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# A Case Study in the Development of a Cost Reduction Methodology in the Public Sector

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# A CASE STUDY IN THE DEVELOPMENT OF

# A COST REDUCTION METHODOLOGY IN THE PUBLIC SECTOR

by

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ABSTRACT

A CASE STUDY IN THE DEVELOPMENT OF A COST REDUCTION METHODOLOGY IN THE PUBLIC SECTOR

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Intense fiscal pressures have caused the Department of Defense (DoD) to explore new ways of reducing operating expenses. The primary technique used to achieve this objective is the use of competition - recently for maintenance requirements not previously subjected to competition. One such maintenance requirement is the periodic overhaul of one of the Navy's front line fighter aircraft - the F-14A Tomcat. This case study documents the cost reduction methodology developed by the DoD's incumbent overhaul facility in preparation for competition. The methodology discusses task time estimation, cost center structure, labor rate development and analysis, internal cost transfers as well as the development, use and institutionalization of appropriate financial Decision Support Systems. The study is presented such that it can be used as a step-by-step guide in analyzing the cost efficiency of virtually any business. Furthermore it is written to a level of detail, and in a vernacular which makes it useful for those with little or no financial background.

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# CHAPTER 1

# INTRODUCTION

## Background

Since 1970 the United States has been operating as a debtor nation. Not only has the United States been in debt since 1970, but it has also added to that debt every year. Public concerns over this rising debt prompted Congress, in 1987, to enact legislation (the Gramm-Rudman-Hollings reduction plan - normally referred to as simply "Gramm-Rudman") intended to balance our country's budget by the early 1990s. The key provision of this plan sets specific decreasing limits for deficit spending for each year until the balanced budget is achieved. In the event that Congress and the President are unable to agree upon an annual budget which meets the Gramm-Rudman deficit target for the corresponding fiscal year, mandatory spending cuts in Domestic and Military Discretionary spending are ordered.

As has been the case in every year since the Gramm-Rudman plan became law, the proposed budget for Fiscal Year 1990 is expected to result in a deficit which exceeds its corresponding limit. According to Mr. Stanley Collender (1989), Director of Federal Budget Policy, this deficit is projected to be $128 billion vs. the $100 billion limit set by Gramm-Rudman. With a total budget of $1.2 trillion, the mandatory cuts of $28 billion represent approximately 2.3% of the nation's total spending. However, nearly 75% of the budget is made up

of non-discretionary spending which is not eligible for Gramm-Rudman cuts. This non-discretionary spending which is exempt from Gramm-Rudman cuts includes interest on the national debt (treasury bills, savings bonds, etc.), contractural obligations from prior years, and entitlements (Social Security, Medicare, etc.) (See Figure 1) Since the $28 billion in budget cuts must be split equally between the remaining two categories of spending (Domestic and Military Discretionary), the impact on Military Discretionary spending is a $14 billion cut in a $187 billion program - a 7.5% cut rather than the effective overall 2.3% cut pointed out earlier.

The impact of Gramm-Rudman, coupled with a perceived softening of the Soviet military threat has created intense pressure for the U.S. defense community to find new, and in some cases unique, ways of cutting military defense spending. The principle vehicle being used to promote cost reductions is the use of competition in the acquisition of spare parts, new weapon systems and maintenance services. For years the defense community has used competitive techniques to obtain parts and services from the private sector. However, the vast majority of the maintenance services required to support military equipment has historically been assigned non-competitively to the public sector.

Maintenance of military equipment is typically divided into three levels - **Organizational** (relatively low-skilled work performed on-site by the operator of the equipment - e.g. lubrication and cleaning); **Intermediate** (medium-skilled work performed at a limited number of specially equipped locations - e.g. trouble-shooting and correcting some discrepancies in various components); and **Depot** (high-skilled work

