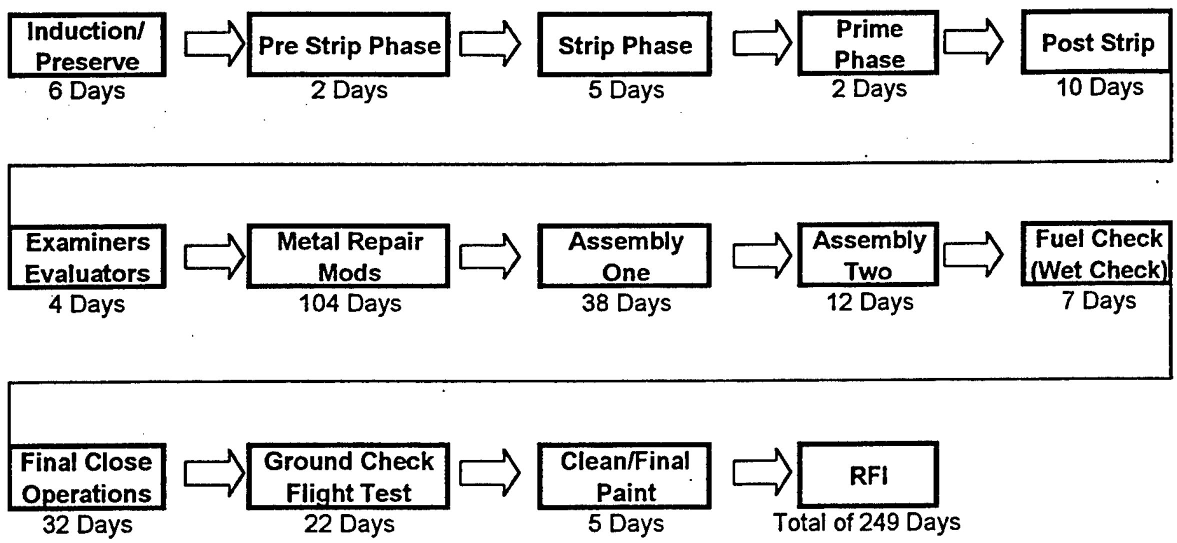
A. BACKGROUND

This chapter compares the overhaul processes for the F-14, F/A-18 and United Airlines 737 aircraft. Each of the three processes begins with a flow diagram, followed by a detailed description of the process. Subsequent to the description, observations on the current philosophies and practices are made. These areas are divided into three distinct categories: Planning, Buy versus Route versus Store, and Culture.

B. PROCESS AT NADEP JACKSONVILLE, FLORIDA

The following flow diagram displays the fourteen phases of the F-14 overhaul process conducted at NADEP Jacksonville, Florida. The scheduled number of workdays that each phase is expected to complete is also included in the diagram.

F-14 Tomcat Overhaul Process



1. The F-14 Overhaul Process

The TAT for the F-14 overhaul process begins when the aircraft arrives from the squadron to NADEP's test line. The initial phase is the Induction/Preserve Phase. NADEP personnel review the aircraft logbooks and Aircraft Discrepancy Book (ADB) in order to familiarize themselves with the maintenance history of the aircraft. Concurrently, the aircraft's engines are operated and a complete systems check is accomplished in order to determine a base line for the aircraft. This base line identifies any specific, inherent features of the aircraft as well as any malfunctions related to that particular aircraft. At this point, the aircraft is defueled, and the next phase begins.

The Pre-Strip Phase starts with the removal of the engines and primary heat exchange unit. Both aircraft engines and the heat exchange unit are preserved and stored in climate controlled buildings to protect them from humidity.

After Pre-strip, the aircraft is towed from the test flight line to the paint removal building for the Strip Phase. During this phase the paint is chemically removed using brushes and solvent. The allotted time for this phase is five days. However, the actual time to complete this phase averages approximately eight days. The reason for this three-day schedule slip is due to excessive layers of paint that often cannot be removed chemically. This results in time-consuming efforts to manually sand and grind particular areas of the aircraft.

Upon being stripped to bare metal, a light green primer coating is applied to the aircraft. The aircraft is then towed from the strip hangar to the main SDLM hangar, where it is stationed for the majority of the SDLM process. All aircraft remain in the same location and artisans move from aircraft to aircraft completing various repairs and modifications as required.

Once in the SDLM hangar, the Post-Strip Phase begins. This includes opening all aircraft panels, disassembling the aircraft, removing the major avionics components, as well as both the Pilot and Radar Intercept Officer ejection seats. In the disassembly of the aircraft, the wings and both sets of vertical and horizontal stabilators are removed and sent to the component shop for inspection and any necessary repairs.

Noting all discrepancies above and beyond those identified during the ASPA inspection is the responsibility of the Examiners and Evaluators (E&E). It is at this point where a determination is made as to which discrepancies are in fact Depot-level responsibilities, and which discrepancies are Organizational or Intermediate level responsibilities. Discrepancies that are deemed correctable at the two lower levels of maintenance are labeled as "Noted But Not Corrected" (NBNC) discrepancies.

The Metal Repairs/Modifications Phase is allotted approximately 104 days TAT. The actual time to complete this phase averages 152 days. Although this phase is allotted the greatest amount of time, the actual work in direct support of SDLM is minor. The majority of the work involves incorporation of major Airframe Changes (AFCs). The most common AFCs that are currently incorporated are:

- 5K and 7K upgrades that are incorporated as the aircraft reaches 5,000 and 7,000 flight hours respectively;
- AFC 794/795, ALR-67 Upgrade;
- AFC 844, Modification for the Tactical Airborne Reconnaissance Pod System (TARPS) and Digital Tarps capability;
- AFC 859, Wing Crack Repair; and
- AFC 873, Replacement of Fuselage Station 353 Frame.

After all modifications and repairs are completed, the Assembly 1 Phase begins. This phase includes assembling the aircraft to the point where the fuel cells are installed and capable of holding fuel. A Fuel Cell (Wet Check) Phase is then conducted and includes fueling the aircraft to capacity, and performing fuel transfer checks and fuel leak checks. Additionally, during this phase, the engine inlet ducts are painted as a matter of a time saving convenience as the engines are not yet installed.

The Assembly 2 Phase requires the aircraft to be fully assembled with the exception of aircraft panels. This includes reinstalling both wings as well as both sets of vertical and horizontal stabilators, the engines and the heat exchange unit. The Final Close Operations Phase includes applying electrical power to perform electronic/avionics system checks, operating aircraft landing gear as well as installing the Pilot and Radar Intercept Officer ejection seats.

The Ground Check/Flight Test Phase includes installation of all access doors along with the remaining aircraft panels onto the aircraft. A Low-Power-Turn-Up (LPTU) and High-Power-Turn-Up (HPTU) is performed on the aircraft. After each turn-up is complete, any discovered discrepancies are fixed and the aircraft is scheduled for a Post-Maintenance Check Flight. Aircrews assigned to NADEP perform the check flight and record the results.

Upon successful completion of the test flight, the aircraft is towed to the paint hangar for the Clean and Final Paint Phase. During this phase, the aircraft is thoroughly cleaned and receives a final nose-to-tail paint-job. No special or customized paint schemes other than normal exterior markings and insignias as directed by the appropriate maintenance manuals are authorized.

After the paint process is completed, the aircraft logbooks and Aircraft Discrepancy Book are reviewed and annotated for transfer back to the squadron. A Ready-for Issue (RFI) aircraft is then flown back to the fleet squadron where it is put back into operational service.

2. Management Philosophy and Practices

a) Planning

The F-14 SDLM program has been plagued with process variability introduced by the ASPA program. It is only through accurate and proper planning that variability can be reduced to allow for a more efficient and effective SDLM process.

A considerable planning issue that must be addressed is the ability of the customer to request additional work content in the form of time consuming Airframe Changes (AFCs). Currently, the customer is able to request the incorporation of additional AFCs up to four months after the induction date of the aircraft. This practice, while handled on a case-by-case basis, introduces more variability, uncertainty and results in reactive planning in the F-14 SDLM program. A loss of process control results, making it more difficult to achieve both cost and TAT requirements. These resulting additions to the workload are the major contributing factors to the current average 48 day increase in TAT during the Metal/Repair/Modification Phase since they affect the availability of tooling, kits, and staffing. Reduction or elimination of this variability should result in better process control and a reduction of the TAT for the Metal/Repair/Modification Phase.

Also of major concern are long-range staff planning and the need to set priorities in order to determine the allocation of internal resources. The current practices of approving regular leave of shop and work floor artisans only to request overtime upon their return to make up for lost production should be discontinued. This practice increases the variability of the overhaul process since there is not a consistent quantity of personnel available on a daily basis. Workload planning and scheduling becomes ineffective as a result of this variability and actual TAT to complete the work exceeds the expected TAT.

Additionally, the workload priorities among the various component repair shops should be aligned to the priorities of completing the overall SDLM process on time and not to completing a predetermined amount of items within a specific reporting period. Currently, component repair shops are expected to complete only a specific quantity of items per reporting period and not necessarily the specific components that will allow an aircraft in the overhaul process to proceed to the next phase. This introduces additional variability into the SDLM process since there is no asset visibility. Consequently, SDLM process managers do not always know when components will return for installation. Elimination of this variability will facilitate better SDLM process control and should reduce the overall TAT.

b) Buy versus Route versus Store

After the aircraft is disassembled in the Post Strip Work Phase, the Examiners and Evaluators (E&E) make a determination as to which aircraft components will be bought, which will be routed to depot back-shops, and which will be stored in an inventory warehouse until reinstallation on the same aircraft later in the SDLM process.

The F-14 SDLM program has been plagued with consistent parts shortages as a result of supply not meeting demand or total requirement. An excessive Navy Inventory Control Point (NAVICP) surcharge on parts has resulted in the NADEP trying to meet requirements by routing components to the back-shops for repair. The NAVICP surcharge pays for NAVICP overhead expenses. This surcharge is calculated by spreading yearly expenses over forecasted sales to arrive at a percentage "tax", which is currently 57 percent. This surcharge consists of:

- Cost of Supply Operations,

- Transportation,
- Inventory Losses,
- Obsolescence,
- Price Stabilization and Inflation,
- Inventory Management,
- Depreciation of Capital Assets, and
- Profits or Losses from Previous Fiscal Year.

Because the surcharge is perceived as too high, the results are in a "Component Death Spiral". This cause and effect situation is created when depots either avoid using NAVICP and/or buy less replacement items than expected. This results in NAVICP overhead not being reimbursed because expected buys did not occur. Consequently, NAVICP raises its surcharge the next year to cover these losses and the next year's overhead. This cycle repeats itself and gets progressively worse over time.

Another contributing factor to the slip in TAT is that approximately sixty-five percent of back-shop components are not delivered on time to the SDLM production line. Additionally, routed components often get overhauled when a complete overhaul of the item is neither necessary nor warranted.

Finally, Total Asset Visibility (TAV) is lost as components are sent to back-shops for repair. Components are viewed as a single entity and lose identity from the aircraft in which they belong. Back-shop personnel are simply concerned with meeting quarterly repair quotas and are not concerned with the resulting implications of not completing items that will support the SDLM production line.

c) Culture

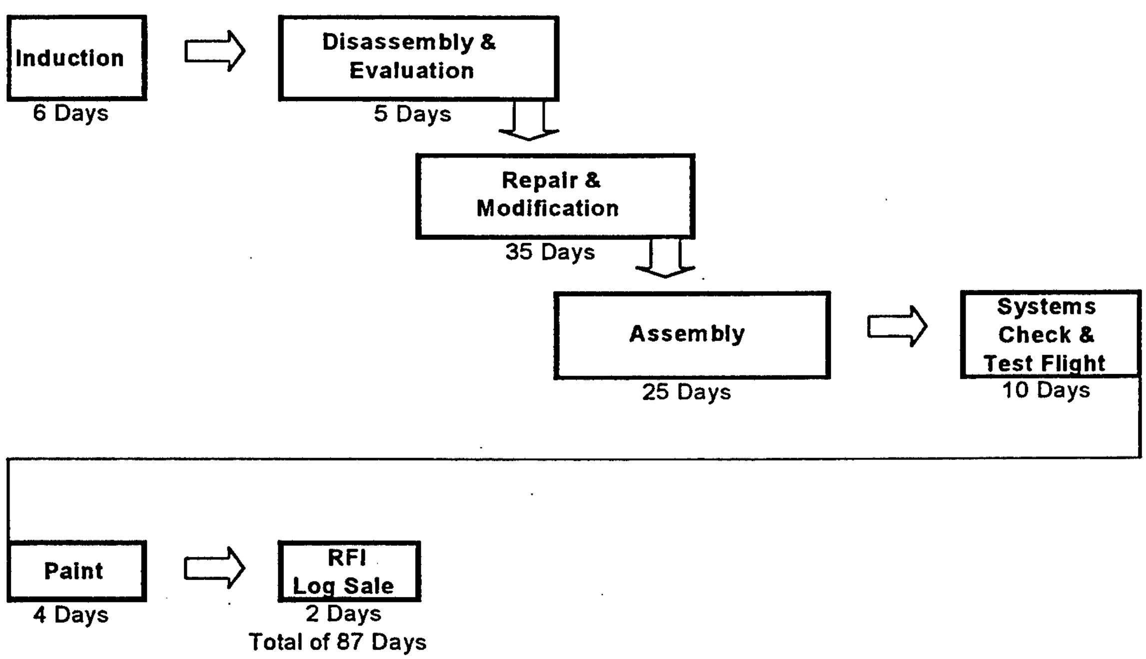
An inherent problem exists within the culture of NADEP Jacksonville, Florida. There is a lack of incentive to save money or reduce turn-around time (TAT) on back-shop routed items. It should further be noted that there is little incentive for NADEP to use NAVICP as their surcharges have forced customers to look for other alternatives. Additionally, this results in NAVICP not accurately forecasting future requirements.

The depot is dependent on overtime. In numerous instances, employees have requested and taken unscheduled non-emergency annual leave during the week prior to weekend overtime. Routine annual leave is very rarely prescheduled. Furthermore, the apparent slow down of work to gain overtime in order to accomplish the task is hurting credibility and crippling the depot's ability to meet set plans and goals/commitments. This results in production delays and additional costs in four ways: 1) there is not enough manpower available to meet the expected production requirements for the week, 2) those artisans on leave receive their pay, 3) NADEP pays additional money for the overtime, and 4) the amount of completed overtime does not return the process to its schedule. These four factors result in an increase in the overall costs and TAT of the SDLM process.

C. PROCESS AT NADEP NORTH ISLAND, CALIFORNIA

The following flow diagram displays the eight phases of the F/A-18 overhaul process. Process efficiency is realized through concurrency during the Disassembly and Evaluation, Repair and Modification and Assembly Phases. The scheduled number of workdays that each phase is expected to complete is also included in the diagram.

F/A-18 Hornet Overhaul Process



1. The F/A-18 Overhaul Process

The TAT of the F/A-18 overhaul process begins when the aircraft arrives from the squadron to NADEP's test line. The initial phase is the Induction Phase. Upon arrival, the pilot thoroughly debriefs NADEP test flight line personnel to identify any systems problems that are not already annotated in either the aircraft logbook or the Aircraft Discrepancy Book (ADB). The pilot debrief and the subsequent screening of the logbooks provides NADEP personnel the first opportunity to schedule any necessary maintenance on the aircraft's systems while it undergoes the overhaul process in the maintenance facility. At this point, test flight personnel complete a full systems check of the aircraft, including engine operation, to verify those discrepancies identified by the pilot and determine an initial baseline for the aircraft. Also during this time, a verification check of easily accessible technical directives and/or modifications is accomplished in order to verify the incorporation of those changes without major disassembly of the aircraft. These procedures provide NADEP with the ability to review the aircraft from both a systems perspective as well as a technical modification perspective and afford them the opportunity to identify those systems and modifications that may need attention or incorporation during the overhaul process. After this process is complete, the aircraft is 100 percent defueled and preserved in accordance with applicable maintenance directives.

From the test flight line, the aircraft is moved to the painting facility where a material condition evaluation is conducted. During this evaluation, the exterior of the aircraft is reexamined for evidence of poor paint adhesion, blisters, cracking, erosion and excessive paint thickness. These areas are initially identified and treated, if necessary, to prevent any further deterioration. Additionally, a determination is made as to what corrective action and subsequent paint requirements will be accomplished after completion of the overhaul process. The aircraft is subsequently moved to the maintenance facility to begin the Disassembly and Evaluation Phase.

Once inside the maintenance facility, the aircraft is parked in a predetermined spot where it remains for the duration of the overhaul process. An Examination and Evaluation (E&E) inspection is then completed concurrently with the disassembly of the aircraft. A more efficient aircraft overhaul process is realized as NADEP engineers evaluate certain aircraft components for possible repair actions while the disassembly phase continues concurrently.

The E&E portion of the overhaul process is the most critical in terms of repair TAT for the F/A-18. It is during this phase that the entire aircraft is evaluated for repair procedures that are "over and above" what is required within the overhaul specifications. The entire specification requires approximately 1900 labor-hours to complete while the "over and above" discrepancies average an additional 5100 labor-hours. During the E&E portion of this phase, estimated repair times are determined as well as the amount of repair necessary for each section of the aircraft. The evaluators consult with NADEP structural engineers to determine exact repair procedures for areas that are not usually suspect to either rework or repair. Finally, during E&E, all technical directives and modifications that are designated as depot level maintenance actions are verified for incorporation. If it is discovered during this sight verification that certain depot level directives or modifications have not been incorporated, the E&E team will investigate the availability of parts and tooling for that specific directive or modification. If the modification has been deemed critical to the safety of flight or structural integrity of the aircraft, it is automatically incorporated into the overhaul schedule. If it is not considered critical, but it is determined that the parts, tooling, personnel, and necessary time is available to incorporate that modification without jeopardizing the scheduled TAT, then that particular modification is scheduled for incorporation.

Disassembly of the aircraft consists of removing components and structures of the aircraft to facilitate maintenance actions on either the airframe or on the component itself during the repair phase of the overhaul process. Only those items identified for removal to facilitate other maintenance actions and those components that need repair as determined through either historical data or evaluation are actually removed. No additional components are removed unless a specific need is identified. Items that are removed only to facilitate airframe inspection and repair are labeled and placed in storage until needed in the assembly phase. Airframe structures and components that are removed for specific inspection and repair are sent to the appropriate artisan within the maintenance facility for completion.

Once the E&E portion of the Disassembly and Evaluation Phase is completed, the Repair and Modification Phase begins. This is not an indication that the disassembly of the aircraft is 100 percent complete or that the disassembly process is inefficient. Instead, it is another indication of the overall maintenance philosophy at NADEP North Island where concurrency is paramount. During the Repair and Modification Phase, all structural repairs and modifications of the airframe take place. Although this phase is allotted the greatest amount of time, the actual work in direct support of the overhaul specifications is minor. The majority of work involves incorporation of various technical directives and modifications depending on the age and current configuration of the aircraft, as well as structural repair due to corrosion. The majority of the F/A-18 TAT time is exhausted during this phase of the overhaul process.

As soon as it is practical, the Assembly Phase begins although there may still be a significant amount of work remaining in the Repair and Modification Phase. Again, this is accomplished through the cooperative efforts of the two foremen responsible for these two phases of the overhaul process. They ensure that there are no conflicts between the various artisans responsible for specific phase tasks.

While the aircraft is reassembled and the components installed, it undergoes as many electrical systems checks as possible prior to being towed to the test flight line for the Systems Test Phase. The electrical systems of the F/A-18 are extremely complex and this "pre-testing" allows for more accurate and quicker troubleshooting if there is an electrical degradation. The electrical system "pre-testing" reduces the TAT of the F/A-18, as the aircraft is still located within the maintenance facility with the majority of the electricians available to assist in solving the problem. The aircraft is the towed to the test flight line where is undergoes the Systems Check phase of the overhaul process.

Upon receipt of the aircraft at the test flight line for the Systems Check and Test Flight Phases, the aircraft is depreserved, refueled, and a full systems check is performed to ensure compliance with operational specifications. If there are system problems, test flight line personnel either repair the problem or artisans from the overhaul production line are called out to troubleshoot and repair the discrepancy. Once the aircraft successfully completes all of the systems checks, it is then ready for test flight. Aircrews assigned to NADEP perform a Post-Maintenance Check Flight and record the results. Upon successful completion of the test flight, the aircraft is towed to the paint facility for clean and final paint.