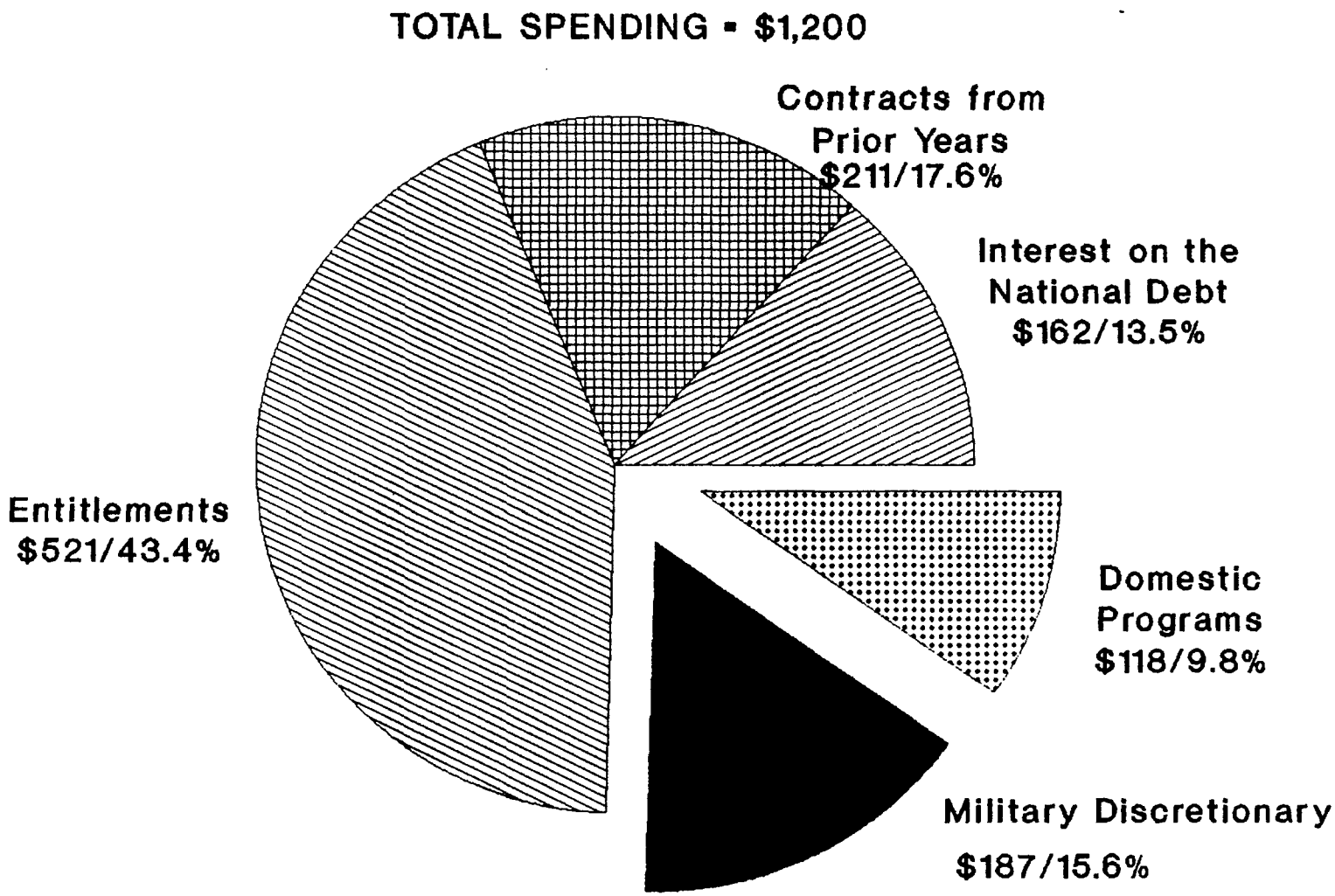



FIG. 1 - FISCAL 1990 SPENDING (in billons of dollars)

performed at a very limited number of locations capable of performing the most sophisticated maintenance services - e.g. major aircraft modifications and complete component overhaul.)

One of the Depot level services provided within the Department of the Navy is the periodic disassembly, inspection, and correction of discrepancies for aircraft assigned to the Navy's aircraft inventory. The name given to this effort is Standard Depot Level Maintenance (SDLM). SDLMs are performed by a network of six Naval Aviation Depots (NADEPs) located across the country. (See Figure 2) Individual NADEPs are equipped to handle specific aircraft. Until recently, SDLM workload was simply assigned to a NADEP without the use of competitive strategies. However, in an effort to comply with the intent of the movement begun in Congress to control Defense spending, the Assistant Secretary of the Navy for Shipbuilding and Logistics decided to conduct a public/private competition for the SDLM of one of the Navy's fighter aircraft - the F-14A Tomcat.

The SDLM of F-14A aircraft has been performed by the NADEP located at Norfolk, Virginia, since the mid 1970s. Therefore, NADEP Norfolk was directed to prepare to compete against other potential bidders from the private sector for F-14A SDLM workload. A competitive award was to be based upon the evaluation of a Technical Proposal (delineating the bidder's technical qualifications) as well as a Cost Proposal. However, since several of the potential bidders were considered comparably technically qualified, the ultimate contract award was seen as hinging upon the bidders' Cost Proposals. In its initial self evaluation, NADEP Norfolk concluded that its cost estimating techniques