During the Paint Phase, the aircraft is prepared for and receives the paint requirements that were determined during the Induction Phase. The paint requirements do not dictate a complete nose-to-tail painting but instead, only provide for major touch up and zonal painting. The intent is to utilize the most effective and economical means to restore the exterior paint finish and not to necessarily repaint the entire aircraft. Additionally, no special or customized paint schemes other than normal exterior markings and insignias as directed by the appropriate maintenance manuals are authorized.

After the paint process is completed, the aircraft logbooks and Aircraft Discrepancy Book are reviewed and annotated for transfer back to the squadron. The aircraft is then flown back to the fleet squadron where it is put back into operational service.

2. Management Philosophies and Practices

a) Planning

The F/A-18 program was initially plagued with significant planning problems that resulted in NADEP North Island, California, losing the depot level maintenance contract to Air Force depots in 1991. The F/A-18 program manager and his staff realized that many significant changes had to occur if future F/A-18 overhaul contracts were to be awarded to NADEP North Island. Some of these changes included a proactive versus reactive management philosophy, better coordinated planning and scheduling between all of the steps in the process, and finally, computer-scheduling software specifically tailored to meet the needs of NADEP schedulers and planners.

Due to these management changes, NADEP North Island won the depot level maintenance contract back from the Air Force. The F/A-18 production office at NADEP North Island initiated full and open communication with their customers and began to plan for aircraft before they physically arrived at their facility. This planning process includes identifying all aircraft being inducted for the quarter no later than 30 days prior to the start of the quarter. This allows the planners and schedulers to order the necessary modification kits, any special tooling and equipment as well as identify any specific maintenance requirements that a particular aircraft may have upon induction. The result has been a greater than 50 percent reduction in the estimated TAT for the aircraft from estimations made before these changes occurred. (Appendix B)

b) Buy versus Route versus Store

The F/A-18 overhaul process is specific in its philosophy of buy versus route versus store. Concurrent rework/overhaul of repairable components beyond organizational and intermediate level is not authorized during depot level maintenance of aircraft unless supply system Ready for Issue (RFI) assets are not available or the supply system response will cause work stoppage (NAVAIR F/A-18 MCAPP Specification). The senior managers of the F/A-18 overhaul process initially attempted to follow this concept, but found through previous historical data as well as recent experiences that it was actually more economical to purchase the components needed through an outside source when faced with an unresponsive supply system instead of attempting repair within their own organization as implied in the MCAPP specification. They found that more than 50 percent of the time, components could be procured either through NAVICP or an outside vendor faster than they could be repaired. This philosophy of buying versus routing of components helps to minimize the self-inflating tax associated with the "Component Death Spiral" experienced in the F-14 community.

Additionally, there were numerous instances where valuable TAT was expended trying to repair components, only to have those components returned from the component shop because the items were either beyond economical repair or the lead time for replacement sub-components was excessive. Any component that functions normally during the induction phase full systems check and has not exceeded is fatigue life is removed, preserved and stored until re-assembly of the aircraft.

Finally, there is very little cannibalization of stored parts unless the availability of a particular part is non-existent and all available means of expeditiously procuring the item have been exhausted.

c) Culture

There is a very strong business-minded culture within the F/A-18 overhaul process. There are no "stovepipe organizations" within the process and all information is open and available for review and analysis by anyone involved in the process. For example, personnel managing the F/A-18 overhaul program use a planning and scheduling program called PDMSS (Planned Depot Maintenance Scheduling System). This system was custom built and tailored to the needs of NADEP personnel involved in managing the overhaul process. This leadership umbrella spans from the Program Manager to the various crew leaders assigned to oversee specific maintenance tasks. PDMSS tracks every evolution of the overhaul process from the initial ordering of materials, to the status of current work in progress, to the amount of completed labor hours by a specific artisan for a particular job. PDMSS is regarded as an evolving software package that is continuously improved and updated in order to accommodate its users. Everyone from the Program Manager to the foremen responsible for each phase within the process have access to all the same information. No one is able to withhold information since it is readily available within PDMSS. The result is free and open communication within the working environment that results in not only more cooperation between those involved in the process, but also a realization of a common goal. That goal is to minimize the impact on the customer by returning a quality product on time so that the fleet squadron can accomplish their mission.

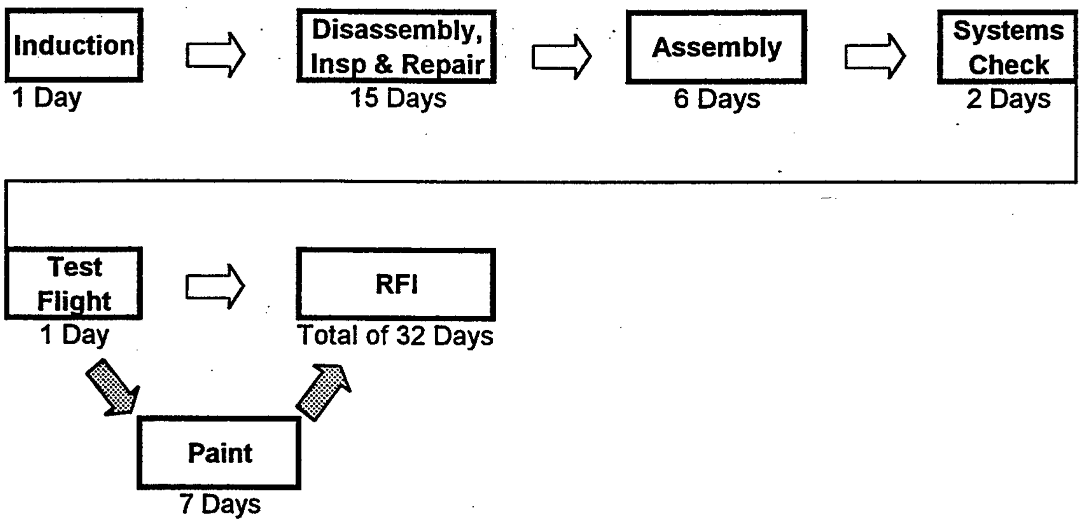
Another culture feature within the F/A-18 overhaul program is the free flow and horizontal flow of communication within the organization. Daily production meetings are conducted to review and update the specific status on each aircraft in detail. Three times a week, these meetings are conducted on the production floor and the other two days, they are held in a conference room. This philosophy of "going to the process" provides the artisans on the floor with a sense of commitment from the F/A-18 management team that they are concerned about the overall process. In addition, the Program Manager holds monthly meetings with all personnel to provide them with updated information concerning the program and reply to their feedback and concerns. Consequently, every individual knows exactly what has recently happened, what is currently going on, what is being planned for the immediate future, as well as what is expected from them in order to continue to improve the overall production effort.

D. PROCESS AT UNITED AIRLINES

Although it is inequitable to compare a non-tactical, commercial aircraft designed for transporting passengers to a tactical military jet designed for supersonic flight, it is the researchers' opinion that the process by which commercial aircraft are overhauled could present valuable insight and information for improvement of the current overhaul processes for military aircraft. It is with this reasoning in mind that this research was conducted in order to identify potential aspects of the commercial overhaul process that could be applied to the NADEP processes.

The following flow diagram displays the 6 phases of the United Airlines 737 aircraft overhaul process. It should be noted that these aircraft are not painted during the overhaul process. Instead, they are independently scheduled to be painted by an outside contractor. However, in order to account for the painting process time and to allow for an equitable comparison between all three processes, the TAT for painting United Airlines 737 aircraft is included in the flow diagram.

United Airlines Overhaul Process



1. The Boeing 737 Overhaul Process

The overhaul process for the Boeing 737 at United Airlines begins with the induction of the aircraft at a predetermined maintenance bay at the overhaul facility. The aircraft is towed into a hangar that has been configured ahead of time to receive the aircraft. Based on historical data of Heavy Maintenance Visits (HMV), all maintenance support equipment, including personnel stands, are moved into position to begin the Disassembly, Inspection and Repair Phase, which consists of opening all compartments for component removal, inspection and evaluation.

During this phase, the interior of the aircraft is gutted of all seats, panels and other equipment.

Additionally, all aircraft components that have been predetermined to require replacement during the overhaul process are also removed. This affords the inspectors the opportunity to have better access to specific areas where the components are located as well as removing the inspection criteria of those components. This results in a reduction in the time required to complete the inspection portion of the process and directly contributes to reducing the overall TAT of the aircraft. Any components identified for replacement are subsequently replaced with new or reworked components that have been pre-positioned in the hangar before the aircraft arrived at the maintenance facility.

The foreman is immediately notified about any area discovered to have a deficiency. The foreman, in turn, identifies the appropriate artisan for the repair action as soon as repair criteria has been determined. There are no specific requirements to wait for the inspection process to be completed. Once the inspectors have finished their assigned area and have identified the discrepancies, the artisan begins working on the repair. It is this concept of concurrent maintenance that is instrumental in reducing the overall TAT of the overhaul process. In addition, during this process, all modifications that were identified prior to the aircraft's arrival to the hangar are incorporated as well as any structural or other defects found during the inspection process.

Once the Disassembly, Inspection and Repair Phase is completed, the Assembly Phase begins. During this time, the aircraft is reassembled with the remaining pre-positioned parts and components. Any critical flight components that require installation are installed and verified for proper installation. A final verification check of the entire aircraft is conducted to ensure the overall integrity of the aircraft as well as to ensure flight worthiness. Following this, the aircraft is removed from the hangar to a testing area for the Systems Check Phase. Once the full systems check is completed, the aircraft is flown on a test flight where all flight characteristics of the aircraft are verified. Upon successful completion of the test flight, the aircraft is then returned to the airport terminal and put back into operational service.

As previously noted, United Airlines 737 aircraft are not painted during the overhaul process and instead, are independently scheduled to be painted by an outside contractor. This decision was based on a cost-benefit analysis where it was determined to be more economical to have the aircraft painted by an outside contractor separate from the overhaul process. This independent painting schedule is incorporated into the long-term maintenance schedule of the aircraft to avoid potential scheduling conflicts and to minimize the non-operational time of the aircraft. United Airlines maintenance planners and schedulers regularly verify this schedule. The outside painting contractor is held to the same rigid schedule as the maintenance managers at United Airlines.

2. Management Philosophies and Practices

a) Planning

Aircraft are scheduled on a rigid 48-month cycle in order to minimize the variability of the overhaul process and to maintain the expected 25-day TAT of the aircraft. The purpose of this rigid schedule is two-fold. First, it is adhered to as a result of safety and maintenance requirements as recommended by the manufacturer and required by the Federal Aviation Administration. Secondly, it affords maintenance schedulers and planners the opportunity to accurately forecast future aircraft inductions and associated requirements due to the low variability of the overhaul process.

The planning process at United Airlines is a complete package that incorporates not only long range planning aspects, but also logistical elements such as supply support, routing of aircraft and scheduling of maintenance facilities. The system, called DOT VISIT LIGHT, is a UNIX based, long range planning tool that affords both the schedulers and planners the ability to coordinate efforts to plan and schedule aircraft overhauls two years in advance. This system incorporates various aspects of logistics including the obvious elements of supply support, maintenance facility planning, and transportation. Aircraft are identified by serial number and a standardized repair package is prepared. This package includes inspection and evaluation criteria of known problem areas previously discovered in other 737 aircraft as well as any inspection criteria mandated by the FAA or the aircraft manufacturer. This planning tool provides the foundation of United Airlines' ability to minimize the TAT of the 737 overhaul process through early identification of the amount of all required replacement components before the aircraft arrives for induction. Additionally, all information within this system is available to any user who is authorized access to the system. The decision by United Airlines to have open access to all information in DOT VISIT LIGHT has resulted in more efficient coordination between the three groups making overall decisions: 1) the maintenance planners, 2) the aircraft operations schedulers and 3) the supply schedulers that coordinate the ordering, tracking and delivery of the necessary parts to support the overhaul effort.

b) Buy versus Route versus Store

United Airlines has a unique maintenance philosophy regarding the buy versus route versus store concept. Due to the fact that United Airlines is a commercial airline, their revenue generating capability is based on their ability to return an aircraft to a flying status as soon as possible. Consequently, because of their ability to effectively plan their maintenance effort, the maintenance managers of United Airlines have determined, through cost-benefit analysis, that it is more economical to replace removed components by the most time efficient means available. Acquiring replacement components is usually accomplished through United Airlines' component repair program. Aircraft components that are removed during the overhaul process are routed through their respective component repair shop for complete overhaul and are subsequently placed back into the United Airlines supply support system until they are needed in support of another aircraft overhaul or in support of flight operations. If there are no replacement components available within United Airlines' supply system, company schedulers pursue other options such as a direct buy from outside local vendors or procurement from the aircraft manufacturer or even from competitors. Although this avenue usually results in a premium price being paid for the component, the philosophy of maintaining or even reducing the TAT of the overhaul process remains paramount as an aircraft not flying is an aircraft not generating revenue.

c) Culture

The culture within United Airlines involves revenue generation. As "employee/owners" of United Airlines, every employee from the most junior apprentice to the most senior maintenance manager is groomed to understand and realize that in order to keep the company profitable, each of them must provide United Airlines with their best effort to return aircraft to a fully safe flying status as quickly as possible. This mindset is achieved through the use of DOT VISIT LIGHT. This open system of scheduling and planning is similar to the F/A-18 PDMSS in that it provides total access and exchange of information without restriction. As in the F/A-18 program, this free access of information allows for early identification of potential problems or conflicts by the various groups supporting the overhaul effort. The result is a TAT that is significantly lower than could be expected if there were no sharing of information. The decrease in TAT results in lower maintenance costs, higher aircraft availability, and consequently, higher revenues since United Airlines can provide more revenue-generating flights to the consumer.

IV. RESULTS OF QUANTITATIVE ANALYSIS

A. BACKGROUND

This chapter provides labor hours and cost data for the F-14 SDLM process from fiscal year 1990 through fiscal year 1997. During this period, the F-14 process was sited at NADEP Norfolk, Virginia, until September 1994 when it began shifting the F-14 SDLM workload to NADEP Jacksonville, Florida. This relocation was a result of the Base Realignment and Closure Committee's decision to close NADEP Norfolk, Virginia, by September 1995.

The F/A-18 overhaul process was initially dual-sited at NADEPs North Island, California, and Jacksonville, Florida, until the end of fiscal year 1991 when the overhaul contract was awarded to Air Force depots. The overhaul contract was re-awarded to NADEP North Island, California, beginning in fiscal year 1993 where it remains today. The labor hour and cost data for the F/A-18 overhaul process includes data from fiscal year 1993 through 1997. All F-14 and F/A-18 data as shown in Appendix C, was obtained from the Commander, Naval Aviation Systems Command (COMNAVAIRSYSCOM) Code 6.3.1 located at Naval Air Station, Patuxent River, Maryland.

United Airlines 737 data is based on 12 aircraft that completed their second overhaul (Heavy Maintenance Visit check) during calendar year 1997. This data was obtained from the United Airlines Maintenance Planning and Scheduling Team located in San Francisco, California.

All financial values presented in this chapter are in "then year" dollars. The "Linear (Actual)" trend lines depicted in Figures 1 through 12 represent the average value of actual labor hours or costs per the number of aircraft completing the overhaul process.

B. F-14 QUANTITATIVE ANALYSIS

As of the completion of this thesis, only four F-14 aircraft completing overhaul at NADEP Jacksonville, Florida, had valid data for consideration, review and analysis. However, research of the F-14 SDLM process indicates that the management philosophies and practices as well as the SDLM process itself has not changed from one site to another. Consequently, data from NADEP Norfolk, Virginia, and NADEP Jacksonville, Florida, have been used in the analysis. A total of 76 aircraft were analyzed for labor hours expended, material costs and overall total costs.

Variations of the process at both locations can be seen graphically in figures 1 through 6.

1. Labor Hour Analysis

Figure 1 exhibits the Estimated versus Actual Labor Hours for 76 aircraft that completed SDLM at NADEPs Norfolk, Virginia, and Jacksonville, Florida, from fiscal year 1990 through fiscal year 1997. The average difference between actual labor hours and the estimated amount of labor hours is 10,002 hours. The graph in Figure 1 displays the extreme variability of expended labor hours per aircraft completing the SDLM process. Figure 1 also shows an increasing trend in the amount of labor hours consumed per aircraft while the estimated number of labor hours remains almost constant.

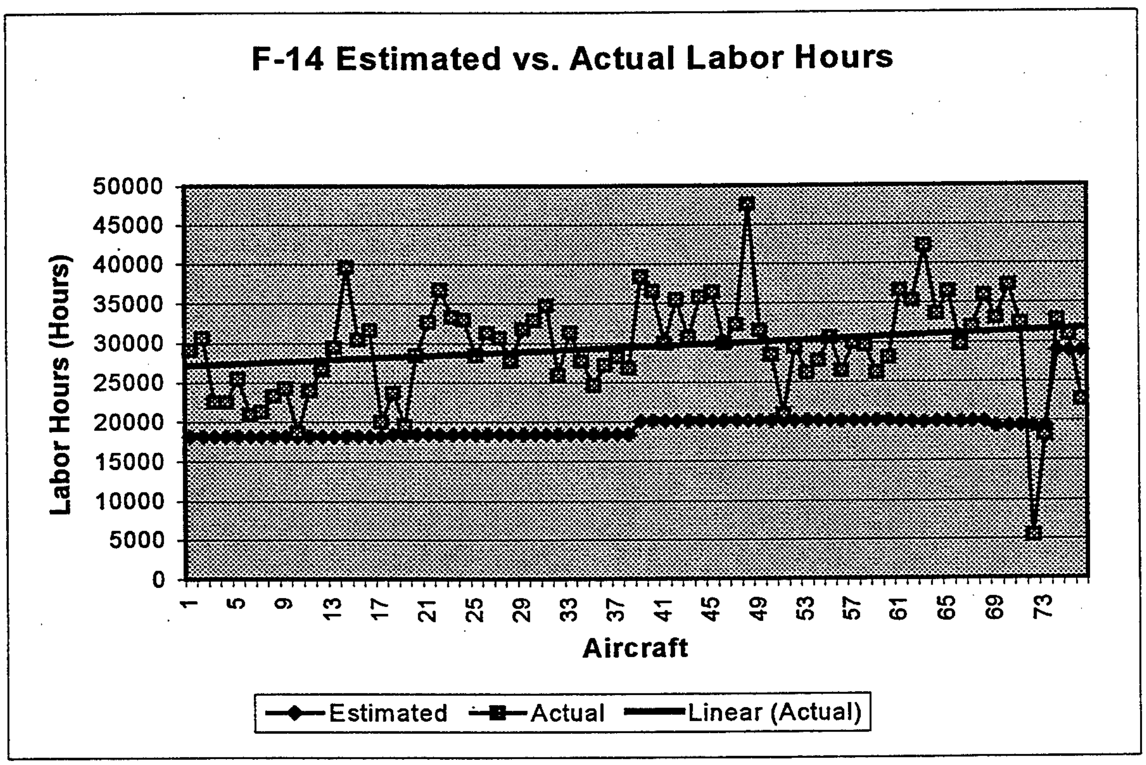


Figure 1. NADEPs Norfolk and Jacksonville Estimated vs. Actual Labor Hours

Figure 2 provides Estimated versus Actual Labor Hours for the four F-14 aircraft completing the SDLM process at NADEP Jacksonville, Florida. Although specific analysis and conclusions can not be made from only four data points, the indication of continuing high deviation is apparent as the average difference between the actual amount of labor hours and the estimated amount is 2,736 more hours. The graph also displays a significant amount of variability in labor hours expended as it ranges from 33,036 labor hours to 22,637 labor hours.