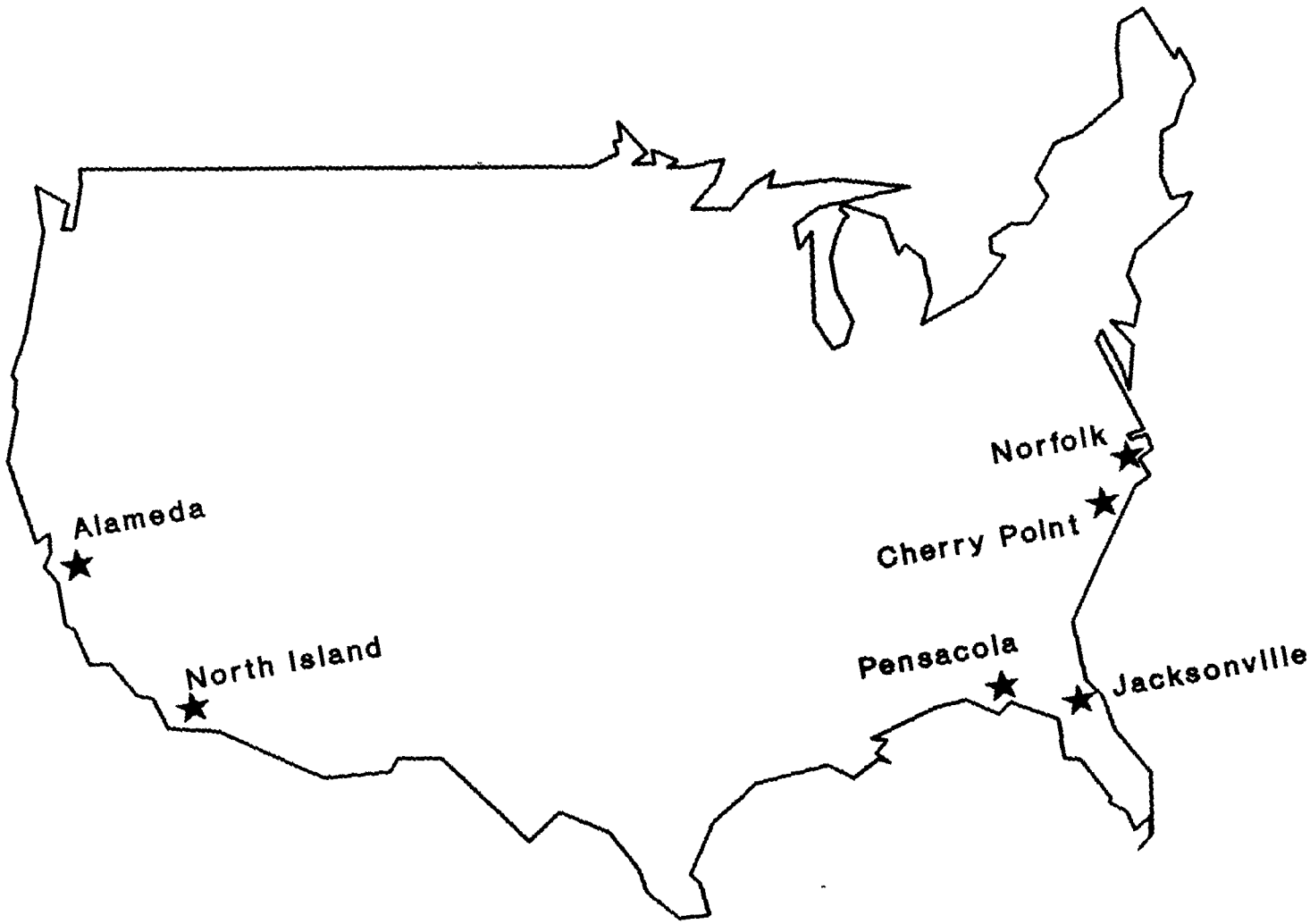



FIG. 2 - THE NAVAL AVIATION DEPOT NETWORK

were antiquated and, unless improved, would not result in the preparation of a truly competitive Cost Proposal. The underlying issues which caused problems in the cost estimating procedures used by NADEP Norfolk were 1) manhour and labor rate estimates for future work were based upon historical data - as much as three years old, 2) some acceptable, but not preferred, accounting procedures were being employed, 3) the overall cost estimating process was understood by a very limited number of people, and 4) there had been little or no incentive to reduce the costs of doing business.

## Purpose

In conducting research for this case study, it became apparent that many articles have been written which deal with finite pieces of the mechanics associated with reducing the costs of running a business. Few, however, bring these pieces together in one document. Fewer still are written in such a way as to be suitable for people with little or no financial background.

The purpose of this case study, therefore, was twofold. First, it was intended to document the specific steps taken by NADEP Norfolk in preparing for its F-14A SDLM competition, as well as the specific results of its efforts. Secondly, and probably more important to the majority of the readers of this case, it was intended to solve the mystery which surrounds the "accounting puzzle" for so many managers. Accordingly, this case was to be presented in a level of detail and in a vernacular which would make it suitable for digestion by managers with little or no financial background. Furthermore, the presentation

of the methodology developed by NADEP Norfolk was to be logical enough and general enough to serve as a step-by-step guide for cost reduction efforts initiated by other businesses - goverment and non-government alike.

## Case Study Methodology

Much of the literature which currently exists relative to cost reduction efforts is either theoretical or narrowly focused, or both. In order to expand upon the scope of literature which currently exists on the subject of reducing costs, a case study approach was selected for this project. A case study was expected to document a methodology which would be more practical than theoretical and, since the NADEP was seeking to reduce costs using any and all appropriate techniques, one which would break away from the typical narrowly focused studies to produce a document which would have more general application for those contemplating a cost reduction effort. Furthermore, it was expected that the quality of the cost reduction methodology which was to be documented at the conclusion of the case study would be enhanced if the case writer actually participated in the development of the methodology. This expectation was consistent with the views of Friedrichs and Ludtke (1975, p. 6) who argued that "participant observation" offers several advantages - 1)"It avoids the discrepancy between real and verbal behavior." 2)"It allows observation in situations when questions only meet with misunderstanding...," 3)"It allows the identification of processes which could otherwise only be brought out by an inconvenient chain of repeated interviews...," and

4)"The observation of behaviour does not depend on the verbal capabilities of the interviewed person."

The lessons learned and observations made during this case study were continuously documented using a running diary type of approach. At several points during the effort the case writer was able to pause to reflect upon what had been learned and to organize his thoughts in preparation for formally documenting the resultant cost reduction methodology.

## Cost Estimating at NADEP Norfolk

The cost of performing SDLMs traditionally has been determined by multiplying the historical average number of man-hours expended ("NORM") times the NADEP's labor rate (called the "Stabilized Rate") and adding an appropriate estimate for direct material expenses. This method of cost estimation had at least two flaws. First, the practice of using historical man-hour expenditures to estimate the cost of future work provided no incentive for process improvement. In fact, if anything, this practice de-emphasized the importance of efficiency by rewarding higher historical expenditures of man-hours by increasing the NORM used for future cost estimates. Secondly, the labor rates applied to the NORM were developed and "locked in" two to three years in advance and therefore did not necessarily represent the current cost of doing business. Furthermore, as was the case in NORM development, there was little incentive to improve the labor rates. The traditional emphasis on rates was one of ensuring proper accountability for funds received and expenses incurred rather than the size of the rate.

## Approach and Methods

A literature review identified several ideas which proved useful in facilitating NADEP Norfolk's cost reduction efforts. Rutherford (1989) outlined a ten point plan aimed at heightening the probability of success in a cost cutting program. This plan included suggestions regarding how to develop objectives, manage change, implement teambuilding and enhance communication.

The need for updating work standards as process improvements are made was stressed by Tatikonda (1987). He pointed out the need for an organization's managers, particularly those in the accounting and production areas, to understand the job responsibilities of each other. Richmond (1986) took the concept of educating an organization's managers in accounting and financial issues a step further by encouraging those responsible for the education process to make sure that the information presented to the targeted audience is in a form and language that they can understand.

One of the keys to controlling overhead expenses is to gain control of the support provided to an organization's production effort by its service groups. Hoshower (1987) broke this issue into two components (controlling costs within the various service departments and controlling the use of these services) and provided a general approach for controlling each.

Brunton (1988) provided a discussion about the advantages and disadvantages of the various allocation methods and bases which can be employed in a company's accounting system. This information proved

useful in modernizing some of the outdated accounting procedures employed by NADEP Norfolk.

Since the cost of performing SDLM on F-14 aircraft is a function of both the man-hours ("work content") and the applicable labor rate, NADEP Norfolk formed two Process Action Teams (PATs) to apply the concepts listed above to identify ways to reduce the final cost of the product. These teams were appropriately called the Work Content and Labor Rate PATs. A summary of the approach used for each team follows:

## Work Content

The Work Content PAT was made up of representatives from the four departments most intimately involved in determining what work must be done during SDLM and how many man-hours that work should take. The PAT's objective was to find the most efficient method of accomplishing F-14A SDLM and to prepare an estimate of the number of man-hours required to perform that work. To accomplish its objective the PAT identified unnecessary tasks currently being performed as well as tasks for which more work was being performed than was actually required.

## Labor Rates

Prior to its exposure to competition, NADEP Norfolk was organized with just four Cost Centers in its Production Department. (The Production Department performs virtually all of the direct work necessary to perform SDLMs.) This limited number of Cost Centers necessitated many illogical groups of dissimilar work operations. In

some cases relatively expensive operations were mixed with relatively inexpensive operations. Since the labor rate developed for each Cost Center represented the average cost of performing all operations within that Center, the result was the subsidization of expensive operations by inexpensive ones. In addition to this subsidization problem, the limited number of Cost Centers created divisions which were staffed with so many employees that detailed analysis of the Cost Center's rates was very difficult.

While the Work Content PAT met to improve the process of estimating man-hour requirements, the Labor Rate PAT sought to improve the process of developing labor rates. One of the first things the Labor Rate PAT did was expand the list of Cost Centers to eliminate subsidization and facilitate analysis. Once the new Cost Centers were identified, each Cost Center's rate was broken down into its three major components - Direct Labor, Production Overhead, and General and Administrative (G&A). Each Cost Center Manager was then assigned responsibility for the Direct Labor and Production Overhead components of his/her rate and tasked with reducing those components wherever possible. A separate team was formed to review the G&A component.

Once the Work Content and Labor Rate efforts were completed, the proposed new price for completing an F-14A SDLM was documented using the format directed by the public/private competition solicitation (i.e. Cost and Price by Work Breakdown Structure reports).

The cost reduction methodology documented herein was developed using information gleaned from treating NADEP Norfolk's cost reduction efforts as a case study. This case study documents the approach taken by the NADEP; highlights problems associated with the effort; suggests areas where the process could be improved; and provides some suggestions regarding the institutionalization of the process. Where appropriate, Decision Support Systems were developed to facilitate the completion of the process.

Since the financial aspects (identifying and allocating costs, developing and applying rates, etc.) of cost reduction held the greatest mystery for the vast majority of NADEP Norfolk's employees, more attention is focused on rate development than work content review. Furthermore, the work content review concentrates principally upon how to more accurately estimate (and hopefully reduce) the manpower required to accomplish finite tasks and therefore is not intended to address the evaluation of the overall process flow of the F-14A aircraft undergoing Standard Depot Level Maintenance.

The inclusion of real data (man-hours and rates) in this case study would compromise the competitive position of NADEP Norfolk for future public/private competitions. Therefore, where the presentation of data is necessary to illustrate the numerical computations, dummy data has been used.

# CHAPTER 2

# DEVELOPMENT OF COST REDUCTION METHODOLOGY

## Agency Setting

NADEP NORFOLK has performed depot level maintenance of Naval aircraft since 1917. The NADEP currently employs approximately 4,000 people, most of whom are civilians, and is organized as shown in Figure 3. The Commanding Officer and Executive Officer are both Navy Captains; those in positions titled "Director of _____" are Navy Commanders. The balance of the positions shown in Figure 3 are held by civilians.

At the time the Secretary of the Navy announced his intent to conduct a public/private competition for Standard Depot Level Maintenance of F-14A aircraft, NADEP Norfolk had no group within its organization which was responsible for preparing formal competitive proposals. In fact, there were very few NADEP employees who had any experience at all in the competitive process. Therefore, the NADEP formed a full time competition team made up of individuals drawn from within the NADEP, and enlisted the aid of a consultant experienced in formal competitive proposal preparation, in order to embark in earnest upon the task of preparing a competitive proposal for performing F-14A SDLM.

Well in advance of the publication of draft or final versions of the competition solicitation, the format which would be required for