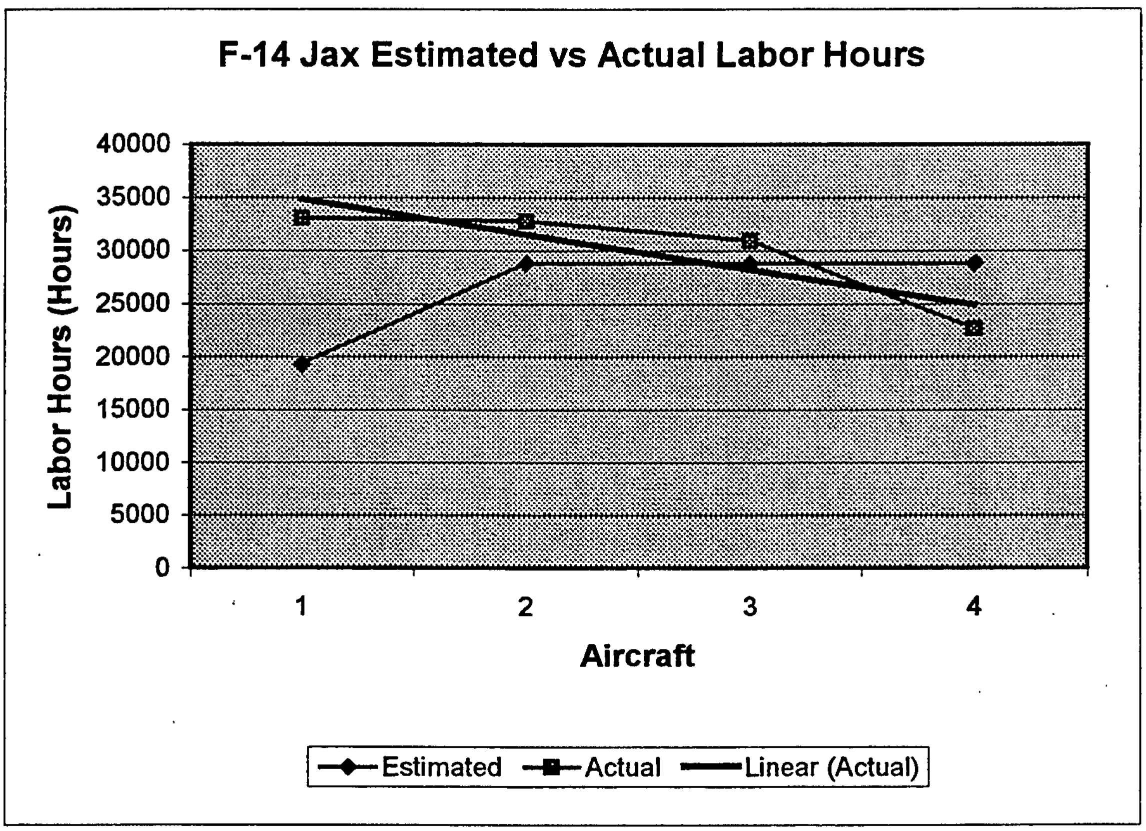


Figure 2. NADEP Jacksonville Estimated vs Actual Labor Hours

2. Material Cost Analysis

Figure 3 exhibits the Estimated versus Actual Material Costs for 76 aircraft that completed SDLM at NADEPs Norfolk, Virginia, and Jacksonville, Florida from fiscal year 1990 through fiscal year 1997. The average deviation of actual material costs is $331,178 more than the estimated amount of material costs. The graph in Figure 3 displays the extreme variability of material costs per aircraft completing the SDLM process. Figure 3 also shows an increasing trend in the material cost per aircraft while the estimated material cost remains almost constant.

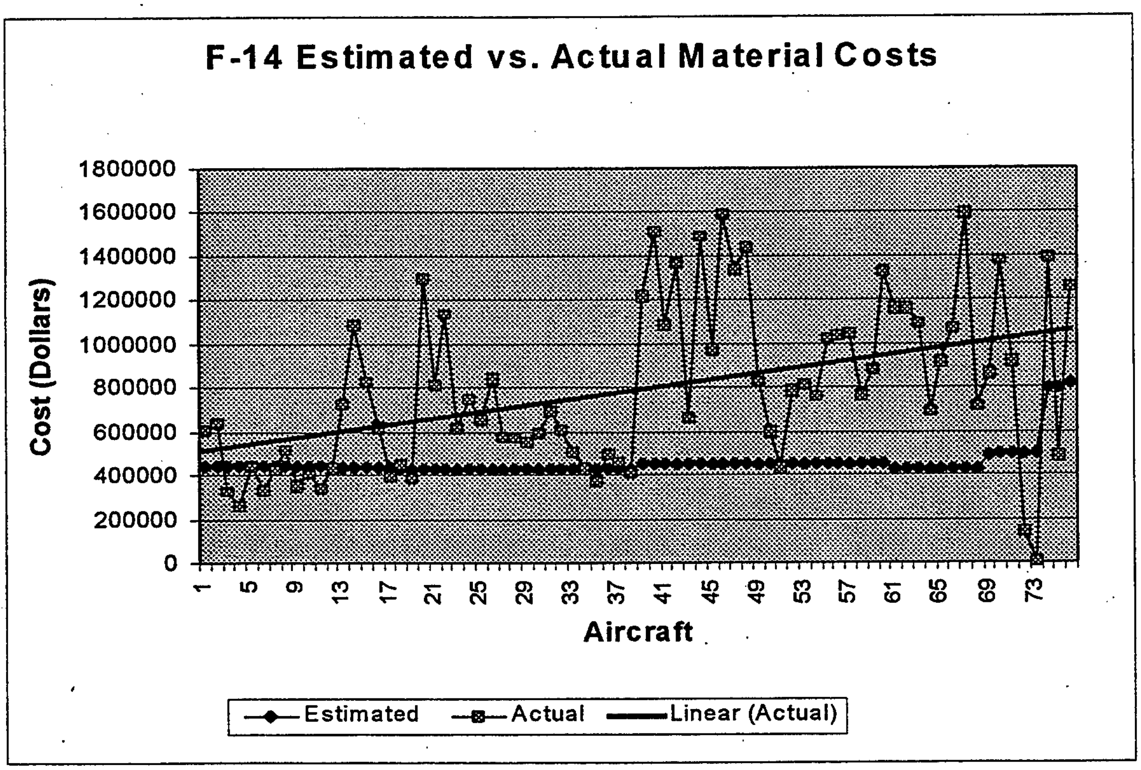


Figure 3. NADEPs Norfolk and Jacksonville Estimated vs. Actual Material Costs

Figure 4 provides Estimated versus Actual Material Costs for the four F-14 aircraft completing the SDLM process at NADEP Jacksonville, Florida. Although specific analysis and conclusions cannot be made from these four data points, the indication of continuing high variance is again apparent as the average deviation for the actual material costs is $277,250 more than the estimated amount. The graph also displays a significant amount of variability in material costs as it ranges from $1,391,000 to $487,000.

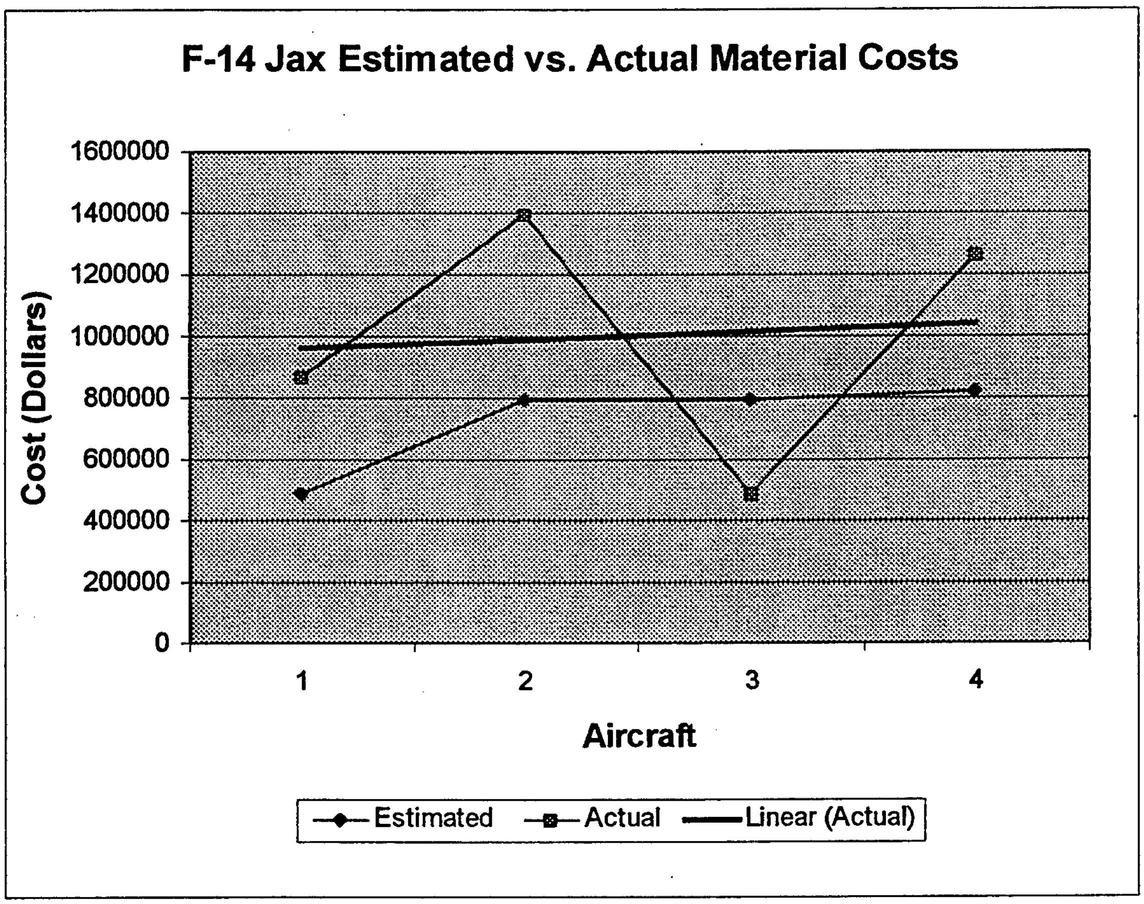


Figure 4. NADEP Jacksonville Estimated vs. Actual Material Costs

3. Total Cost Analysis

Figure 5 exhibits the Estimated versus Actual Total Costs for 76 aircraft that completed SDLM at NADEPs Norfolk, Virginia, and Jacksonville, Florida from fiscal year 1990 through fiscal year 1997. The average deviation of total costs is $905,263 more than estimated. Figure 5 also shows an increasing trend in the total cost per aircraft while the estimated total cost increases significantly less.

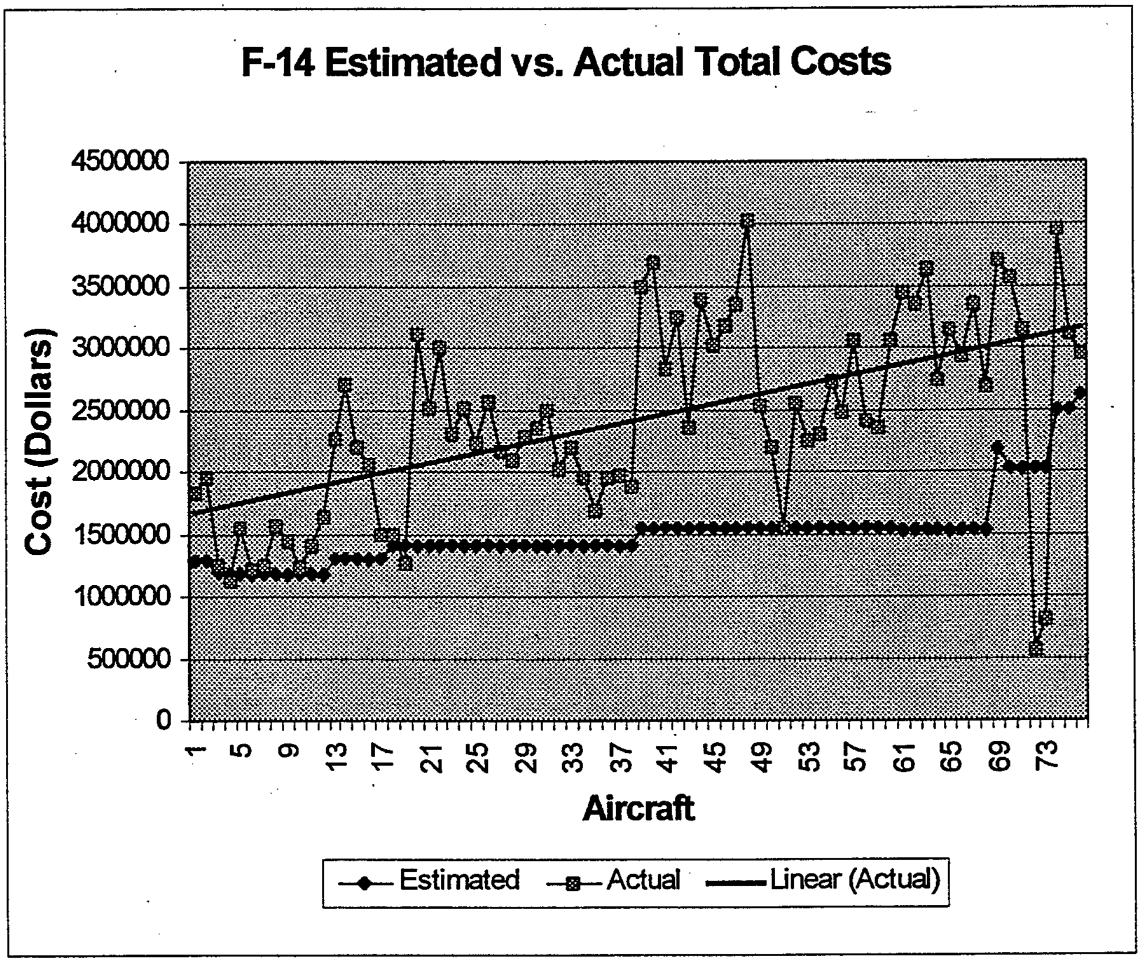


Figure 5. F-14 Estimated vs. Actual Total Costs

Figure 6 provides Estimated versus Actual Total Costs for the four F-14 aircraft completing the SDLM process at NADEP Jacksonville, Florida. Although specific analysis and conclusions cannot be made from only four data points, the indication of continuing high variance is apparent as the average amount of deviation for total cost is $977,750 more than estimated. The graph also displays a significant amount of variability in total costs as it ranges from $3,947,000 to $2,953,000.

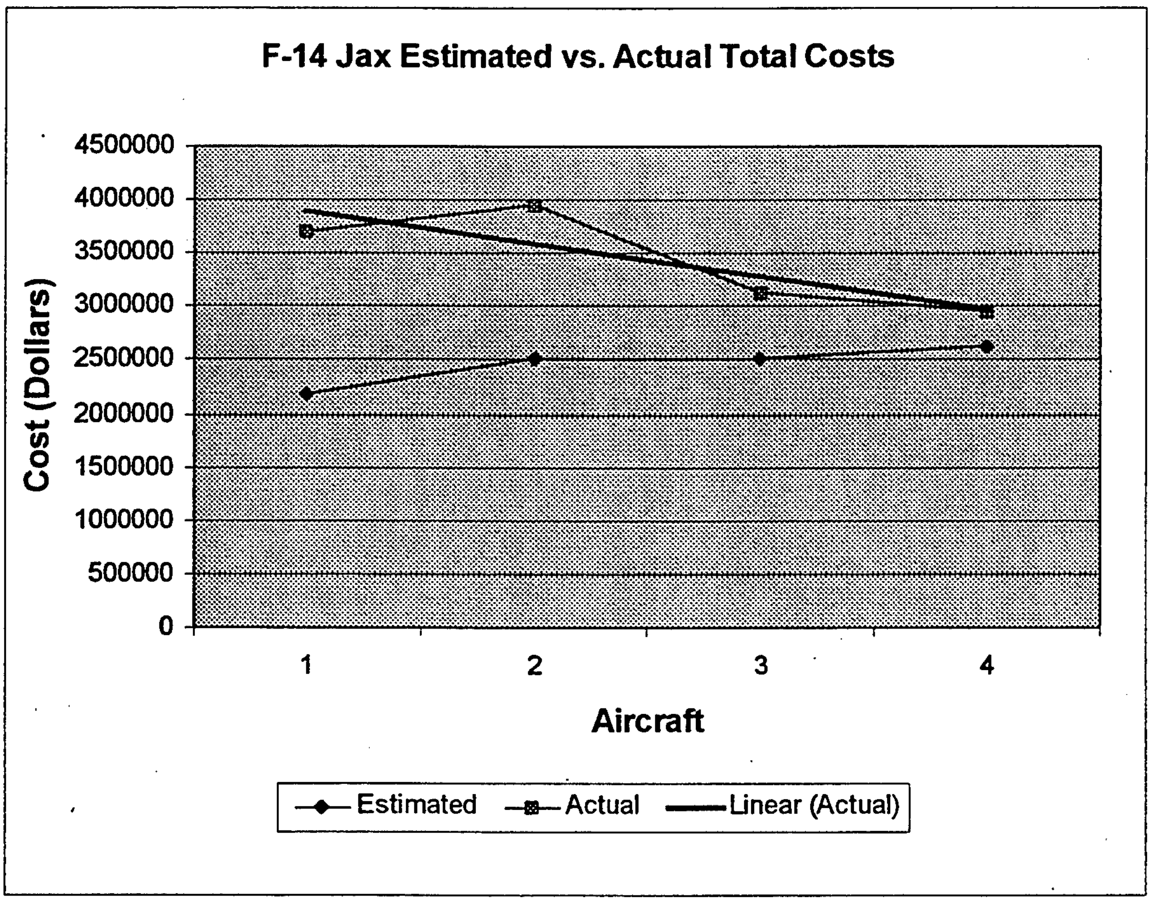


Figure 6. NADEP Jacksonville Estimated vs. Actual Total Costs

C. F/A-18 QUANTITATIVE ANALYSIS

The F/A-18 overhaul process was initially conducted at both NADEP North Island, California, and NADEP Jacksonville, Florida, prior to 1992. However, that overhaul contract was to expire at the end of 1991 and only a one year contract was to be awarded for fiscal year 1992. Due to the high process variability and resulting high costs incurred at both NADEPs, the contract was awarded to an Air Force Depot. As a result, NADEP North Island, California, began its initial planning to regain the contract and return the process of overhauling naval aircraft to a Navy depot.

As a result of their planning and changes in their process management philosophy, NADEP North Island, California, reacquired the F/A-18 overhaul contract beginning in fiscal year 1993. Their philosophy of continuous process improvement is clearly shown in the accompanying data of this section.

1. Labor Hour Analysis

Figure 7 exhibits the Estimated versus Actual Labor Hours for 184 aircraft that completed overhaul at NADEP North Island, California, from fiscal year 1993 through fiscal year 1997. Over this 5 year time period, the average actual labor hours are 539 hours less than the estimated amount. The graph in Figure 7 clearly displays the decreasing variability of expended labor hours per aircraft over time. Figure 7 also shows a decreasing trend in the amount of actual labor hours consumed per aircraft as well as a slightly decreasing trend in the estimated number of labor hours per aircraft.

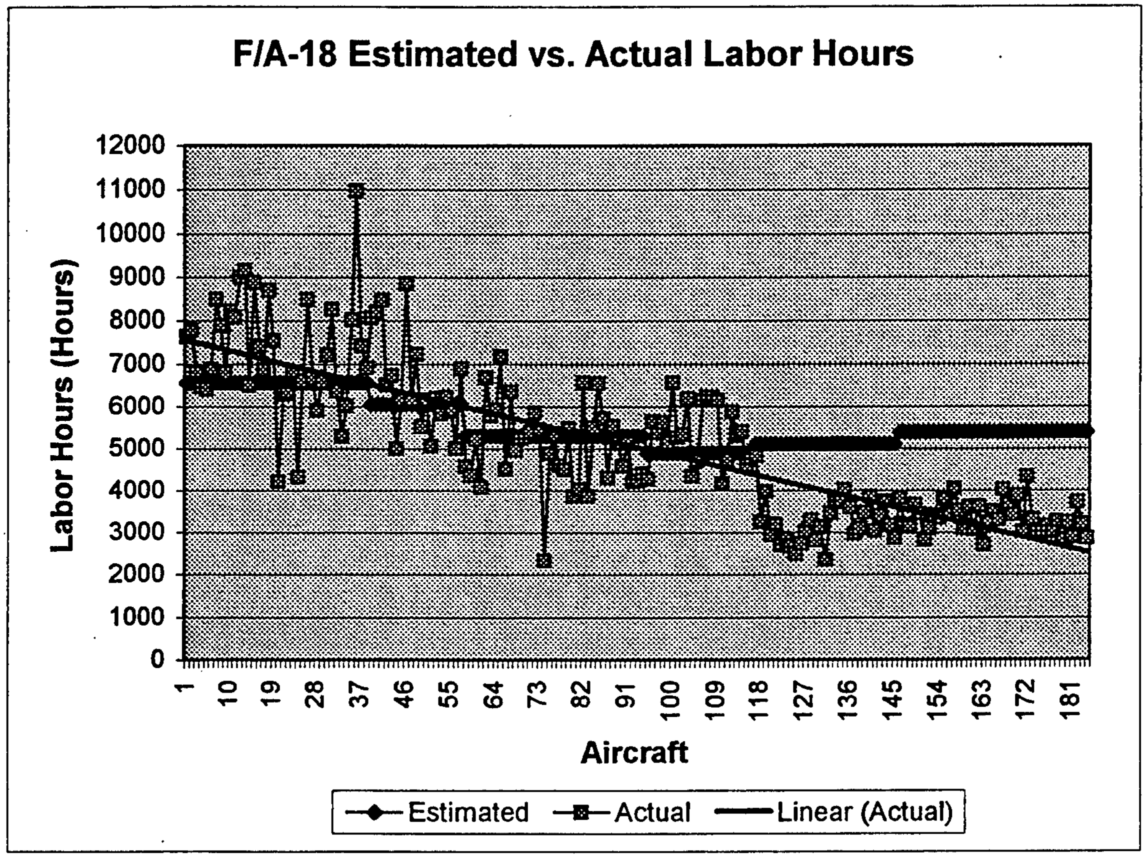


Figure 7. F/A-18 Estimated vs. Actual Labor Hours

2. Material Analysis

Figure 8 exhibits the Estimated versus Actual Material Costs for 184 aircraft that completed overhaul at NADEP North Island, California, from fiscal year 1993 through fiscal year 1997. The average actual material costs are

$12,575 less than the estimated material costs and for the last 150 aircraft completing overhaul, the average actual costs are less than the estimated costs. Figure 8 also shows a decreasing trend in total material costs per aircraft while the estimated material costs remain relatively constant.