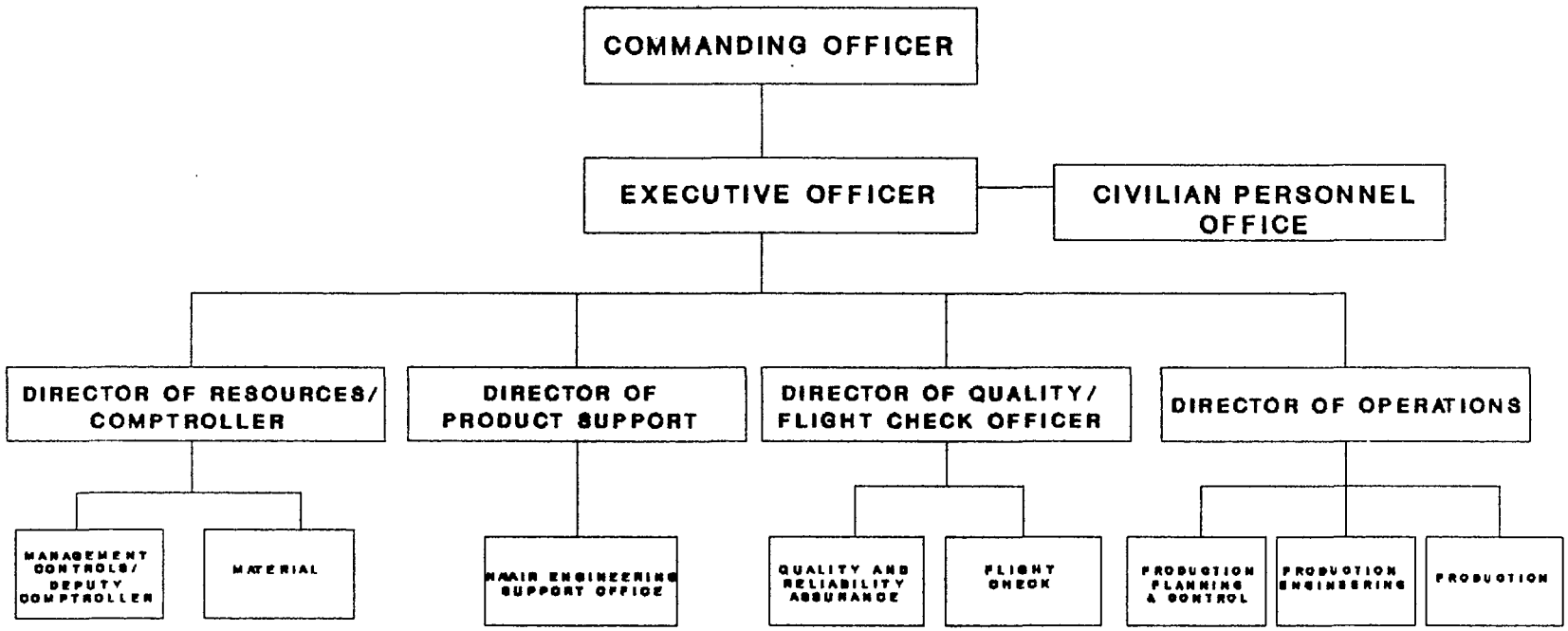



FIG. 3 - NADEP NORFOLK ORGANIZATION

the proposal was rumored to be similar to that used in a prior competition on another aircraft. In that case there were two major subdivisions to the total proposal - a Technical Proposal and a Cost Proposal. Accordingly, the NADEP subdivided its competition team into two elements - one to prepare the Technical Proposal; the other to prepare the Cost Proposal. Separate individuals were placed in charge of the efforts associated with each of the two proposals. The Technical and Cost Proposal team leaders in turn reported to the overall Competition Manager as illustrated in Figure 4.

As the Cost Proposal team began laying the foundation upon which its proposal would be based, it quickly became apparent that the prices contained in the proposal would be a function of two variables, man-hours (or "work content") and labor rates, as illustrated in the following simple relationship:

PRICE = (WORK CONTENT)(LABOR RATE)

Accordingly, the NADEP formed two separate PATs - one to address each of the variables. A descripton of the approach taken by each PAT follows.

## Work Content Review

In keeping with the NADEP's commitment to participative management, a Work Content Process Action Team was formed to develop man-hour estimates associated with the work called for in the solicitation. This PAT was widely represented by employees drawn from throughout the NADEP. For its effort the NADEP decided to head this

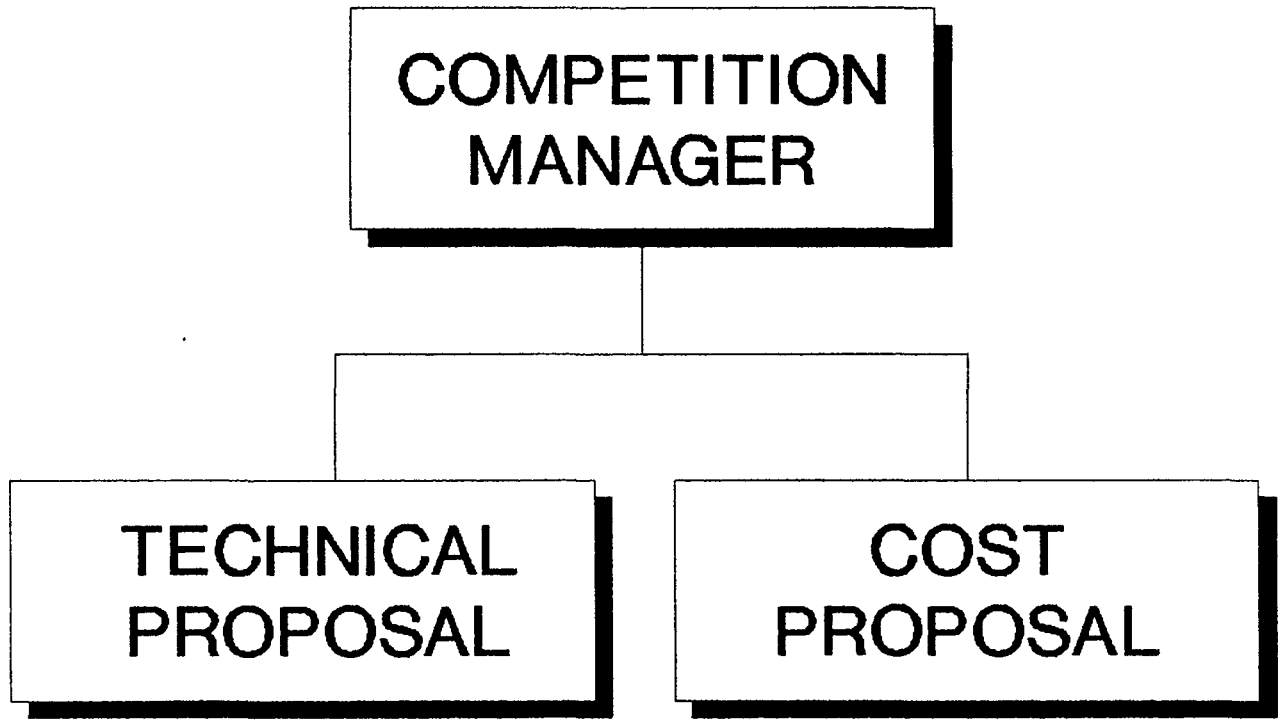



FIG. 4 - COMPETITION ORGANIZATION

team with an individual from its Production Department. This was a departure from past practice which typically headed such an effort with someone from the Planning Department. This decision was made in order to achieve several objectives.

**1- Put man-hour estimating as close to the work as possible** - The theory here was that the NADEP's planners thoroughly understood the tasks in a general sense (but not in a specific sense). By heading the Work Content PAT with an employee from the Production Department, it was believed that the work content estimating process would be more aggressive and creative through the direction of someone who knew the work the best.

**2- Put direction of the process as close as possible to "the threat"** - The NADEP fully realized that failure to win the F-14 Competition would result in the loss of a large number of jobs - most of them from the Production Department. The NADEP believed that heading the work content review process by someone from the organization with the most to lose would further enhance the aggressiveness and creativity it was seeking to achieve.