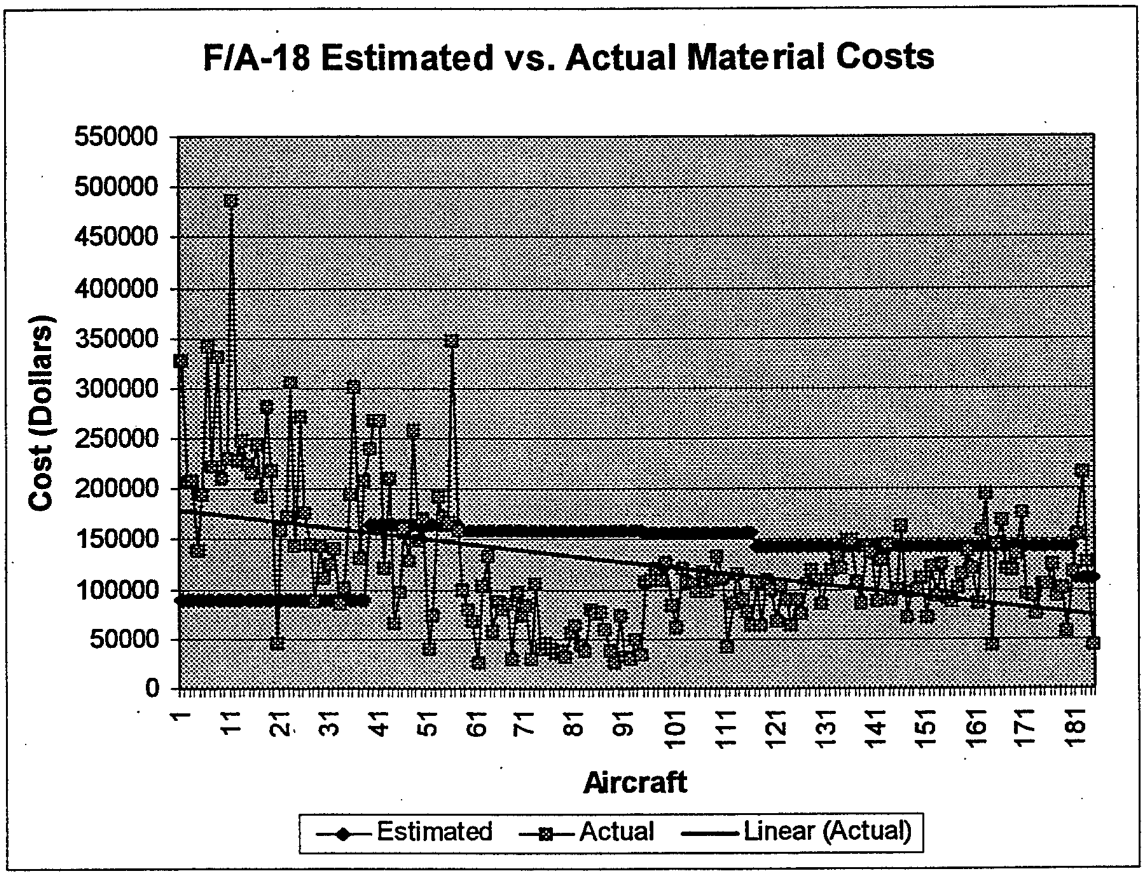


Figure 8. F/A-18 Estimated vs. Actual Material Costs

3. Total Cost Analysis

Figure 9 exhibits the Estimated versus Actual Total Costs for 184 aircraft that completed the overhaul process at NADEP North Island, California, from fiscal year 1993 through fiscal year 1997. The average total cost per aircraft is $36,610 less than the estimated total cost per aircraft and for the last 130 aircraft completing overhaul, the average total costs are less than the estimated costs. The graph in Figure 9 clearly displays the decreasing variability of total costs per aircraft completing the overhaul process. Figure 9 also shows a significantly decreasing trend in the total costs per aircraft while the estimated total costs remains relatively constant.

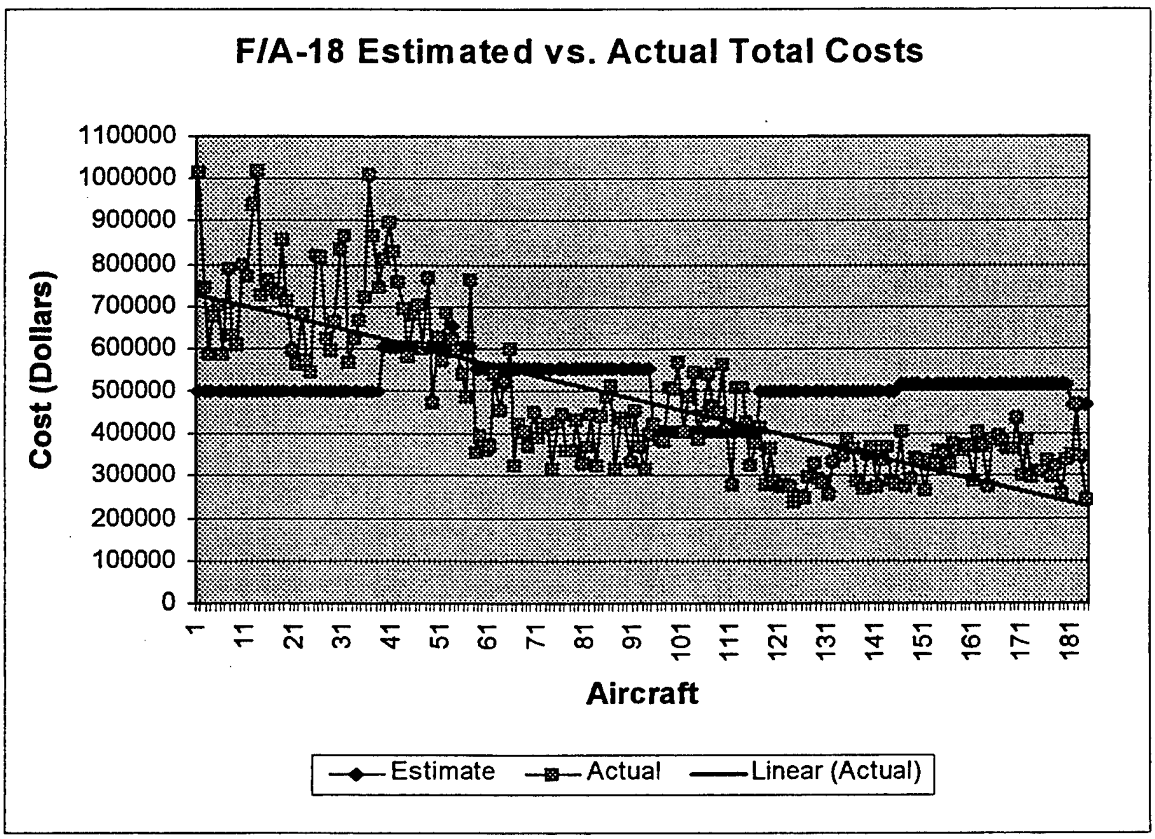


Figure 9. F/A-18 Estimated vs. Actual Total Costs

D. UNITED AIRLINES QUANTITATIVE ANALYSIS

The sample of 12 United Airlines 737 aircraft completing their second Heavy Maintenance Visit (HMV) checks during calendar year 1997 was the only data available to the researchers for consideration, review and analysis by the completion of this thesis. However, these data are a good indication of the efficiencies and effectiveness of United Airlines' overhaul process and shows why their maintenance program has continuously been recognized as a benchmark within the airline industry.

1. Labor Hour Analysis

Figure 10 exhibits the Estimated versus Actual Labor Hours for 12 Boeing 737 aircraft that completed United Airlines' overhaul process during calendar year 1997. The average variation of the actual labor hours is 1,906 hours less than the estimated total labor hours per aircraft. The graph in Figure 10 clearly displays the decreasing variability over time of amount of labor hours expended per aircraft completing an HMV check. Figure 10 also shows the average actual costs are less than the estimated costs as well as a decreasing trend in the actual labor hours consumed per aircraft.

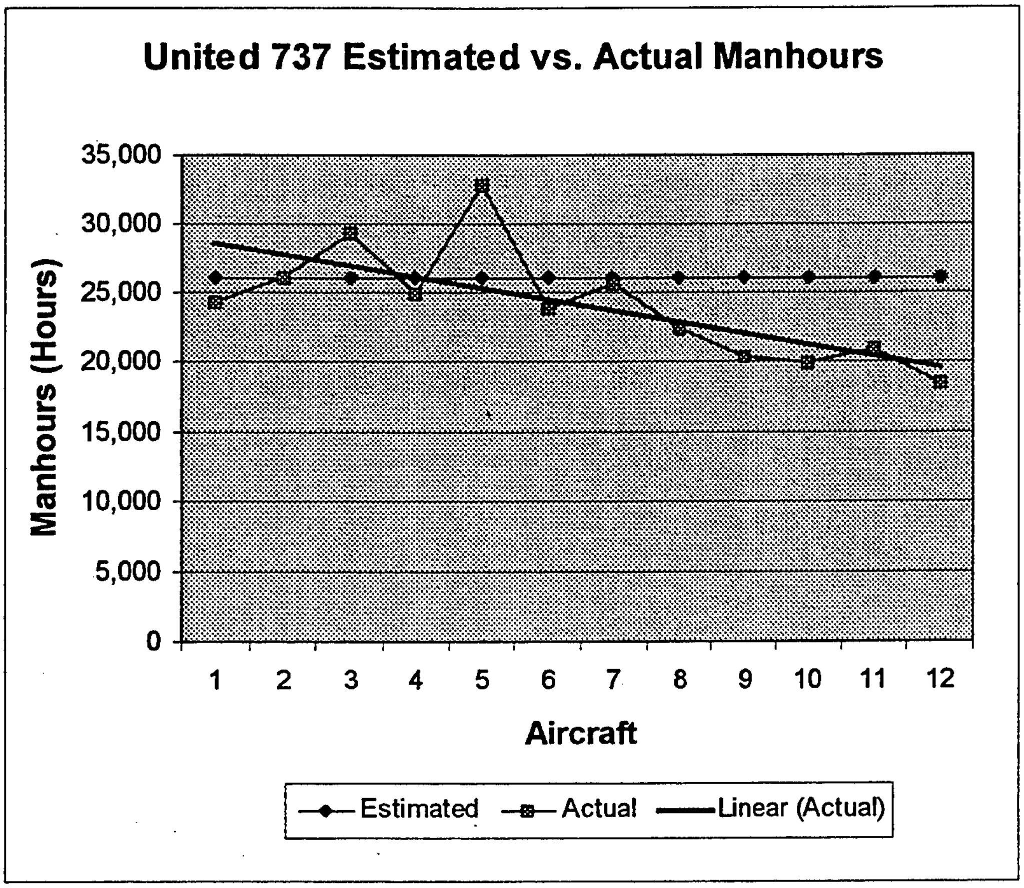


Figure 10. United 737 Estimated vs. Actual Labor Hours

2. Material Analysis

Figure 11 exhibits the Estimated versus Actual Material Costs for 12 Boeing 737 aircraft that completed United Airlines' overhaul process during calendar year 1997. The average material cost per aircraft is $2,119 more than the estimated material cost per aircraft. The graph in Figure 11 clearly displays the extremely low variability of the material costs per aircraft completing an HMV check. Figure 11 also shows a fairly constant trend in the material costs per aircraft indicating that the overall process of material usage is under control.

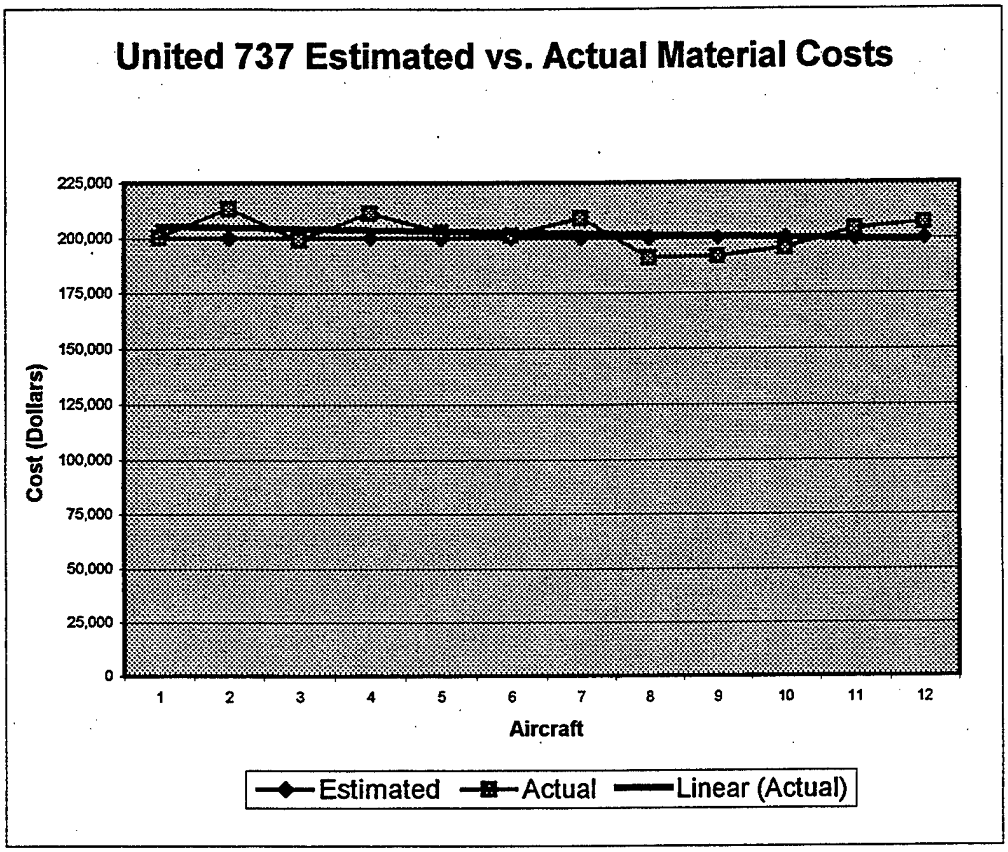


Figure 11. United 737 Estimated vs. Actual Material Costs

3. Total Cost Analysis

Figure 12 exhibits the Estimated versus Actual Total Costs for 12 Boeing 737 aircraft that completed United Airlines' HMV check process during calendar year 1997. The average total cost per aircraft is $117,529 less than the estimated total cost per aircraft. Figure 11 also shows a significantly decreasing trend in the total costs per aircraft while the estimated total costs remains constant over time.

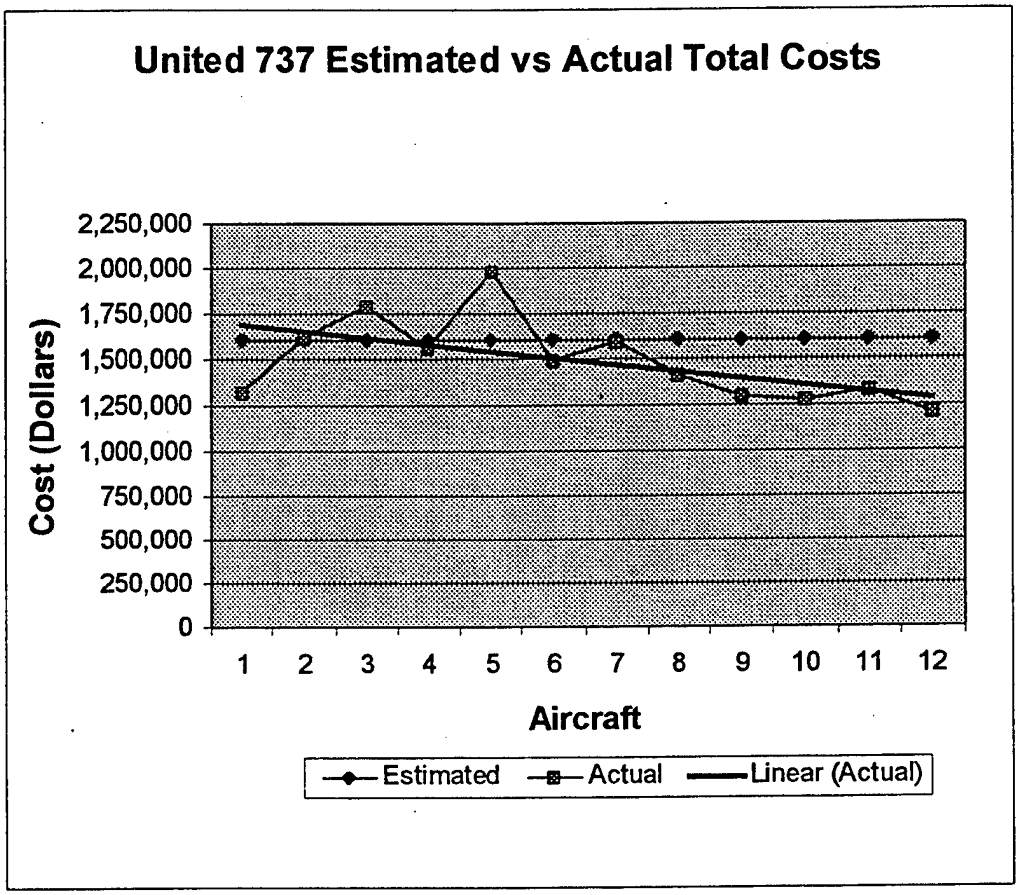


Figure 12. United 737 Estimated vs. Actual Total Costs

E. SUMMARY

Table 1 summarizes the findings exhibited in Figures 1 through 12. A negative number indicates that the average actual labor hours and/or costs are less than the estimated labor hours and/or costs.

	Labor Hours	Material Costs	Total Costs
F-14 (Norfolk & Jacksonville)	10,002	$331,178	$905,263
F-14 Jacksonville	2,735	$277,250	$977,750
F/A-18	-539	$-12,575	$-36,610
United 737	-1,906	$2,119	$-117,529

Table 1: Average Difference Between Actual and Estimated Labor Hours and Costs

As previously discussed in Chapter III, the management philosophy and practices, the decisions on buying versus routing versus storing, and the culture within an organization directly contribute to the overall control of the process and ultimately, the amount of variation within the process. Inefficiencies within the NADEP Jacksonville, Florida, process have resulted in large variations of labor hours consumed, as well as both material cost and total cost overruns. Efficiencies found in the F/A-18 and United 737 processes have resulted in smaller variations of labor hours consumed, as well as smaller material cost and total cost variations. In fact, these efficiencies have resulted in both NADEP North Island, California, and United Airlines overestimating on average, the amount of labor hours and total costs expected per aircraft.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This thesis has examined the efficiency and effectiveness of the F-14, F/A-18 and United Airlines 737 aircraft. The analysis focused on the management philosophies and practices of 1) planning, 2) the concept of buy versus route versus store and 3) the culture within each overhaul process. The analysis also focused on the resulting variabilities of labor hours consumed, material costs and total costs based on the respective management philosophies and practices. The following six conclusions can be drawn.

1. **Current planning for the F-14 SDLM is inefficient due to disruptions and lack of rigorous advance planning.** Planning for the overhaul and upgrade of a tactical fighter must be completed weeks prior to the aircraft's arrival. This allows for sufficient time to identify and acquire parts, materials, tooling, and modification kits. It also allows for the timely staffing and identification of the personnel levels needed to complete the process as scheduled. Post-induction requests for changes and/or

additional modifications to the aircraft increase TAT which result in additional costs to the customer and is a practice that should be curtailed.

2. **Changing the current policy of Buy versus Route versus Store can enhance productivity.** F-14 aircraft inducted into the SDLM process must be given the first priority after deploying squadrons for component procurement. The coordinated focus of the supply effort must be to ensure there are no production delays due to the lack of parts. NAVICP has not worked closely with NADEP Jacksonville, Florida, to identify and procure those components whose historical data indicate replacement during the SDLM process. The resulting parts shortages have forced NADEP to route components to backshops for repair. This contributes to the "Component Death Spiral" where utilization of supply support decreases and future surcharges imposed by NAVICP increase. As both a cost and SDLM TAT reduction initiative, backshop production should primarily support restocking the Navy supply system and not totally supporting the SDLM production line.

3. **Improved Total Asset Visibility of inducted components can reduce F-14 SDLM TAT.** Workload priorities among the component repair shops are not aligned to the priorities of the SDLM production line. SDLM aircraft

components inducted for mandatory Fatigue Life Expenditure (FLE) inspection criteria are not identified to backshop supervisors as requirements to the SDLM schedule. Backshop supervisors are primarily focused on completing a predetermined quarterly quota, which is not harmonized with supporting the SDLM production line.

4. **TAT of components routed for repair is excessive and can be improved.** With the exception of FLE components, backshops should support replenishing the supply inventory and not the production line. As stated in the second conclusion, F-14 SDLM production priority means that every part resource must be focused on high velocity SDLM TAT. Approximately sixty-five percent of backshop components are not delivered on time to the SDLM production line. Routed components often get overhauled when a complete overhaul of the item is neither necessary nor warranted.

5. **Amending current management of the labor force could result in improved production.** The frequent practice of approving leave of personnel and then approving overtime upon their return is disruptive and costly to the overhaul process. This results in the inability to execute workload efficiently, on schedule and within cost.

6. **Overlapping of work phases within the SDLM process could result in shorter TAT.** Concurrent task initiation

within the process is used effectively by both the F/A-18 and United Airlines 737 overhaul programs. Overlapping of work phases when possible within a process results in a shorter overall TAT.

B. RECOMMENDATIONS

This section discusses the recommendations concluded from the research effort.

1. Identify Pre-induction requirements. Customers should identify specific aircraft for induction and request all modifications to that aircraft prior to its induction into the SDLM process. Except for safety of flight issues, it is imperative that no further changes or additional modifications be accepted once the aircraft is inducted.

2. Eliminate parts shortages and initiate dialogue with NAVICP to facilitate better communication. NAVICP should make an initial investment and establish an economical order size for all needed F-14 components currently at "zero depth" in the Navy supply system. This eliminates NADEP attempting to gain control of a component shortage problem through "cost-intensive" in-house backshop support. In addition, identify one coordinating manager from NADEP Jacksonville, Florida, and one from NAVICP who understand SDLM requirements and can forecast and budget total requirements to match NADEP capacity. This will result in a more cooperative effort between the two commands.

3. **Establish better coordination between NADEP divisions.** SDLM production line management must develop the communication networks necessary to ensure that the focus of backshop support is toward the SDLM production process regarding FLE components and not toward divisional quotas.

4. **Control out of scope tasks.** Components requiring repair beyond the normal range of SDLM specifications need to be identified for additional funding. Furthermore, components removed from the SDLM aircraft and routed to backshops for inspections/repair should be replaced by inventory assets. Backshops should only overhaul components if necessary and return them to the supply inventory.

5. **Reduce dependency on overtime.** Issue guidelines to supervisors for efficient use and authorization of annual leave to minimize the amount of overtime needed to maintain the established production schedule. Annual leave must be planned in advance in order to execute the workload efficiently and on schedule.

6. **Implement simultaneous execution of specific work phases.** SDLM process managers need to identify potential work phases that can be performed simultaneously within labor, material and logistical constraints.

C. AREAS FOR FURTHER RESEARCH

In the course of this research, many ideas surfaced which could provide areas for further research. One idea specifically tied to this thesis is the utilization of NADEP backshop support to solely provide for the Navy supply system and not the SDLM production line. Four other ideas include:

1. In response to a lack of initial production aircraft in the foreseeable future, investigate the potential cost benefit of increasing the financial backing to the current overhaul program as if it were an initial production program.
2. Compare a budget/time phased overhaul plan to the present depot process to determine potential cost savings related to reductions of process variability.
3. Identify facility-related chokepoints and potential solutions as they apply to Naval Aviation Depots.
4. Determine the cost-benefit opportunity for partnering with industry versus expanding the current NADEP core capabilities.

APPENDIX A. SDLM MASTER PLAN

TMS	BUNO	PED	ASPA	Best guess for next major Depot Rqmnt	Reason for Depot Rqmnt	ESTIMATE Retire/ Store
F-14B	161873	Nov-97	4	Nov-97	ASPA fail(#4)	Oct-05
F-14B	163218	Dec-97	4	Dec-97	ASPA fail(#4)	Aug-06
F-14A	160902	Sep-99	1	Dec-97	112% [3G Rest]	Dec-97
F-14A	161620	May-99	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	161624	Feb-98	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	159848	May-98	3	Dec-97	82% [5G Rest]	Dec-97
F-14A	159873	Nov-00	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160386	May-99	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160396	Mar-00	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160909	Mar-98	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	161270	Mar-98	3	Dec-97	82% [5G Rest]	Dec-97
F-14A	159465	Mar-98	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	160896	Nov-98	5	Dec-97	82% [5G Rest]	Dec-97
F-14A	160908	Sep-97	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	161162	Sep-00	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	161164	Jun-98	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	161616	Feb-98	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	161850	Jan-98	3	Dec-97	82% [5G Rest]	Dec-97
F-14A	161853	Dec-97	3	Dec-97	82% [5G Rest]	Aug-00
F-14A	161864	Mar-98	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	161868	Jun-98	3	Dec-97	82% [5G Rest]	Dec-97
F-14A	159845	Apr-00	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	159864	Oct-99	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160403	May-98	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160669	Apr-00	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160696	Jul-98	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	160914	Dec-98	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	160917	Aug-98	5	Dec-97	82% [5G Rest]	Dec-97
F-14A	160925	Aug-00	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160928	Apr-98	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	161141	May-00	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	161271	Jun-98	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	161285	Sep-98	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	161598	Aug-98	4	Dec-97	82% [5G Rest]	Dec-97

TMS	BUNO	PED	A S P A	Best guess for next major Depot Rqmnt	Reason for Depot Rqmnt	ESTIMATE Retire/ Store
F-14A	162598	Jan-99	1	Dec-97	82% [5G Rest]	Feb-01
F-14A	162607	Jun-98	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	162689	Dec-99	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	161857	May-98	3	Dec-97	82% [5G Rest]	Dec-97
F-14B	161608	Dec-97	4	Dec-97	Upgrd (SDLM)	Jan-07
F-14A	162604	Apr-98	2	Jan-98	5K Skd [5G rest]	Nov-01
F-14D	159595	May-99	1	Jan-98	5K [790] Sked	Nov-06
F-14D	163898	Nov-97	3	Jan-98	SDLM+5/7k	Oct-08
F-14A	160391	Nov-98	1	Jan-98	82% TCR	Jan-98
F-14A	160910	Jul-01	1	Jan-98	112% DDead	Jan-98
F-14A	161626	May-98	2	Feb-98	5K Sked	Oct-01
F-14A	162600	Oct-98	2	Feb-98	82% TCR	May-02
F-14B	162927	Feb-98	4	Feb-98	Upgrd (SDLM)	Nov-04
F-14B	162925	Apr-98	4	Mar-98	Upgrd (SDLM)	Jun-10
F-14D	163413	Apr-98	4	Mar-98	SDLM+5/7k	Nov-10
F-14A	160920	May-98	4	Mar-98	82% TCR	Mar-98
F-14A	162603	Feb-98	1	Apr-98	5K Skd [5G rest]	Dec-00
F-14A	162688	Oct-99	1	Apr-98	5K Sked	Dec-02
F-14A	162696	Jan-99	1	Apr-98	5K Skd [5G rest]	Feb-02
F-14B	161422	Apr-98	4	Apr-98	Upgrd (SDLM)	Oct-04
F-14D	163896	Mar-98	3	Apr-98	SDLM+5/7k	Dec-08
F-14B	161440	Sep-98	5	Apr-98	100% TCR	Apr-98
F-14A	158636	Apr-98	4	Apr-98	ASPA fail(#4)	Mar-07
F-14A	159855	Apr-98	7	Apr-98	ASPA fail(#4)	Apr-98
F-14D	159600	Nov-98	1	May-98	5K [790] Sked	Oct-06
F-14D	161163	Aug-98	3	May-98	SDLM+9kV-V	Oct-01
F-14B	163215	Jun-98	5	Jun-98	Upgrd (SDLM)	Apr-07
F-14B	163224	Aug-98	5	Jun-98	Upgrd (SDLM)	Aug-09
F-14D	159610	Mar-98	2	Jun-98	SDLM+7k	Feb-03
F-14D	161166	Aug-98	1	Jun-98	5K [790] Sked	Jan-07
F-14A	158617	Sep-97	2	Jul-98	5K Sked	Feb-03
F-14A	161603	Sep-98	2	Jul-98	5K Sked	Nov-00
F-14A	161607	Dec-97	1	Jul-98	5K Skd [5G rest]	Oct-01
F-14A	161619	Jul-98	1	Jul-98	5K Sked	Jun-02
F-14A	162704	Jun-99	1	Jul-98	5K Skd [5G rest]	May-01
F-14B	162918	Apr-98	5	Jul-98	Upgrd (SDLM)	Jun-02
F-14D	163414	Apr-98	4	Jul-98	SDLM+5/7k	Sep-09

TMS	BUNO	PED	ASPA	Best guess for next major Depot Rqmnt	Reason for Depot Rqmnt	ESTIMATE Retire/ Store
F-14D	159613	Apr-97	1	Jul-98	SDLM+7k	Apr-04
F-14A	161276	May-98	3	Jul-98	82% TCR	Nov-02
F-14B	162926	Jul-98	5	Aug-98	Upgrd (SDLM)	May-10
F-14D	163894	Aug-97	3	Aug-98	ASPA fail(#4)	Jan-09
F-14D	163897	Aug-97	3	Aug-98	ASPA fail(#4)	May-09
F-14A	158637	Sep-00	1	Aug-98	82% TCR	Mar-02
F-14A	158615	Aug-98	3	Aug-98	82% TCR	Aug-98
F-14A	158629	Apr-00	1	Aug-98	82% TCR	Mar-02
F-14A	161291	Jul-98	5	Sep-98	SDLM+5k,T	Sep-03
F-14B	161417	Sep-98	5	Sep-98	ASPA fail(#5)	Sep-98
F-14B	163407	Aug-98	5	Sep-98	Upgrd (SDLM)	Aug-08
F-14D	159603	May-99	1	Sep-98	5K [790] Sked	Jun-06
F-14D	163893	Sep-98	4	Sep-98	ASPA fail(#4)	Sep-09
F-14A	161600	Mar-98	3	Sep-98	82% [5G Rest]	Sep-01
F-14B	161860	Nov-98	2	Oct-98	Ug (SDLM+9k)	Mar-05
F-14B	163410	Sep-98	4	Oct-98	Ug (SDLM+9k)	Jun-05
F-14A	161866	Oct-97	3	Oct-98	ASPA fail(#4)	Jul-04
F-14A	161622	Jun-98	2	Oct-98	82% TCR	Oct-02
F-14A	158633	Jul-98	3	Oct-98	82% TCR	Jun-02
F-14B	161858	Oct-97	1	Nov-98	Upgrd (7k ??)	Oct-06
F-14A	160681	May-98	3	Nov-98	82% TCR	Nov-98
F-14D	163895	Nov-98	4	Nov-98	ASPA fail(#4)	Jun-08
F-14B	163226	Nov-97	3	Nov-98	ASPA fail(#4)	Nov-05
F-14D	163900	Nov-98	4	Nov-98	ASPA fail(#4)	Jun-08
F-14A	162592	Jul-98	1	Dec-98	5K Sked	Apr-02
F-14B	162705	Dec-98	2	Dec-98	Ug (SDLM+9k)	Nov-04
F-14A	158614	Sep-97	1	Dec-98	82% TCR	Oct-02
F-14A	162594	Nov-98	1	Jan-99	5K Skd [5G rest]	Nov-01
F-14A	162597	May-98	1	Jan-99	5K Skd [5G rest]	Apr-01
F-14A	162606	Oct-98	1	Jan-99	5K Sked	Sep-02
F-14B	162693	Jan-99	1	Jan-99	Ug (9k+SDLM ??)	Feb-01
F-14B	161429	Jan-98	4	Jan-99	ASPA fail(#5)	Jan-99
F-14A	160382	Jan-98	1	Jan-99	82% TCR	Jan-99
F-14A	158618	Dec-00	1	Jan-99	82% TCR	Dec-02
F-14A	161168	Nov-98	1	Feb-99	5K Sked	Jun-03
F-14A	161856	Apr-01	1	Feb-99	5K Sked	Nov-02
F-14B	161855	Dec-97	1	Feb-99	Ug (9k+SDLM ??)	Jun-04

TMS	BUNO	PED	A S P A	Best guess for next major Depot Rqmnt	Reason for Depot Rqmnt	ESTIMATE Retire/ Store
F-14A	158612	Jun-98	3	Feb-99	82% TCR	Dec-02
F-14B	161851	Jun-98	3	Feb-99	112% DDead	Apr-97
F-14B	162703	Jul-00	1	Mar-99	Upgrd (7k ??)	Jan-04
F-14B	163229	Sep-98	4	Mar-99	Ug (SDLM+9k)	Jun-05
F-14D	159618	Jan-00	1	Mar-99	5K [790] Sked	Oct-05
F-14B	161419	Mar-98	4	Mar-99	ASPA fail(#5)	Mar-99
F-14B	162913	Mar-98	4	Mar-99	ASPA fail(#5)	Mar-06
F-14A	160666	Aug-97	3	Mar-99	82% TCR	Mar-99
F-14A	158627	Mar-98	3	Mar-99	ASPA fail(#4)	Jun-07
F-14D	163902	Mar-98	3	Mar-99	ASPA fail(#4)	Apr-08
F-14A	158632	Apr-98	3	Apr-99	ASPA fail(#4)	Apr-08
F-14B	161437	Apr-98	3	Apr-99	100% TCR	Apr-99
F-14A	158620	Apr-98	3	Apr-99	ASPA fail(#4)	Jun-05
F-14B	161434	Apr-98	4	Apr-99	ASPA fail(#5)	Apr-99
F-14D	163903	Apr-98	3	Apr-99	ASPA fail(#4)	Nov-09
F-14D	161159	Oct-98	3	Apr-99	ASPA fail(#3)	May-05
F-14B	161599	Jan-98	3	Apr-99	112% DDead	Apr-99
F-14A	161617	Mar-99	1	May-99	5K Sked	Sep-03
F-14B	162699	Jul-99	1	May-99	Ug (9k+SDLM ??)	Jan-02
F-14A	160678	May-98	5	May-99	ASPA fail(#6)	May-99
F-14B	163216	Mar-98	3	Jun-99	Ug (SDLM+9k)	Apr-05
F-14D	163416	Jun-98	3	Jun-99	ASPA fail(#4)	Dec-09
F-14D	164343	Jun-98	3	Jun-99	ASPA fail(#4)	Aug-07
F-14D	164344	Jun-98	3	Jun-99	ASPA fail(#4)	Apr-09
F-14D	164342	Jun-98	3	Jun-99	ASPA fail(#4)	Nov-06
F-14D	163904	Jun-98	3	Jun-99	ASPA fail(#4)	Jul-08
F-14A	161274	Apr-00	1	Jul-99	5K Sked	Jan-03
F-14B	162695	Aug-00	1	Jul-99	Upgrd (7k ??)	Apr-04
F-14B	161871	Jul-98	3	Jul-99	ASPA fail(#4)	Jul-06
F-14D	164341	Jul-98	3	Jul-99	ASPA fail(#4)	Jun-08
F-14A	159591	Jun-01	1	Aug-99	82% TCR	Sep-03
F-14A	158635	Aug-97	2	Aug-99	ASPA fail(#4)	Nov-07
F-14D	163412	Aug-98	3	Aug-99	ASPA fail(#4)	Jun-12
F-14D	164345	Aug-98	3	Aug-99	ASPA fail(#4)	Feb-09
F-14D	159628	Jan-99	1	Aug-99	82% TCR	Feb-06
F-14B	161859	Aug-98	2	Sep-99	Ug (9k+SDLM ??)	Jul-03
F-14B	161610	Sep-98	4	Sep-99	ASPA fail(#5)	Sep-99

TMS	BUNO	PED	ASPA	Best guess for next major Depot Rqmnt	Reason for Depot Rqmnt	ESTIMATE Retire/ Store
F-14D	164348	Sep-98	3	Sep-99	ASPA fail(#4)	Mar-08
F-14A	161281	Mar-98	2	Sep-99	112% DDead	Sep-99
F-14D	164347	Sep-98	3	Sep-99	ASPA fail(#4)	Oct-08
F-14D	164350	Oct-98	3	Oct-99	ASPA fail(#4)	Apr-10
F-14D	164346	Nov-98	3	Nov-99	ASPA fail(#4)	Oct-08
F-14A	160891	Sep-97	3	Nov-99	112% DDead	Nov-99
F-14A	160913	Apr-98	4	Nov-99	82% TCR	Nov-99
F-14D	164351	Dec-98	3	Dec-99	ASPA fail(#4)	Sep-10
F-14D	164600	Dec-97	2	Dec-99	ASPA fail(#4)	Mar-08
F-14B	163220	Jan-99	4	Jan-00	ASPA fail(#5)	Sep-08
F-14B	163222	Jan-99	4	Jan-00	ASPA fail(#5)	Mar-07
F-14D	163415	Jan-98	2	Jan-00	ASPA fail(#4)	Jun-09
F-14D	164349	Jan-98	2	Jan-00	ASPA fail(#4)	Mar-10
F-14D	164602	Jan-98	2	Jan-00	ASPA fail(#4)	Aug-10
F-14D	164599	Feb-98	2	Feb-00	ASPA fail(#4)	Aug-11
F-14D	159592	Aug-98	1	Feb-00	100% TCR	Apr-04
F-14D	164603	Feb-99	3	Feb-00	ASPA fail(#4)	Jun-11
F-14A	162611	Jan-99	1	Feb-00	82% TCR	Apr-04
F-14A	162591	Dec-98	2	Feb-00	112% DDead	Feb-00
F-14B	163408	Mar-98	3	Mar-00	ASPA fail(#5)	Feb-10
F-14D	159619	May-97	1	Mar-00	ASPA fail(#3)	Dec-03
F-14D	159629	Mar-98	1	Mar-00	ASPA fail(#3)	Feb-04
F-14D	164601	Mar-98	2	Mar-00	ASPA fail(#4)	Apr-09
F-14D	164604	Mar-98	2	Mar-00	ASPA fail(#4)	Sep-11
F-14B	162915	May-98	4	May-00	ASPA fail(#6)	Feb-07
F-14A	162697	Feb-01	1	Jun-00	112% DDead	Jun-00
F-14B	163409	Sep-98	3	Sep-00	ASPA fail(#5)	Apr-07
F-14B	163223	Sep-98	4	Sep-00	ASPA fail(#6)	Jan-10
F-14A	162601	Apr-99	1	Oct-00	82% TCR	Nov-04
F-14A	162698	Dec-98	1	Oct-00	82% TCR	Dec-04
F-14A	160378	Nov-97	3	Nov-00	ASPA fail(#6)	Nov-00
F-14A	162589	Nov-97	2	Nov-00	112% DDead	Feb-99
F-14A	161160	Jul-99	1	Nov-00	112% DDead	Nov-00
F-14D	163417	Dec-97	1	Dec-00	ASPA fail(#4)	Feb-11
F-14A	160667	Feb-98	3	Dec-00	82% TCR	Dec-00
F-14B	161428	Dec-00	1	Jan-01	100% TCR	Aug-05
F-14A	161615	Jan-99	1	Jan-01	82% TCR	Mar-05