**3- Instill ownership of the new way of doing business into the Production Department** - The Work Content PAT was expected to find ways to substantially reduce the number of man-hours necessary to perform Standard Depot Level Maintenance (SDLM) on the F-14A aircraft. Numerous reviews aimed at reducing man-hours had been conducted in the past - but under the direction of the Planning Department. Typically the Production Department would see these reviews as an attempt to

simply make its employees work harder without making any substantial improvements in the process by which F-14A SDLMs were performed. Furthermore, since the man-hour reductions were viewed more as a commitment on the part of Planning, not of Production, even if some man-hour reductions were achieved in the near term, they soon disappeared under an umbrella of finger pointing. Production would claim that Planning had committed to unreasonable improvements, didn't fully understand the day-to-day problems encountered by Production, etc. By putting leadership of the Work Content PAT in the hands of "one of Production's own," the NADEP expected to see a heightened commitment by the Production Department to achieve and sustain the improvements projected as a result of the work content review.

The Work Content PAT team leader was supported by full time representatives with backgrounds in examination and evaluation, planning, process flow and layout, engineering, as well as artisans who had substantial experience in hands-on repair of modern military aircraft - much of it specifically on the F-14A.

The F-14A SDLM Specification is the document which identifies the work required to be performed during Standard Depot Level Maintenance. This specification was the primary reference document used in the solicitation to define the technical requirements. The Work Content PAT's basic charter was to review the work requirements dictated by the F-14A SDLM Specification and estimate the man-hours necessary to accomplish only what was specifically called for. As straight forward as this may sound, it was a difficult task to accomplish. Over the

years the NADEP had developed close working relationships with the activities which receive the aircraft it repairs. In an effort to build and strengthen customer relations, the NADEP had in many cases committed to doing more work than was called for by the SDLM Specification. In some cases the commitment was made to satisfy some specific request by a customer to simply enhance the appearance of the aircraft it processed. In other cases the NADEP performed work simply because it considered SDLM a convenient time to correct many minor discrepancies which could, and according to documented procedures should, be corrected by the customer.

With the advent of public/private competition, it was clear to the NADEP that it now had a new customer to satisfy - the contracting officer responsible for making the competitive selection. In spite of what the NADEP believed the aircraft operators wanted, it realized no extra credit would be given for performing work not required by the SDLM Specification. Furthermore, the NADEP knew its competitors would not include man-hours to perform work not specifically required.

After being indoctrinated regarding the "new customer approach," the Work Content PAT performed a line by line review of the requirements contained in the F-14A SDLM specification. Each requirement in the SDLM Specification was compared with the NADEP's local processing documentation. In those instances for which the local processing documentation called for work not supported by the SDLM Specification, the local processing document was modified to delete the unnecessary requirement. Changes prompted by this review concentrated primarily around eliminating Organizational and Intermediate level work

requirements as well as deleting unspecified disassembly of the aircraft.

Once the bona fide SDLM processing requirements had been identified, the Work Content PAT estimated the time required to perform each task. Using traditional methods, these estimates would have been developed almost exclusively using previously developed standards and/or historical man-hour expenditures for the same or similar tasks. However, recognizing that many of the NADEP's standards included time to perform work not specifically required by the SDLM Specification, and that the validity of historical man-hour expenditures was clouded by the realization that many of the artisans' labor transactions included time legitimately chargeable to another transaction number, the PAT sought another approach to develop the lowest realistic time estimates possible. The approach the PAT developed centered around the creation of an idealistic situation in which an artisan was permitted to work uninterrupted on a task from start to finish encountering no problems in the completion of the task. The PAT would then rely on the application of applicable factors to their estimates in order to develop "real world" bid times.

## "Raw Time"

The time estimates developed under the assumptions of an idealistic work situation became known as "raw time" estimates. In general this idealistic work situation assumed that an employee performing a specific task would be able to work uninterrupted and at a highly productive pace from start to finish, that all effort

contributed directly to the completion of the task, and that the task would always be completed correctly the first time it was assigned. Since the concept of raw time represented a significant departure from the way time estimates had historically been developed by the NADEP, and since the PAT anticipated that the team members would have a tendency to drift back into a "business as usual" thought process as the job of estimating thousands of specific tasks dragged on, the team spent some time, prior to developing any time estimates, to brainstorm and document what was mutually agreed to as being the characteristics of this ideal work situation. The final list of characteristics was then posted on butcher paper and hung on the walls of the room in which the Work Content PAT worked.

## Setup Factors, "S"

One of the things which cause a job to take longer than the "raw time" estimate is the need to prepare, or set up, for the job, as well as to return the worksite to its pre-setup status. This category also includes some of the administrative time necessary to ensure proper completion of the job as well as provide for proper documentation of the job. The setup factor developed for use by the Work Content PAT included time to perform the types of job related tasks listed below:

Read and analyze technical data

Review workbook

Stamp workbook or document

Transact labor

Fill out parts request

Obtain parts from storeroom

Select parts from free issue bin

Unbag hardware

Inventory kit

Defod work area

Verify part number

Return component to control center

Get tools from toolroom

Get special equipment (slings, etc.)

Get test equipment (hydraulic stands, etc.)

Connect test equipment to aircraft

Get workstand

Reposition workstands

Reposition rollaway

Uncoil airhose

In the course of completing an F-14A SDLM, NADEP Norfolk performs two primary types of work - "line" and "backshop." Line work refers to work performed on the "aircraft line" where the fuselage of the aircraft is stationed for extended periods of time. Aircraft line work includes the removal and reinstallation of aircraft components as well as the repair and modification of portions of the fuselage. Backshop work refers to work which is performed in a series of remotely located process shops. This work principally involves the processing of aircraft components in one or more of the backshops - hydraulics,

machining, plating, Nondestructive Inspection, painting, etc. Since "line" and "backshop" types of work are substantially different, different setup factors were developed for each.