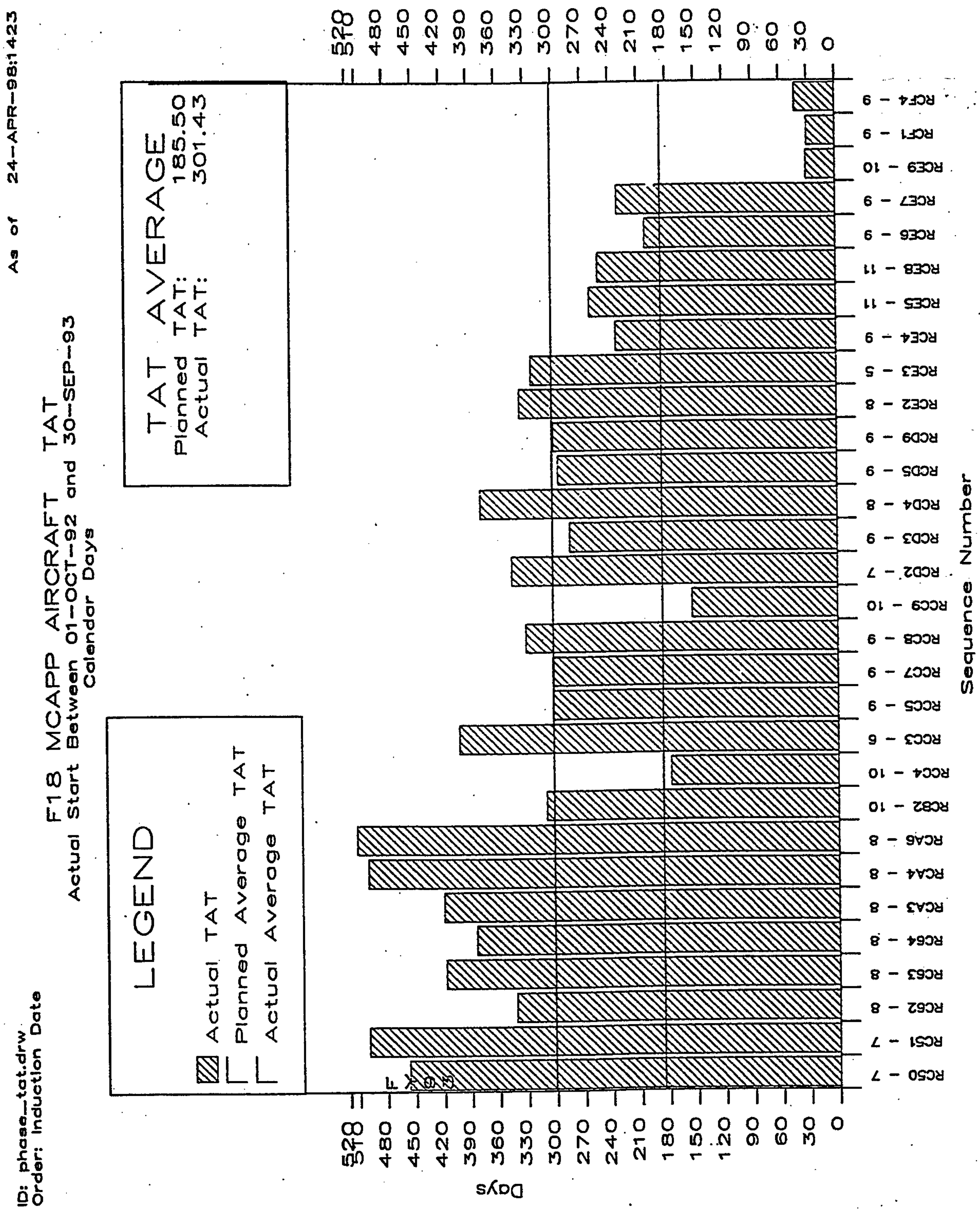
TMS	BUNO	PED	ASPA	Best guess for next major Depot Rqmnt	Reason for Depot Rqmnt	ESTIMATE Retire/ Store
F-14A	161621	Jan-98	1	Jan-01	82% TCR	Mar-05
F-14A	162608	Jul-99	1	Feb-01	82% TCR	Mar-05
F-14D	159630	Jan-98	1	Feb-01	ASPA fail(#3)	Aug-05
F-14B	163227	Feb-99	3	Feb-01	ASPA fail(#5)	Oct-06
F-14B	163228	Feb-98	3	Feb-01	ASPA fail(#6)	Sep-06
F-14B	161862	Jul-98	1	Apr-01	100% TCR	Feb-05
F-14B	162700	Oct-98	1	Oct-01	ASPA fail(#4)	Jun-07
F-14A	162610	Jul-00	1	Oct-01	82% TCR	Nov-05
F-14B	162692	Dec-98	1	Dec-01	ASPA fail(#4)	May-07
F-14A	159428	Jun-99	1	Dec-01	82% TCR	Feb-06
F-14B	161441	May-02	1	Feb-02	105% TCR	Dec-04
F-14B	162691	Mar-99	1	Mar-02	ASPA fail(#4)	Feb-08
F-14A	161292	Mar-99	2	Mar-02	112% DDead	May-99
F-14B	161424	Dec-01	1	Jun-02	100% TCR	Jun-02
F-14B	161435	May-01	1	Jun-02	105% TCR	Apr-06
F-14B	161432	Apr-01	1	Jun-02	105% TCR	Apr-06
F-14A	161280	May-00	1	Jul-02	112% DDead	Aug-99
F-14A	158634	Jul-97	1	Jul-02	ASPA fail(#5)	Oct-08
F-14B	162912	Nov-98	2	Aug-02	105% TCR	Jun-06
F-14A	161612	Jan-98	2	Aug-02	ASPA fail(#6)	Nov-01
F-14B	162920	Apr-01	1	Sep-02	100% TCR	May-07
F-14B	161442	Sep-99	1	Sep-02	ASPA fail(#4)	Jan-08
F-14A	161272	Jan-01	1	Sep-02	112% DDead	Sep-02
F-14B	162694	Jan-01	1	Oct-02	105% TCR	Aug-05
F-14A	161609	Jul-99	1	Oct-02	82% TCR	Oct-02
F-14A	161284	Aug-98	2	Oct-02	112% DDead	Dec-99
F-14B	161421	Apr-01	1	Dec-02	105% TCR	Oct-06
F-14B	161418	Jan-00	3	Mar-03	105% TCR	Dec-06
F-14B	162916	Jan-01	1	May-03	105% TCR	Mar-06
F-14A	161869	May-97	1	Aug-03	82% TCR	Sep-07
F-14A	159829	Oct-99	1	Oct-03	ASPA fail(#5)	Oct-03
F-14B	161433	Nov-99	1	Nov-03	105% TCR	Sep-06
F-14A	161288	Jul-98	1	Nov-03	112% DDead	Dec-00
F-14A	161863	Dec-99	1	Dec-03	ASPA fail(#5)	Feb-12
F-14A	161275	Oct-99	2	Jan-04	112% DDead	Feb-01
F-14B	162922	Aug-01	1	Feb-04	100% TCR	Feb-04
F-14A	161279	Sep-98	1	Feb-04	112% DDead	Mar-01

TMS	BUNO	PED	A S P A	Best guess for next major Depot Rqmnt	Reason for Depot Rqmnt	ESTIMATE Retire/ Store
F-14B	161870	Jun-00	2	Feb-04	105% TCR	Dec-06
F-14B	162911	Sep-01	1	Mar-04	100% TCR	Mar-04
F-14B	161427	May-98	1	May-04	105% TCR	Mar-07
F-14B	162919	May-02	1	Jun-04	100% TCR	Jun-04
F-14A	158628	Jun-99	1	Jul-04	112% DDead	Aug-01
F-14B	161426	Jun-98	2	Aug-04	105% TCR	Jun-08
F-14B	162917	Aug-01	1	Aug-04	105% TCR	Jun-08
F-14B	162921	Jan-02	1	Aug-04	100% TCR	Aug-04
F-14B	162701	Dec-00	1	Mar-05	105% TCR	Feb-09
F-14D	163418	Apr-00	3	Apr-05	105% TCR	Oct-07
F-14A	160658	Apr-00	1	Apr-05	ASPA fail(#6)	Apr-05
F-14A	161295	Apr-99	2	May-05	112% DDead	Jun-02
F-14B	163225	Jul-99	1	Aug-05	105% TCR	Jun-08
F-14B	163221	Nov-01	1	Nov-05	ASPA fail(#5)	Oct-09
F-14B	162923	Feb-02	1	Feb-06	ASPA fail(#5)	Jun-09
F-14B	163217	Jun-00	1	Feb-06	105% TCR	Jan-10
F-14B	162924	Oct-00	1	Jun-06	105% TCR	May-10
F-14B	162910	Nov-01	1	Aug-06	ASPA fail(#5)	Nov-11
F-14A	161294	Jan-02	1	Sep-06	112% DDead	Sep-03
F-14A	161293	May-00	3	Oct-06	112% DDead	Oct-03
F-14B	163219	Feb-99	1	Oct-06	105% TCR	Sep-10
F-14A	158624	Apr-02	4	Nov-06	112% DDead	Dec-03
F-14D	163901	Sep-98	2	Jan-07	ASPA fail(#5)	Jul-10
F-14A	161297	Aug-99	2	Jan-07	112% DDead	Feb-04
F-14D	163899	Mar-98	1	Apr-07	105% TCR	Nov-10
F-14A	158616	Jun-02	1	Jun-07	ASPA fail(#6)	Jun-05
F-14A	158630	Jun-98	2	Sep-07	ASPA fail(#6)	May-07
F-14A	161299	Oct-99	1	Nov-07	ASPA fail(#6)	May-07
F-14A	161296	May-99	2	Mar-08	112% DDead	Mar-05
F-14A	158631	Sep-98	1	Aug-08	ASPA fail(#6)	Mar-06
F-14A	158625	Aug-97	2	Aug-01	ASPA fail(#6)	Aug-01
F-14A	158984	Jul-98	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	159455	Jul-97	4	Jul-99	ASPA fail(#6)	Jul-99
F-14A	159836	Nov-97	3	Dec-97	82% [5G Rest]	Dec-97
F-14A	159868	Oct-97	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	159871	Nov-97	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	160389	May-98	3	Dec-97	82% [5G Rest]	Dec-97

TMS	BUNO	PED	ASPA	Best guess for next major Depot Rqmnt	Reason for Depot Rqmnt	ESTIMATE Retire/ Store
F-14A	160397	Oct-99	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160405	Apr-97	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	160406	Jul-98	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	160407	Apr-98	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160408	Feb-98	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	160411	Aug-97	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	160655	Nov-97	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	160665	Jun-98	4	Dec-98	82% TCR	Dec-98
F-14A	160671	Dec-97	3	May-99	82% TCR	May-99
F-14A	160673	Jul-97	3	Dec-97	82% [5G Rest]	Dec-97
F-14A	160686	Sep-97	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	160687	May-98	5	Dec-97	82% [5G Rest]	Dec-97
F-14A	160689	Mar-98	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	160692	Jan-97	2	Jan-98	82% [5G Rest]	Jan-98
F-14A	160693	Aug-97	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	160893	Mar-98	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	160900	Mar-98	5	Dec-97	82% [5G Rest]	Dec-97
F-14A	160911	May-97	3	Dec-97	112% DDead	Dec-97
F-14A	160915	Aug-99	1	Dec-97	82% [5G Rest]	Dec-97
F-14A	160926	Mar-99	1	Dec-97	112% [3G Rest]	Dec-97
F-14A	161133	Sep-97	4	Dec-97	112% [3G Rest]	Dec-97
F-14A	161134	Apr-99	1	Dec-97	112% [3G Rest]	Dec-97
F-14A	161135	Mar-98	4	Dec-97	112% [3G Rest]	Dec-97
F-14A	161139	Nov-98	1	May-97	Strk Rqst, Fire	May-97
F-14A	161140	Apr-98	5	Dec-97	82% [5G Rest]	Dec-97
F-14A	161147	Nov-97	2	Dec-97	82% [5G Rest]	Dec-97
F-14A	161155	Aug-98	5	Dec-97	82% [5G Rest]	Dec-97
F-14A	161161	Aug-97	5	Aug-97	ASPA fail(#5)	Aug-97
F-14A	161445	Sep-97	3	Sep-97	ASPA fail(#5)	Sep-97
F-14A	161611	Feb-98	4	Dec-97	82% [5G Rest]	Dec-97
F-14A	161618	Sep-98	1	Jan-98	82% TCR	Jan-98
F-14A	161852	Jun-98	3	Jun-99	112% DDead	Jun-99
F-14A	162588	Jan-98	2	Dec-97	112% DDead	Dec-97
F-14A	162709	May-97	2	May-97	ASPA failed	May-97
F-14A	162710	Nov-97	7	Nov-97	ASPA fail(#4)	Nov-97
F-14A	162711	Oct-96	4	Oct-96	ASPA failed	Oct-96
F-14B	161287	Nov-95	3	Jan-01	If rtned to Service	Aug-95

TMS	BUNO	PED	ASPA	Best guess for next major Depot Rqmnt	Reason for Depot Rqmnt	ESTIMATE Retire/ Store
F-14B	161416	Jun-97	3	Jun-98	Offset/Stow	Feb-97
F-14B	161425	Jun-98	4	Feb-98	100% TCR	Feb-98
F-14B	161438	Jun-96	1	Jul-00	If rtned to Service	Jun-95

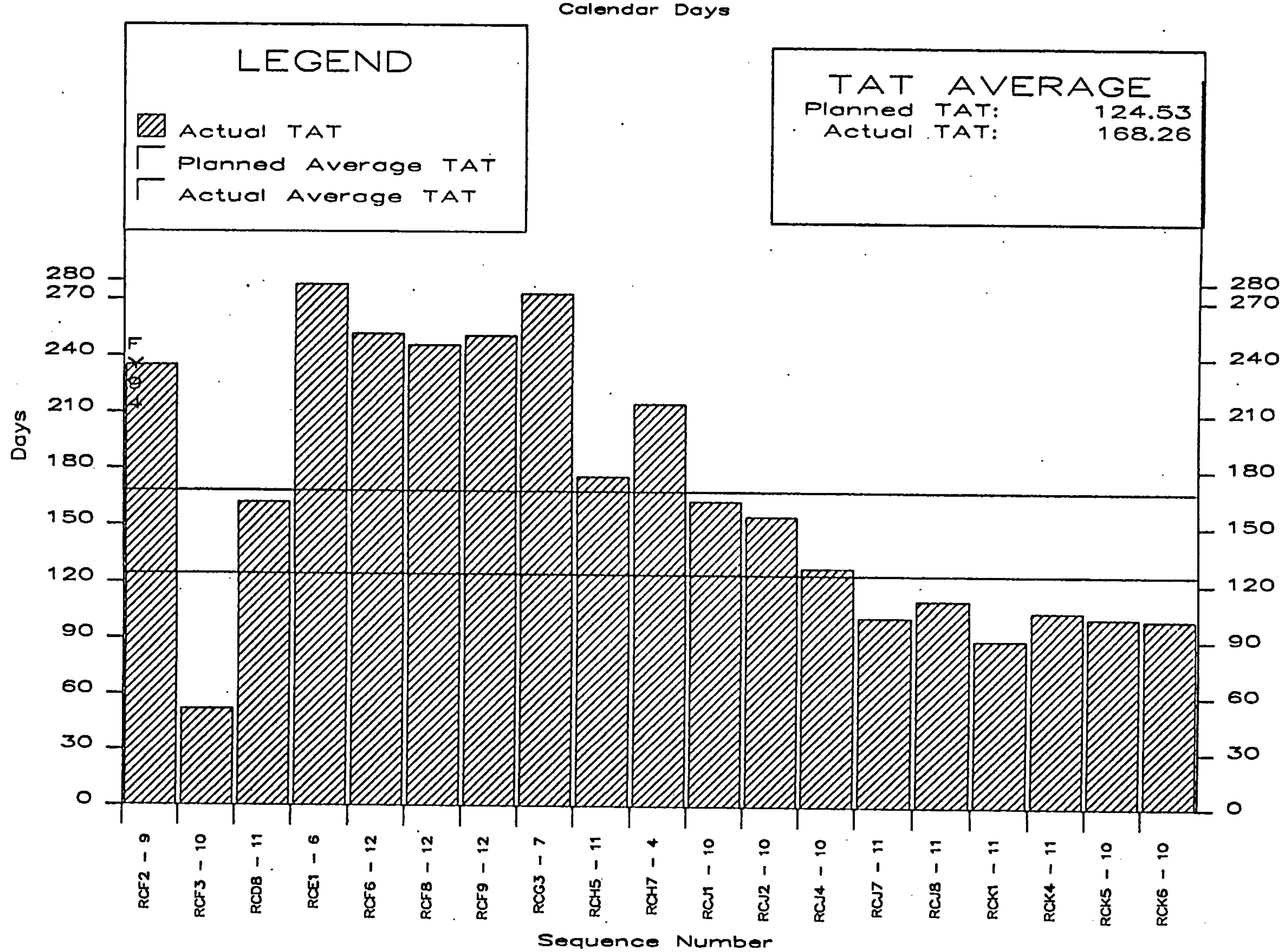
APPENDIX B. F/A-18 TAT
OCTOBER 1992-MAY 1998

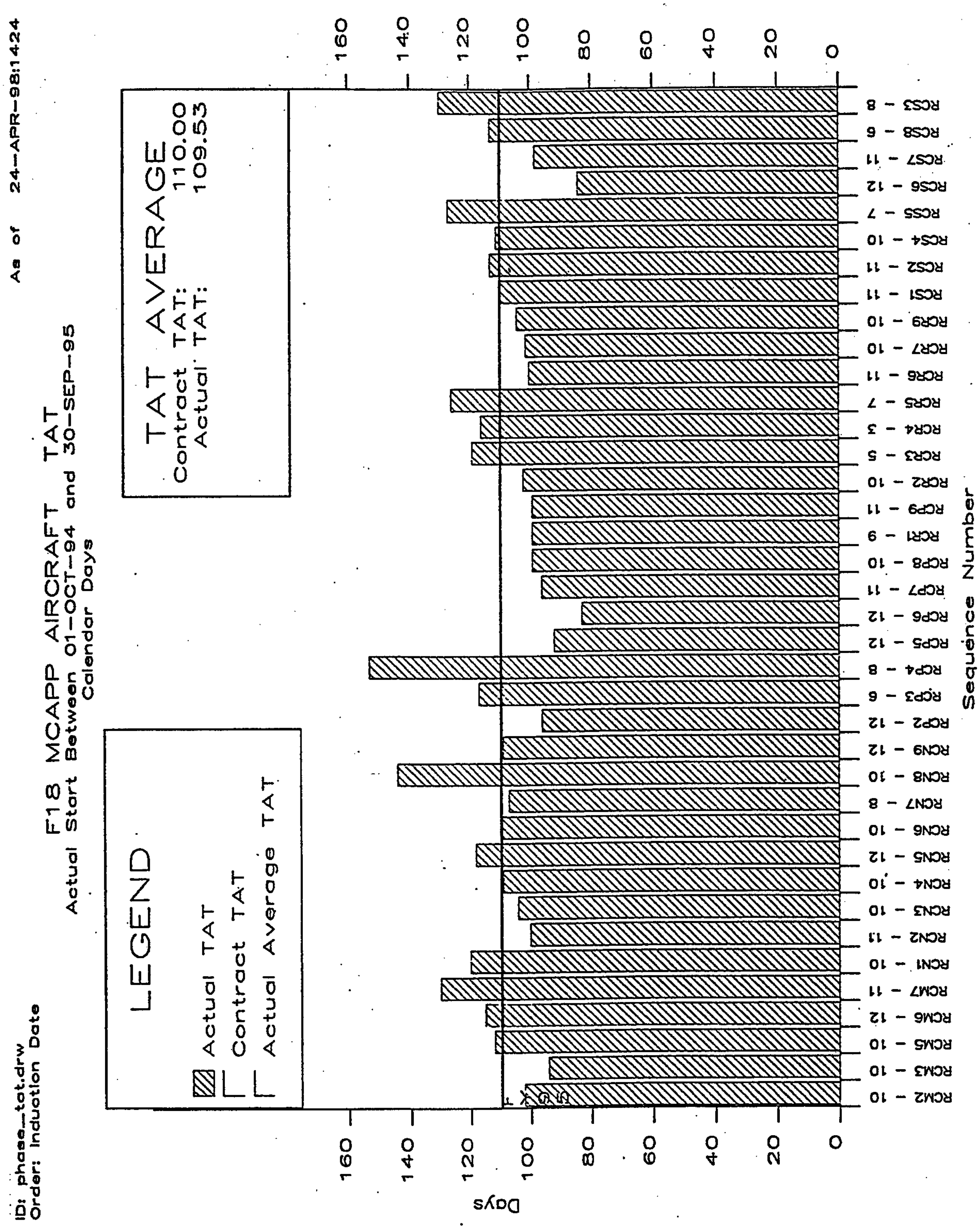


ID: phase_tat.drw
Order: Induction Date

As of 24-APR-98:1424

F18 MCAPP AIRCRAFT TAT
Actual Start Between 01-OCT-93 and 30-SEP-94
Calendar Days





ID: phase_tat.drw
Order: Induction Date
F18 MCAPP AIRCRAFT TAT
Actual Start Between 01-OCT-94 and 30-SEP-95
Calendar Days
As of 24-APR-98:1424
LEGEND
Actual TAT
Contract TAT
Actual Average TAT
TAT AVERAGE
Contract TAT: 110.00
Actual TAT: 109.53
Days
Sequence Number
RCM2 - 10
RCM3 - 10
RCM5 - 10
RCM6 - 12
RCM7 - 11
RCN1 - 10
RCN2 - 11
RCN3 - 10
RCN4 - 10
RCN5 - 12
RCN6 - 10
RCN7 - 8
RCN8 - 10
RCN9 - 12
RCP2 - 12
RCP3 - 6
RCP4 - 8
RCP5 - 12
RCP6 - 12
RCP7 - 11
RCP8 - 10
RCR1 - 9
RCP9 - 11
RCR2 - 10
RCR3 - 5
RCR4 - 3
RCR5 - 7
RCR6 - 11
RCR7 - 10
RCR9 - 10
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RCS2 - 11
RCS4 - 10
RCS5 - 7
RCS6 - 12
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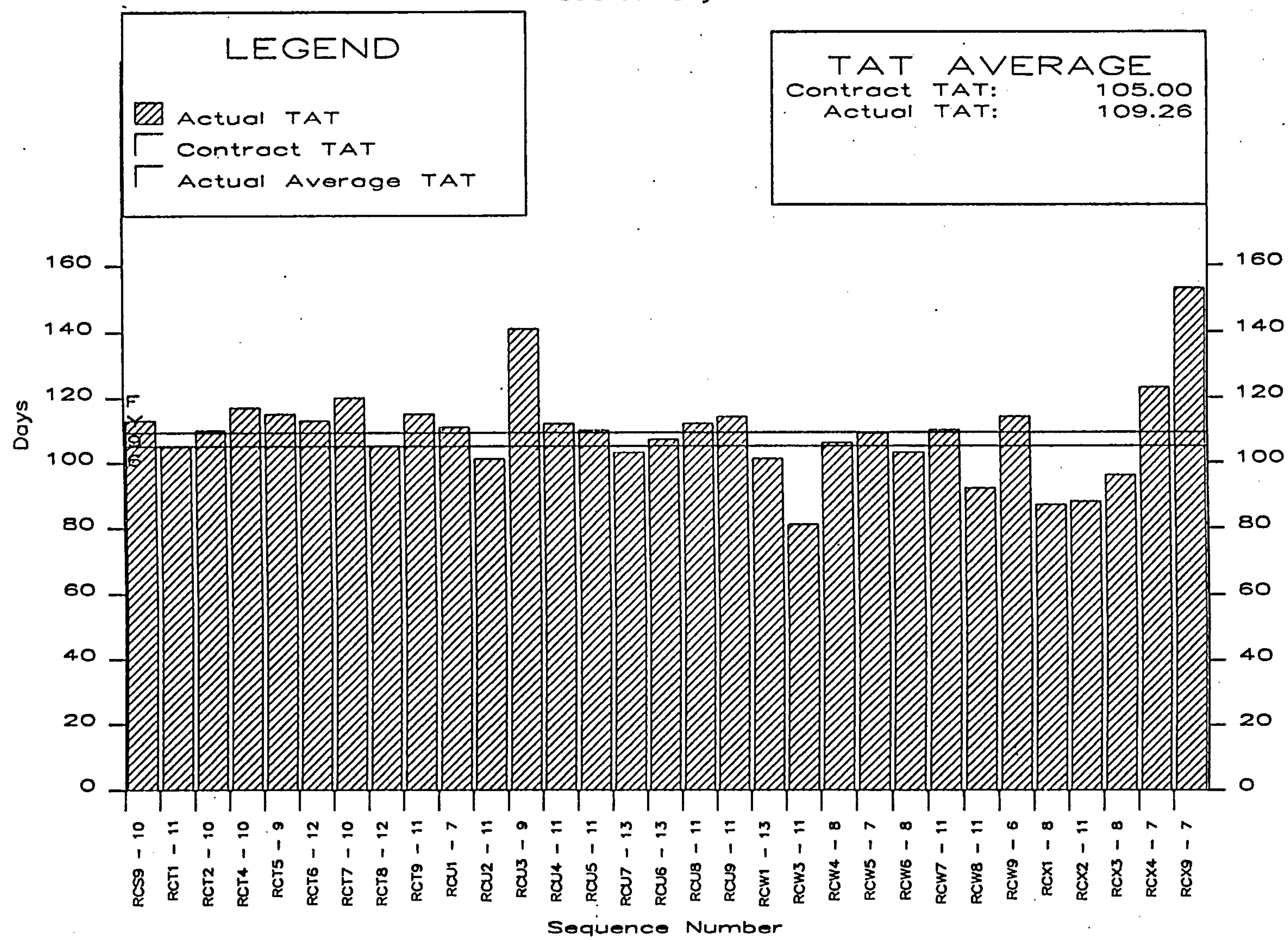
RCS8 - 6
RCS3 - 8

ID: F18phase_tat.drw
Order: Induction Date

As of 08-MAY-98:0912

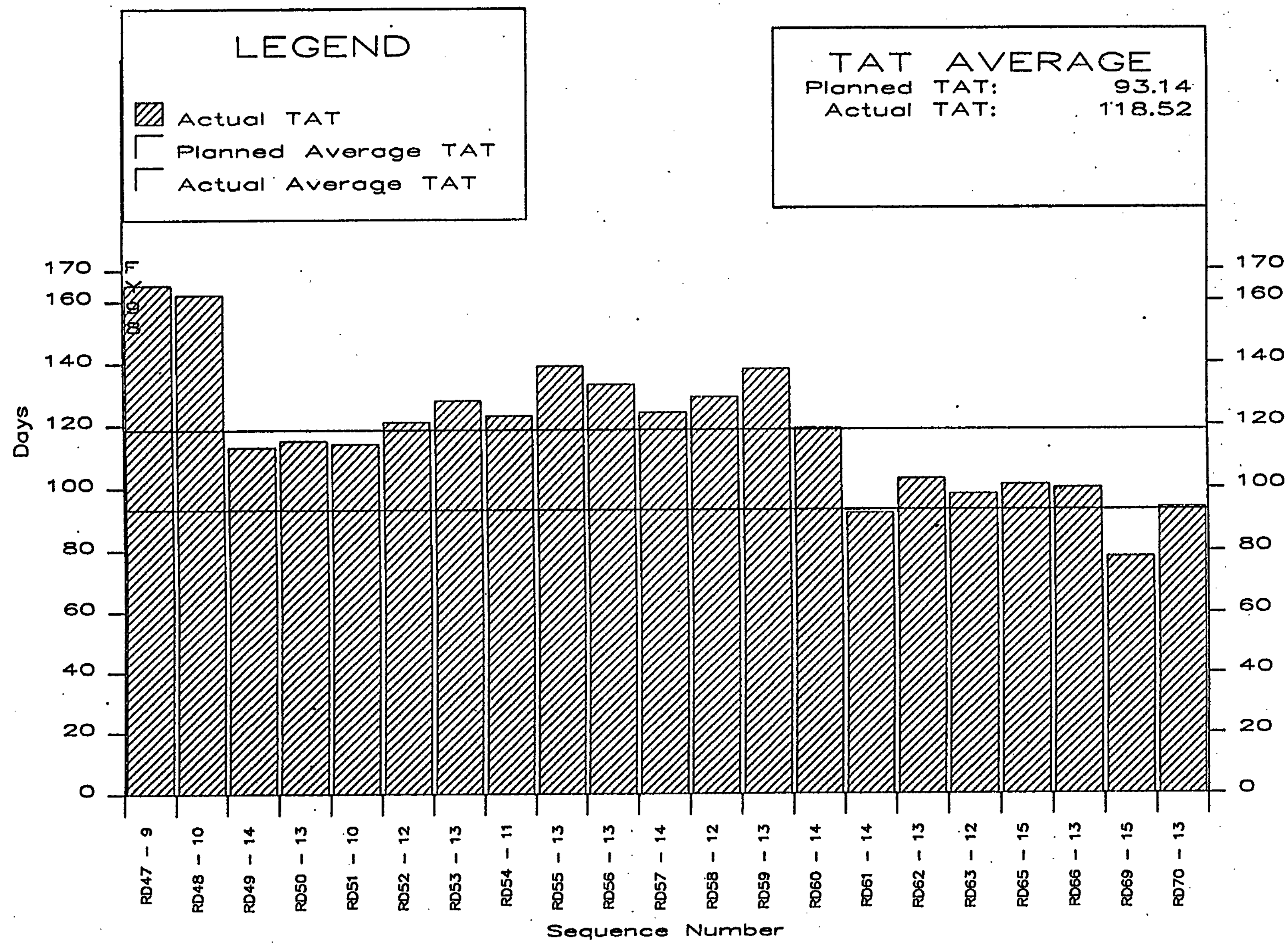
F18 MCAPP AIRCRAFT TAT
Actual Start Between 01-OCT-95 and 27-SEP-96
Calendar Days



ID: F18phase_tat.drw
Order: Induction Date

As of 08-MAY-98:1055

F18 MCAPP AIRCRAFT TAT
Actual Start Between 01-OCT-97 and 08-MAY-98
Calendar Days



APPENDIX C. F-14 AND F/A-18 FINANCIAL DATA

					Manhours			Material Costs			Total Costs		
NADEP	TMS	RWK	BUNO	FY	Est	Act	Var	Est	Act	Var	Est	Act	Var
NORVA	F14	SDLM	159454	90	18124	29074	-10950	439208	604315	-165107	1277683	1821871	-544188
NORVA	F14	SDLM	159606	90	18124	30545	-12421	439208	639533	-200325	1280084	1957956	-677872
NORVA	F14	SDLM	161147	90	18124	22413	-4289	439208	325671	113537	1189542	1240985	-51443
NORVA	F14	SDLM	159017	90	18124	22437	-4313	439208	258875	180333	1173568	1127904	45664
NORVA	F14	SDLM	159457	90	18124	25455	-7331	439208	439952	-744	1173568	1540597	-367029
NORVA	F14	SDLM	161150	90	18124	20809	-2685	439208	332760	106448	1173568	1217341	-43773
NORVA	F14	SDLM	161164	90	18124	21263	-3139	439208	421740	17468	1173568	1247059	-73491
NORVA	F14	SDLM	161281	90	18124	23254	-5130	439208	509074	-69866	1173568	1562132	-388564
NORVA	F14	SDLM	161850	90	18124	24207	-6083	439208	355653	83555	1173568	1433163	-259595
NORVA	F14	SDLM	161853	90	18124	18546	-422	439208	399229	39979	1173568	1229858	-56290
NORVA	F14	SDLM	161857	90	18124	23929	-5805	439208	341123	98085	1173568	1398763	-225195
NORVA	F14	SDLM	161861	90	18124	26558	-8434	439208	428933	10275	1173568	1636819	-463251
NORVA	F14	SDLM	160391	91	18124	29385	-11261	432000	721994	-289994	1305033	2265780	-960747
NORVA	F14	SDLM	160403	91	18124	39587	-21463	432000	1087946	-655946	1305033	2711617	-1406584
NORVA	F14	SDLM	161284	91	18124	30363	-12239	432000	826597	-394597	1305033	2204405	-899372
NORVA	F14	SDLM	162600	91	18124	31556	-13432	432000	621925	-189925	1305033	2050086	-745053
NORVA	F14	SDLM	162604	91	18124	19944	-1820	432000	396677	35323	1305033	1488318	-183285
NORVA	F14	SDLM	160386	92	18374	23676	-5302	424582	451404	-26822	1402263	1496306	-94043
NORVA	F14	SDLM	160390	92	18374	19472	-1098	424582	381290	43292	1402263	1273552	128711
NORVA	F14	SDLM	161134	92	18374	28416	-10042	424582	1299196	-874614	1402263	3114535	-1712272
NORVA	F14	SDLM	161139	92	18374	32575	-14201	424582	813168	-388586	1402263	2520780	-1118517
NORVA	F14	SDLM	161152	92	18374	36787	-18413	424582	1130224	-705642	1402263	3008961	-1606698
NORVA	F14	SDLM	161603	92	18374	33269	-14895	424582	614948	-190366	1402263	2296878	-894615
NORVA	F14	SDLM	161615	92	18374	32965	-14591	424582	747968	-323386	1402263	2511418	-1109155
NORVA	F14	SDLM	161618	92	18374	28388	-10014	424582	654046	-229464	1402263	2224934	-822671
NORVA	F14	SDLM	161621	92	18374	31239	-12865	424582	843760	-419178	1402263	2559593	-1157330
NORVA	F14	SDLM	162602	92	18374	30579	-12205	424582	576028	-151446	1402263	2164033	-761770
NORVA	F14	SDLM	162692	92	18374	27606	-9232	424582	566071	-141489	1402263	2097545	-695282
NORVA	F14	SDLM	160382	92	18374	31750	-13376	424582	550492	-125910	1402263	2282998	-880735
NORVA	F14	SDLM	160407	92	18374	32803	-14429	424582	590394	-165812	1402263	2362124	-959861
NORVA	F14	SDLM	161285	92	18374	34703	-16329	424582	689093	-264511	1402263	2496859	-1094596
NORVA	F14	SDLM	161607	92	18374	25837	-7463	424582	602702	-178120	1402263	2016981	-614718
NORVA	F14	SDLM	161609	92	18374	31363	-12989	424582	506284	-81702	1402263	2188913	-786650
NORVA	F14	SDLM	162599	92	18374	27644	-9270	424582	434861	-10279	1402263	1947377	-545114
NORVA	F14	SDLM	162603	92	18374	24522	-6148	424582	365524	59058	1402263	1693551	-291288
NORVA	F14	SDLM	162691	92	18374	27179	-8805	424582	494002	-69420	1402263	1956287	-554024
NORVA	F14	SDLM	162693	92	18374	28195	-9821	424582	453443	-28861	1402263	1964531	-562268
NORVA	F14	SDLM	162700	92	18374	26702	-8328	424582	411899	12683	1402263	1885117	-482854
NORVA	F14	SDLM	158629	93	20004	38362	-18358	449886	1214726	-764840	1551306	3490755	-1939449
NORVA	F14	SDLM	158637	93	20004	36586	-16582	449886	1508618	-1058732	1551306	3698255	-2146949
NORVA	F14	SDLM	159864	93	20004	29903	-9899	449886	1087242	-637356	1551306	2835075	-1283769
NORVA	F14	SDLM	159867	93	20004	35454	-15450	449886	1367451	-917565	1551306	3243713	-1692407
NORVA	F14	SDLM	160379	93	20004	30642	-10638	449886	656642	-206756	1551306	2360534	-809228
NORVA	F14	SDLM	160915	93	20004	35709	-15705	449886	1484585	-1034699	1551306	3390360	-1839054
NORVA	F14	SDLM	160926	93	20004	36388	-16384	449886	975458	-525572	1551306	3029125	-1477819
NORVA	F14	SDLM	161160	93	20004	29814	-9810	449886	1590225	-1140339	1551306	3179819	-1628513
NORVA	F14	SDLM	161282	93	20004	32344	-12340	449886	1332893	-883007	1551306	3354108	-1802802
NORVA	F14	SDLM	161620	93	20004	47542	-27538	449886	1439847	-989961	1551306	4020198	-2468892
NORVA	F14	SDLM	162592	93	20004	31540	-11536	449886	828010	-378124	1551306	2534140	-982834
NORVA	F14	SDLM	162594	93	20004	28401	-8397	449886	595334	-145448	1551306	2192963	-641657
NORVA	F14	SDLM	162597	93	20004	20811	-807	449886	428785	21101	1551306	1550401	905
NORVA	F14	SDLM	162598	93	20004	29375	-9371	449886	787851	-337965	1551306	2551645	-1000339

					Manhours			Material Costs			Total Costs		
NADEP	TMS	RWK	BUNO	FY	Est	Act	Var	Est	Act	Var	Est	Act	Var
NORVA	F14	SDLM	162601	93	20004	26045	-6041	449886	809730	-359844	1551306	2248723	-697417
NORVA	F14	SDLM	162606	93	20004	27599	-7595	449886	756446	-306560	1551306	2305257	-753951
NORVA	F14	SDLM	162608	93	20004	30650	-10646	449886	1023799	-573913	1551306	2718699	-1167393
NORVA	F14	SDLM	162611	93	20004	26333	-6329	449886	1037182	-587296	1551306	2478812	-927506
NORVA	F14	SDLM	162688	93	20004	29811	-9807	449886	1041853	-591967	1551306	3067210	-1515904
NORVA	F14	SDLM	162696	93	20004	29513	-9509	449886	765181	-315295	1551306	2410947	-859641
NORVA	F14	SDLM	162699	93	20004	26074	-6070	449886	876770	-426884	1551306	2359943	-808637
NORVA	F14	SDLM	162704	93	20004	28055	-8051	449886	1331978	-882092	1551306	3063259	-1511953
NORVA	F14	SDLM	159845	94	19878	36585	-16707	423699	1159941	-736242	1537861	3444412	-1906551
NORVA	F14	SDLM	160669	94	19878	35279	-15401	423699	1161319	-737620	1537861	3353558	-1815697
NORVA	F14	SDLM	160925	94	19878	42194	-22316	423699	1091743	-668044	1537861	3636931	-2099070
NORVA	F14	SDLM	161141	94	19878	33561	-13683	423699	692752	-269053	1537861	2743268	-1205407
NORVA	F14	SDLM	161274	94	19878	36425	-16547	423699	922174	-498475	1537861	3148655	-1610794
NORVA	F14	SDLM	162689	94	19878	29597	-9719	423699	1067307	-643608	1537861	2932549	-1394688
NORVA	F14	SDLM	160902	94	19878	31900	-12022	423699	1595340	-1171641	1537861	3357346	-1819485
NORVA	F14	SDLM	161617	94	19878	35924	-16046	423699	716770	-293071	1537861	2686931	-1149070
JAX	F14	SDLM	160910	95	19265	33036	-13771	490000	868000	-378000	2186000	3705000	-1519000
NORVA	F14	SDLM	159873	95	19265	37197	-17932	496612	1373645	-877033	2017584	3575082	-1557498
NORVA	F14	SDLM	160658	95	19265	32377	-13112	496612	919665	-423053	2017584	3137741	-1120157
NORVA	F14	SDLM	161162	95	19265	5403	13862	496612	143234	353378	2017584	565850	1451734
NORVA	F14	SDLM	161432	95	19265	18205	1060	496612	7470	489142	2017584	808889	1208695
JAX	F14	SDLM	161280	96	28807	32772	-3965	793000	1391000	-598000	2503000	3947000	-1444000
JAX	F14	SDLM	161294	96	28807	30919	-2112	793000	487000	306000	2503000	3116000	-613000
JAX	F14	SDLM	162589	97	28807	22637	6170	819000	1258000	-439000	2618000	2953000	-335000