## Personal, Fatigue and Supplemental, "P,F&S"

Another factor which prevents the accomplishment of a task within the "raw time" estimate is the impact of Personal, Fatigue and Supplemental (P,F&S) influences. P,F&S factors typically include the impact of the items listed below:

**Personal**

- Restroom breaks
- Drink of water
- Fresh air

**Fatigue**

- Physical nature of work
- Mental concentration
- Environmental conditions
- Monotony
- Restrictive safety devices and clothing

**Supplemental (delays)**

- From preceding tasks
- Power failure
- Equipment repairs
- Wait for job assignment
- Fire drills

## Efficiency

The final factor which prevents accomplishment of a task for the "raw time" estimates is the inefficiency, or lack of efficiency, exhibited by the organization. Efficiency is loosely defined as the ratio of how long it should take to complete a task (including "raw time," setup time and P,F&S) to how long it does take to complete the task. The key contributors to poor efficiency identified by NADEP Norfolk are as follows:

Inadequate training

Inadequate tooling

Outdated support equipment

Poor tech data

For the purpose of preparing man-hour estimates for competitively awarded F-14A SDLM work, NADEP Norfolk projected substantially higher efficiencies than it had historically exhibited. Several changes contributed to the higher efficiency estimates:

1- **No Unfunded Work** - The man-hour estimates used to project the work content, or NORM, for future F-14A SDLMs was typically based upon historical expenditures. This NORM, coupled with the corresponding labor rate and projected direct material expenditures, was used to project funding requirements for future F-14A SDLMs. Because of the bureaucratic way in which budgeting is performed within the Department of Defense, not only were budgetary projections developed two to three

years in advance of the time the work was to be accomplished, but also these projections were virtually "locked in" at the time they were made. Therefore, in the past, as new work requirements were added to the F-14A SDLM Specification, NADEP Norfolk would request an adjustment to the NORM used to fund the applicable F-14A SDLM aircraft. Typically the response from those responsible for funding F-14A SDLMs was sympathetic but, more often than not, would be accompanied by some kind of direction to absorb the cost of performing the additional work until the requirement could be considered in the next budget review. Since additional SDLM work requirements continued to be identified as the average age of F-14A aircraft climbed, the NADEP was routinely underfunded waiting for the ever elusive "next budget review." As NADEP Norfolk continued to expend more hours than the F-14A SDLM NORM, the initial and most obvious conclusion drawn by most "outsiders" was that the NADEP was very inefficient.

One of the positive aspects of the creation of a formal contractual arrangement was the realization that no work would be performed without adequate funding. Therefore, since the NADEP could count on not being required to absorb the costs associated with future additional SDLM Specification requirements, it also projected a rise in its demonstrated efficiency.

**2- Command Work Center** - The nature of the work associated with SDLM historically resulted in periods of time when one or more of the artisans assigned to a particular shop within the Production Department was idled by some unexpected delay. Over the years, the NADEP had developed the perception that all direct man-hour expenditures were

good and all indirect man-hour expenditures were bad. Therefore, when an artisan encountered a delay and no other work was available to be assigned, the tendency within the Production Department had been to permit that employee to continue to charge to his/her last job, or to charge to some other job that may have been completed ahead of time. In either case the result was the documentation of more hours required to complete the task than was actually required. This in turn resulted in reduced demonstrated efficiency.

In order to avoid overcharging to specific jobs, the NADEP created an organization called the "Command Work Center." This center serves as a clearinghouse to match temporarily excess (or delayed) employees from one shop, with surge requirements for manpower in another shop. In the event that surge requirements do not exist, the employee is assigned to relatively low skilled facility maintenance or beautification tasks which the NADEP had historically contracted out. The creation of the Command Work Center now gives the supervisor of an idled employee the opportunity to temporarily reassign him/her to the Command Work Center to be matched with meaningful work until needed again in his/her permanent shop. The net result is a reduction in the number of direct hours charged by artisans which in turn improves the efficiency of the NADEP.

After the "raw times," setup factors, PF&S factor and efficiency estimates had been developed, a unique "bid time" estimate was

developed for each task in the F-14A SDLM Specification using the following relationship:

$$\frac{(\text{"RAW TIME"})(1+S)(PF\&S)}{(\text{EFFICIENCY})} = \text{"BID TIME"}$$

## Labor Rate Review

While the Work Content PAT worked to reduce the man-hour estimates associated with F-14A SDLM, a parallel effort to reduce labor rates was conducted under the leadership of the Labor Rate PAT team leader. As was the case in the Work Content PAT, NADEP Norfolk departed from traditional thinking to assign someone with almost no experience in labor rate development as the Labor Rate PAT's team leader. Although this assignment was made with less forethought than that which preceded the Work Content PAT team leader selection, it did yield several significant benefits.

**1- No Preconceived Position** - Since the team leader entered the process with no rate development experience, he also entered without a preconceived notion of "how things ought to be." As a result, the team leader, in many instances, challenged "the obvious" relative to traditional rate development policies and procedures.

**2- "Broke the Code"** - Prior to exposure to F-14A SDLM competition, the process by which labor rates were developed was thoroughly understood by only a few individuals at NADEP Norfolk - most, if not all, in the Management Controls (Finance/Accounting) Department. Rate development was a virtual mystery elsewhere within the NADEP. As was

the case in the Work Content PAT, the NADEP wanted to get more people involved in rate development. Therefore, since the Labor Rate PAT team leader was himself inexperienced in rate development, he was in a perfect position to develop an understanding of how labor rates were developed and then to explain the process to other members of the Labor Rate PAT in layman's terms.

**3- Development of Decision Support Systems** - Prior to F-14 competition the NADEP performed all of its rate development processes aided only by a calculator. The Labor Rate PAT's team leader had some experience in developing computer applications and used this experience to develop Decision Support Systems which proved instrumental in assisting the members of the PAT in analyzing the NADEP's labor rates.

As with the Work Content PAT, the Labor Rate PAT was broadly represented by upper level managers throughout the Production Department and the Service Groups as well as working level employees up through the department head in the Management Controls Department.

Prior to preparing for F-14A competition, NADEP Norfolk's Production Department was organized with just four cost centers. These cost centers performed the functions listed in the corresponding blocks on Figure 5. As with its other aircraft repair programs, the F-14A Program drew support from these four cost centers to accomplish the "hands-on" work required to process the aircraft. The weighted average of the labor rates associated with these four cost centers then yielded a composite F-14A Program Labor Rate.