					Manhours			Material Costs			Total Costs		
NADEP	TMS	RWK	BUNO	FY	Est	Act	Var	Est	Act	Var	Est	Act	Var
NORIS	F/A18	MCAP	161353	93	6555	7622	-1067	89400	327261	-237861	499874	1014466	-514592
NORIS	F/A18	MCAP	161711	93	6555	7772	-1217	89400	206799	-117399	499874	745397	-245523
NORIS	F/A18	MCAP	161937	93	6555	6799	-244	89400	209462	-120062	499874	587240	-87366
NORIS	F/A18	MCAP	161939	93	6555	6470	85	89400	139912	-50512	499874	676834	-176960
NORIS	F/A18	MCAP	162445	93	6555	6414	141	89400	195025	-105625	499874	701538	-201664
NORIS	F/A18	MCAP	162463	93	6555	6876	-321	89400	341685	-252285	499874	584650	-84776
NORIS	F/A18	MCAP	162861	93	6555	8486	-1931	89400	222499	-133099	499874	789828	-289954
NORIS	F/A18	MCAP	162863	93	6555	7883	-1328	89400	331878	-242478	499874	629071	-129197
NORIS	F/A18	MCAP	162877	93	6555	6785	-230	89400	211201	-121801	499874	609002	-109128
NORIS	F/A18	MCAP	162889	93	6555	8216	-1661	89400	230987	-141587	499874	796798	-296924
NORIS	F/A18	MCAP	162890	93	6555	8080	-1525	89400	485531	-396131	499874	771142	-271268
NORIS	F/A18	MCAP	162892	93	6555	9000	-2445	89400	228166	-138766	499874	942290	-442416
NORIS	F/A18	MCAP	162904	93	6555	9156	-2601	89400	248115	-158715	499874	1019163	-519289
NORIS	F/A18	MCAP	162905	93	6555	6501	54	89400	225320	-135920	499874	724115	-224241
NORIS	F/A18	MCAP	163100	93	6555	8883	-2328	89400	216560	-127160	499874	760338	-260464
NORIS	F/A18	MCAP	163120	93	6555	7406	-851	89400	244896	-155496	499874	739658	-239784
NORIS	F/A18	MCAP	163142	93	6555	6856	-301	89400	192087	-102687	499874	728177	-228303
NORIS	F/A18	MCAP	163143	93	6555	8705	-2150	89400	281504	-192104	499874	855941	-356067
NORIS	F/A18	MCAP	163147	93	6555	7545	-990	89400	219213	-129813	499874	714226	-214352
NORIS	F/A18	MCAP	163161	93	6555	4202	2353	89400	46127	43273	499874	593121	-93247
NORIS	F/A18	MCAP	163163	93	6555	6290	265	89400	158789	-69389	499874	564381	-64507
NORIS	F/A18	MCAP	163173	93	6555	6316	239	89400	172702	-83302	499874	682257	-182383
NORIS	F/A18	MCAP	163439	93	6555	6802	-247	89400	306418	-217018	499874	573718	-73844
NORIS	F/A18	MCAP	163452	93	6555	4311	2244	89400	143570	-54170	499874	547606	-47732
NORIS	F/A18	MCAP	163456	93	6555	6609	-54	89400	271781	-182381	499874	820283	-320409
NORIS	F/A18	MCAP	163458	93	6555	8483	-1928	89400	176139	-86739	499874	816736	-316862
NORIS	F/A18	MCAP	163465	93	6555	6668	-113	89400	145571	-56171	499874	622212	-122338
NORIS	F/A18	MCAP	163478	93	6555	5910	645	89400	86849	2551	499874	594551	-94677
NORIS	F/A18	MCAP	163481	93	6555	6583	-28	89400	142494	-53094	499874	660458	-160584
NORIS	F/A18	MCAP	163494	93	6555	7213	-658	89400	110355	-20955	499874	836066	-336192
NORIS	F/A18	MCAP	163708	93	6555	8256	-1701	89400	125043	-35643	499874	867056	-367182
NORIS	F/A18	MCAP	163717	93	6555	6364	191	89400	140858	-51458	499874	566765	-66891
NORIS	F/A18	MCAP	163730	93	6555	5296	1259	89400	84681	4719	499874	622506	-122632
NORIS	F/A18	MCAP	163733	93	6555	6017	538	89400	100661	-11261	499874	665493	-165619
NORIS	F/A18	MCAP	163740	93	6555	8019	-1464	89400	194324	-104924	499874	721717	-221843
NORIS	F/A18	MCAP	163746	93	6555	10978	-4423	89400	301305	-211905	499874	1009625	-509751
NORIS	F/A18	MCAP	163754	93	6555	7417	-862	89400	131940	-42540	499874	867548	-367674
NORIS	F/A18	MCAP	163765	93	6555	6900	-345	89400	207826	-118426	499874	744691	-244817
NORIS	F/A18	MCAP	161955	94	6054	8069	-2015	165200	241081	-75881	604297	812742	-208445
NORIS	F/A18	MCAP	162436	94	6054	8202	-2148	165200	268336	-103136	604297	894900	-290603
NORIS	F/A18	MCAP	163124	94	6054	8465	-2411	165200	267355	-102155	604297	828963	-224666
NORIS	F/A18	MCAP	163131	94	6054	6514	-460	165200	120541	44659	604297	757065	-152768
NORIS	F/A18	MCAP	163435	94	6054	6726	-672	165200	211125	-45925	604297	692168	-87871
NORIS	F/A18	MCAP	163449	94	6054	5003	1051	165200	65939	99261	604297	580549	23748
NORIS	F/A18	MCAP	163477	94	6054	6149	-95	165200	96305	68895	604297	682399	-78102
NORIS	F/A18	MCAP	163491	94	6054	8844	-2790	165200	159882	5318	604297	701542	-97245
NORIS	F/A18	MCAP	163506	94	6054	6164	-110	165200	129591	35609	604297	597443	6854
NORIS	F/A18	MCAP	163508	94	6054	7222	-1168	165200	257386	-92186	604297	766844	-162547
NORIS	F/A18	MCAP	163741	94	6054	5523	531	165200	149091	16109	604297	473426	130871
NORIS	F/A18	MCAP	163759	94	6054	6160	-106	165200	170506	-5306	604297	624646	-20349
NORIS	F/A18	MCAP	163761	94	6054	5058	996	165200	39524	125676	604297	573663	30634
NORIS	F/A18	MCAP	163764	94	6054	6196	-142	165200	74347	90853	604297	684223	-79926

					Manhours			Material Costs			Total Costs		
NADEP	TMS	RWK	BUNO	FY	Est	Act	Var	Est	Act	Var	Est	Act	Var
NORIS	F/A18	MCAP	163769	94	6054	5822	232	165200	193313	-28113	653399	620610	32789
NORIS	F/A18	MCAP	163992	94	6054	6228	-174	165200	172408	-7208	604297	594775	9522
NORIS	F/A18	MCAP	163998	94	6054	5891	163	165200	166375	-1175	604297	539881	64416
NORIS	F/A18	MCAP	164012	94	6054	4999	1055	165200	348066	-182866	604297	486132	118165
NORIS	F/A18	MCAP	164013	94	6054	6884	-830	165200	159593	5607	604297	761052	-156755
NORIS	F/A18	MCAP	161354	95	5303	4565	738	158995	99461	59534	554281	354742	199539
NORIS	F/A18	MCAP	161740	95	5303	4363	940	158995	79463	79532	554281	396465	157816
NORIS	F/A18	MCAP	161938	95	5303	5217	86	158995	67499	91496	554281	360299	193982
NORIS	F/A18	MCAP	161947	95	5303	4067	1236	158995	25043	133952	554281	374700	179581
NORIS	F/A18	MCAP	162452	95	5303	6673	-1370	158995	103000	55995	554281	538973	15308
NORIS	F/A18	MCAP	162834	95	5303	5769	-466	158995	133903	25092	554281	453915	100366
NORIS	F/A18	MCAP	162835	95	5303	5930	-627	158995	57498	101497	554281	524979	29302
NORIS	F/A18	MCAP	162860	95	5303	7179	-1876	158995	86615	72380	554281	599890	-45609
NORIS	F/A18	MCAP	163156	95	5303	4509	794	158995	79396	79599	554281	324830	229451
NORIS	F/A18	MCAP	163432	95	5303	6350	-1047	158995	84530	74465	554281	421929	132352
NORIS	F/A18	MCAP	163433	95	5303	4960	343	158995	30128	128867	554281	407967	146314
NORIS	F/A18	MCAP	163450	95	5303	5239	64	158995	97168	61827	554281	372478	181803
NORIS	F/A18	MCAP	163455	95	5303	5282	21	158995	73386	85609	554281	451186	103095
NORIS	F/A18	MCAP	163459	95	5303	5394	-91	158995	83464	75531	554281	390369	163912
NORIS	F/A18	MCAP	163469	95	5303	5846	-543	158995	29424	129571	554281	415393	138888
NORIS	F/A18	MCAP	163480	95	5303	5461	-158	158995	104859	54136	554281	425729	128552
NORIS	F/A18	MCAP	163483	95	5303	2322	2981	158995	39238	119757	554281	315023	239258
NORIS	F/A18	MCAP	163490	95	5303	4882	421	158995	46572	112423	554281	426900	127381
NORIS	F/A18	MCAP	163502	95	5303	5291	12	158995	38879	120116	554281	445901	108380
NORIS	F/A18	MCAP	163504	95	5303	4605	698	158995	35705	123290	554281	359258	195023
NORIS	F/A18	MCAP	163505	95	5303	4493	810	158995	36981	122014	554281	359942	194339
NORIS	F/A18	MCAP	163509	95	5303	5485	-182	158995	32042	126953	554281	434584	119697
NORIS	F/A18	MCAP	163743	95	5303	3859	1444	158995	54844	104151	554281	327161	227120
NORIS	F/A18	MCAP	163745	95	5303	4027	1276	158995	62752	96243	554281	371677	182604
NORIS	F/A18	MCAP	163748	95	5303	6551	-1248	158995	43225	115770	554281	447400	106881
NORIS	F/A18	MCAP	163752	95	5303	3858	1445	158995	37265	121730	554281	323790	230491
NORIS	F/A18	MCAP	163758	95	5303	5502	-199	158995	80128	78867	554281	442259	112022
NORIS	F/A18	MCAP	163762	95	5303	6549	-1246	158995	75552	83443	554281	488244	66037
NORIS	F/A18	MCAP	163766	95	5303	5708	-405	158995	77769	81226	554281	512564	41717
NORIS	F/A18	MCAP	163782	95	5303	4291	1012	158995	60184	98811	554281	313961	240320
NORIS	F/A18	MCAP	163996	95	5303	5536	-233	158995	38048	120947	554281	437920	116361
NORIS	F/A18	MCAP	163999	95	5303	5129	174	158995	25886	133109	554281	429969	124312
NORIS	F/A18	MCAP	164007	95	5303	4576	727	158995	72592	86403	554281	333686	220595
NORIS	F/A18	MCAP	164008	95	5303	5129	174	158995	31279	127716	554281	453181	101100
NORIS	F/A18	MCAP	164016	95	5303	4207	1096	158995	29351	129644	554281	371561	182720
NORIS	F/A18	MCAP	164023	95	5303	4224	1079	158995	50108	108887	554281	314383	239898
NORIS	F/A18	MCAP	164025	95	5303	4406	897	158995	33021	125974	554281	399842	154439
NORIS	F/A18	MCAP	162396	96	4900	4267	633	155950	106756	49194	407467	423040	-15573
NORIS	F/A18	MCAP	162408	96	4900	5640	-740	155950	109268	46682	407467	386192	21275
NORIS	F/A18	MCAP	162844	96	4900	5382	-482	155950	120212	35738	407467	384109	23358
NORIS	F/A18	MCAP	163141	96	4900	5617	-717	155950	109307	46643	407467	511484	-104017
NORIS	F/A18	MCAP	163158	96	4900	5145	-245	155950	127584	28366	407467	502695	-95228
NORIS	F/A18	MCAP	163457	96	4900	6560	-1660	155950	82972	72978	407467	568474	-161007
NORIS	F/A18	MCAP	163487	96	4900	5254	-354	155950	62489	93461	407467	404632	2835
NORIS	F/A18	MCAP	163489	96	4900	5334	-434	155950	121197	34753	407467	484835	-77368
NORIS	F/A18	MCAP	163493	96	4900	6176	-1276	155950	107641	48309	407467	546229	-138762
NORIS	F/A18	MCAP	163716	96	4900	4338	562	155950	104594	51356	407467	386994	20473

					Manhours			Material Costs			Total Costs		
NADEP	TMS	RWK	BUNO	FY	Est	Act	Var	Est	Act	Var	Est	Act	Var
NORIS	F/A18	MCAP	163727	96	4900	4711	189	155950	96485	59465	407467	441663	-34196
NORIS	F/A18	MCAP	163755	96	4900	6144	-1244	155950	118052	37898	407467	541206	-133739
NORIS	F/A18	MCAP	163760	96	4900	6222	-1322	155950	97918	58032	407467	464629	-57162
NORIS	F/A18	MCAP	163767	96	4900	6230	-1330	155950	109483	46467	407467	448636	-41169
NORIS	F/A18	MCAP	163768	96	4900	6153	-1253	155950	132497	23453	407467	563054	-155587
NORIS	F/A18	MCAP	163778	96	4900	4158	742	155950	110985	44965	407467	422115	-14648
NORIS	F/A18	MCAP	163781	96	4900	4734	166	155950	40990	114960	407467	279148	128319
NORIS	F/A18	MCAP	164062	96	4900	5867	-967	155950	85422	70528	407467	511059	-103592
NORIS	F/A18	MCAP	164067	96	4900	5300	-400	155950	114839	41111	407467	507274	-99807
NORIS	F/A18	MCAP	164197	96	4900	5390	-490	155950	89599	66351	407467	428791	-21324
NORIS	F/A18	MCAP	164215	96	4900	4605	295	155950	77080	78870	407467	325752	81715
NORIS	F/A18	MCAP	164235	96	4900	4761	139	155950	63842	92108	407467	379181	28286
NORIS	F/A18	MCAP	162900	97	5110	4829	281	142100	107877	34223	499596	416243	83353
NORIS	F/A18	MCAP	164049	97	5110	3248	1862	142100	64339	77761	499596	277879	221717
NORIS	F/A18	MCAP	163726	97	5110	3959	1151	142100	109726	32374	499596	365326	134270
NORIS	F/A18	MCAP	164221	97	5110	2921	2189	142100	98903	43197	499596	287325	212271
NORIS	F/A18	MCAP	164240	97	5110	3193	1917	142100	67402	74698	499596	275584	224012
NORIS	F/A18	MCAP	164048	97	5110	2698	2412	142100	104200	37900	499596	279440	220156
NORIS	F/A18	MCAP	164051	97	5110	2851	2259	142100	89546	52554	499596	275398	224198
NORIS	F/A18	MCAP	164693	97	5110	2666	2444	142100	62619	79481	499596	239867	259729
NORIS	F/A18	MCAP	163987	97	5110	2492	2618	142100	89165	52935	499596	253595	246001
NORIS	F/A18	MCAP	163699	97	5110	2723	2387	142100	75279	66821	499596	247558	252038
NORIS	F/A18	MCAP	164204	97	5110	3032	2078	142100	104810	37290	499596	299018	200578
NORIS	F/A18	MCAP	164202	97	5110	3285	1825	142100	118195	23905	499596	327619	171977
NORIS	F/A18	MCAP	164041	97	5110	2809	2301	142100	109714	32386	499596	293579	206017
NORIS	F/A18	MCAP	164048	97	5110	3140	1970	142100	84504	57596	499596	285398	214198
NORIS	F/A18	MCAP	163773	97	5110	2353	2757	142100	109847	32253	499596	259036	240560
NORIS	F/A18	MCAP	163701	97	5110	3458	1652	142100	119051	23049	499596	334908	164688
NORIS	F/A18	MCAP	164230	97	5110	3728	1382	142100	133630	8470	499596	359891	139705
NORIS	F/A18	MCAP	164205	97	5110	3720	1390	142100	121660	20440	499596	346574	153022
NORIS	F/A18	MCAP	163715	97	5110	4009	1101	142100	149524	-7424	499596	389913	109683
NORIS	F/A18	MCAP	162899	97	5110	3592	1518	142100	149346	-7246	499596	363455	136141
NORIS	F/A18	MCAP	164209	97	5110	2967	2143	142100	107853	34247	499596	290118	209478
NORIS	F/A18	MCAP	164639	97	5110	3094	2016	142100	86082	56018	499596	272245	227351
NORIS	F/A18	MCAP	163135	97	5110	3470	1640	142100	143538	-1438	499596	350553	149043
NORIS	F/A18	MCAP	162871	97	5110	3837	1273	142100	136303	5797	499596	369559	130037
NORIS	F/A18	MCAP	164210	97	5110	3033	2077	142100	86471	55629	499596	276428	223168
NORIS	F/A18	MCAP	164227	97	5110	3394	1716	142100	129870	12230	499596	336380	163216
NORIS	F/A18	MCAP	164225	97	5110	3746	1364	142100	144650	-2550	499596	370359	129237
NORIS	F/A18	MCAP	164645	97	5110	3169	1941	142100	89372	52728	499596	286441	213155
NORIS	F/A18	MCAP	164636	97	5110	2861	2249	142100	99533	42567	499596	279414	220182
NORIS	F/A18	MCAP	164225	97	5402	3814	1588	142100	162200	-20100	520024	404168	115856
NORIS	F/A18	MCAP	164648	97	5402	3174	2228	142100	71166	70934	520024	275027	244997
NORIS	F/A18	MCAP	164047	97	5402	3122	2280	142100	97516	44584	520024	293915	226109
NORIS	F/A18	MCAP	164059	97	5402	3650	1752	142100	99781	42319	520024	340943	179081
NORIS	F/A18	MCAP	164223	97	5402	3434	1968	142100	111236	30864	520024	339613	180411
NORIS	F/A18	MCAP	164682	97	5402	2819	2583	142100	70849	71251	520024	263966	256058
NORIS	F/A18	MCAP	164222	97	5402	3085	2317	142100	123336	18764	520024	339461	180563
NORIS	F/A18	MCAP	164021	97	5402	3414	1988	142100	94186	47914	520024	328136	191888
NORIS	F/A18	MCAP	164055	97	5402	3331	2071	142100	125675	16425	520024	360132	159892
NORIS	F/A18	MCAP	162873	97	5402	3784	1618	142100	91893	50207	520024	358292	161732
NORIS	F/A18	MCAP	164218	97	5402	3427	1975	142100	87518	54582	520024	329868	190156

					Manhours			Material Costs			Total Costs		
NADEP	TMS	RWK	BUNO	FY	Est	Act	Var	Est	Act	Var	Est	Act	Var
NORIS	F/A18	MCAP	164268	97	5402	4041	1361	142100	102110	39990	520024	380860	139164
NORIS	F/A18	MCAP	164050	97	5402	3510	1892	142100	116038	26062	520024	361877	158147
NORIS	F/A18	MCAP	164253	97	5402	3085	2317	142100	139413	2687	520024	362008	158016
NORIS	F/A18	MCAP	162470	97	5402	3596	1806	142100	121071	21029	520024	372445	147579
NORIS	F/A18	MCAP	164268	97	5402	3057	2345	142100	85120	56980	520024	290172	229852
NORIS	F/A18	MCAP	161924	97	5402	3617	1785	142100	159794	-17694	520024	406349	113675
NORIS	F/A18	MCAP	164258	97	5402	2698	2704	142100	193653	-51553	520024	375465	144559
NORIS	F/A18	MCAP	164635	97	5402	3227	2175	142100	44404	97696	520024	274318	245706
NORIS	F/A18	MCAP	164277	97	5402	3496	1906	142100	144036	-1936	520024	388160	131864
NORIS	F/A18	MCAP	164250	97	5402	3284	2118	142100	168190	-26090	520024	396905	123119
NORIS	F/A18	MCAP	162880	97	5402	4018	1384	142100	121576	20524	520024	385329	134695
NORIS	F/A18	MCAP	162853	97	5402	3660	1742	142100	119641	22459	520024	363665	156359
NORIS	F/A18	MCAP	164275	97	5402	3402	2000	142100	134576	7524	520024	365652	154372
NORIS	F/A18	MCAP	162428	97	5402	3882	1520	142100	175900	-33800	520024	438483	81541
NORIS	F/A18	MCAP	164668	97	5402	3013	2389	142100	95571	46529	520024	300692	219332
NORIS	F/A18	MCAP	162438	97	5402	4331	1071	142100	93915	48185	520024	387321	132703
NORIS	F/A18	MCAP	164033	97	5402	3302	2100	142100	75063	67037	520024	299185	220839
NORIS	F/A18	MCAP	164255	97	5402	3003	2399	142100	104281	37819	520024	311360	208664
NORIS	F/A18	MCAP	164638	97	5402	3010	2392	142100	105317	36783	520024	312459	207565
NORIS	F/A18	MCAP	164274	97	5402	3144	2258	142100	125448	16652	520024	340182	179842
NORIS	F/A18	MCAP	164261	97	5402	2997	2405	142100	92642	49458	520024	297344	222680
NORIS	F/A18	MCAP	164036	97	5402	3259	2143	142100	101166	40934	520024	325048	194976
NORIS	F/A18	MCAP	163706	97	5402	2826	2576	142100	58319	83781	520024	255604	264420
NORIS	F/A18	MCAP	161967	97	5402	3230	2172	142100	117500	24600	520024	337746	182278
NORIS	F/A18	MCAP	164654	98	5402	2876	2526	111519	155365	-43846	467079	353404	113675
NORIS	F/A18	MCAP	163444	98	5402	3710	1692	111519	216808	-105289	467079	467700	-621
NORIS	F/A18	MCAP	163993	98	5402	3200	2202	111519	127903	-16384	467079	347739	119340
NORIS	F/A18	MCAP	164686	98	5402	2846	2556	111519	43929	67590	467079	242376	224703

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