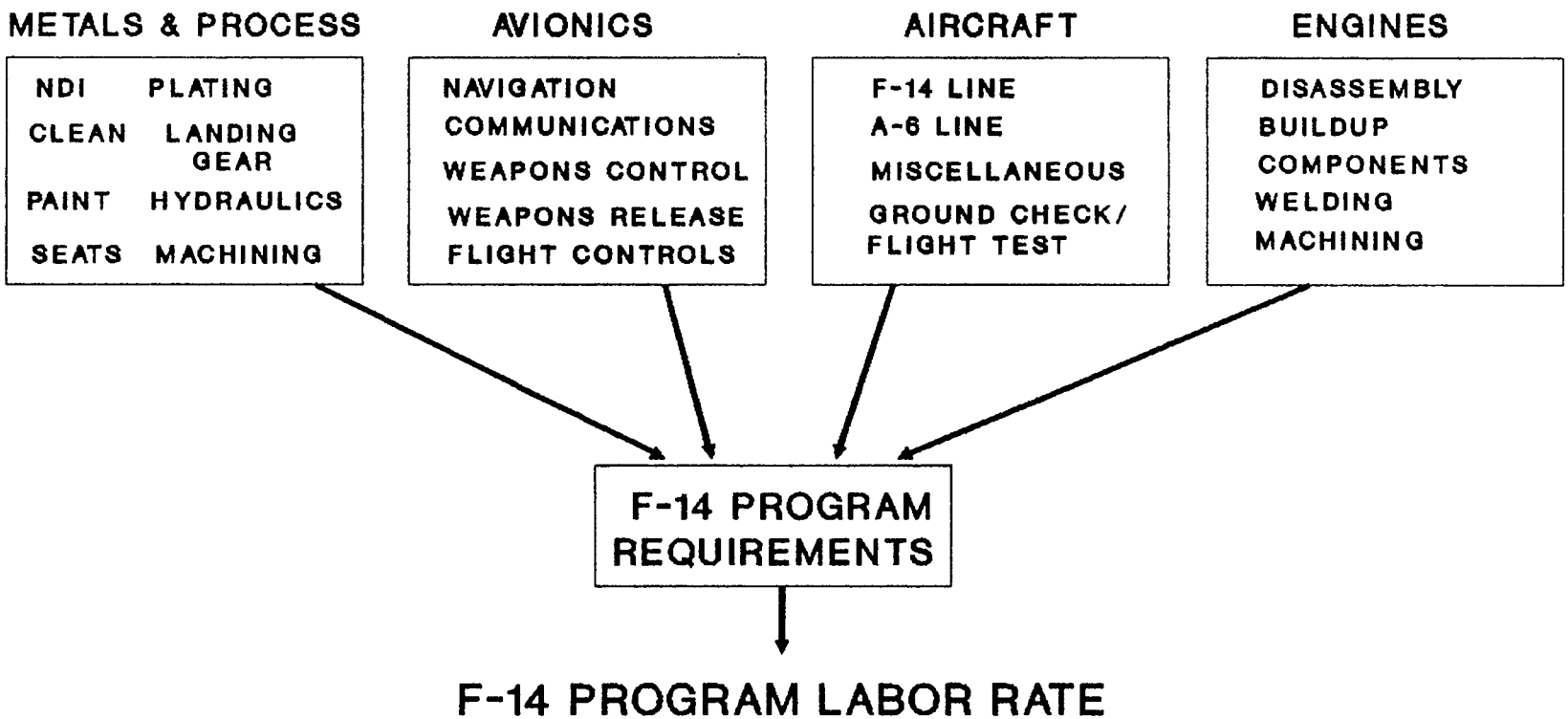



FIG. 6 - PRE-COMPETITION PRODUCTION COST CENTERS

The pre-competition cost center structure contained two obstacles for the Labor Rate PAT. The first obstacle centered around the sheer size of the cost centers, which averaged more than 500 employees each. The size of the cost centers coupled with their corresponding costs of operation made detailed analysis of their rates very difficult. The second problem related to the subsidizing effect created by the grouping of dissimilar functions. For example, the Metals and Process cost center grouped relatively expensive processes such as machining and plating (with high artisan skills/salaries, high associated tooling and facility costs, and high indirect material costs) with relatively inexpensive processes such as cleaning and painting (with low artisan skills/salaries, low associated tooling and facility costs, and low indirect material costs).

At this point the NADEP was forced to make a choice - redefine or reorganize the cost center structure to benefit only its F-14A Program, or to benefit all programs (including the F-14A). The NADEP passed up the first choice recognizing that it could lead to suboptimization by encouraging the identification of ways to get other NADEP programs to absorb more than their fair share of costs so that F-14A SDLM could be performed for less. Not only was this considered unethical and potentially illegal but it also was contrary to the NADEP's commitment to Total Quality Management which promotes continuous process improvement for all assigned work. Furthermore, if competition spread to other programs, it was recognized that this type of decision would make it increasingly difficult to successfully compete for these other programs.

Recognizing the disadvantages associated with developing and using an approach which primarily benefited the F-14A program, NADEP Norfolk opted to take a systems approach in making improvements to its cost center labor rates. Accordingly, the NADEP broke up the four large cost centers displayed in Figure 5 into ten smaller cost centers as illustrated in Figure 6. All of the cost centers shown in Figure 6 were available to support all the NADEP's programs, not just F-14A SDLM. Therefore, any improvements made in the labor rates in any of the cost centers supporting F-14A SDLM benefited all other programs drawing support from that cost center.

Once the new cost center structure had been developed, an initial labor rate was established for each cost center. Each of these rates was then subdivided into its three major components of Direct Labor, Production Overhead, and General and Administrative. Direct Labor was further subdivided into Salary and Leave and Benefits; Production Overhead into Incurred and Transfers. The relationship of these components is illustrated in Figure 7. An analysis of each of these components was then conducted as described below.

## Direct Labor

The direct labor component is made up of two sub-components - the average hourly salary of the direct employees assigned to the cost center, as well as a surcharge to cover leave and other benefits available to the employees. Each cost center manager within NADEP Norfolk was tasked with analyzing those elements which influence the average hourly salary for employees in his/her cost center. Although

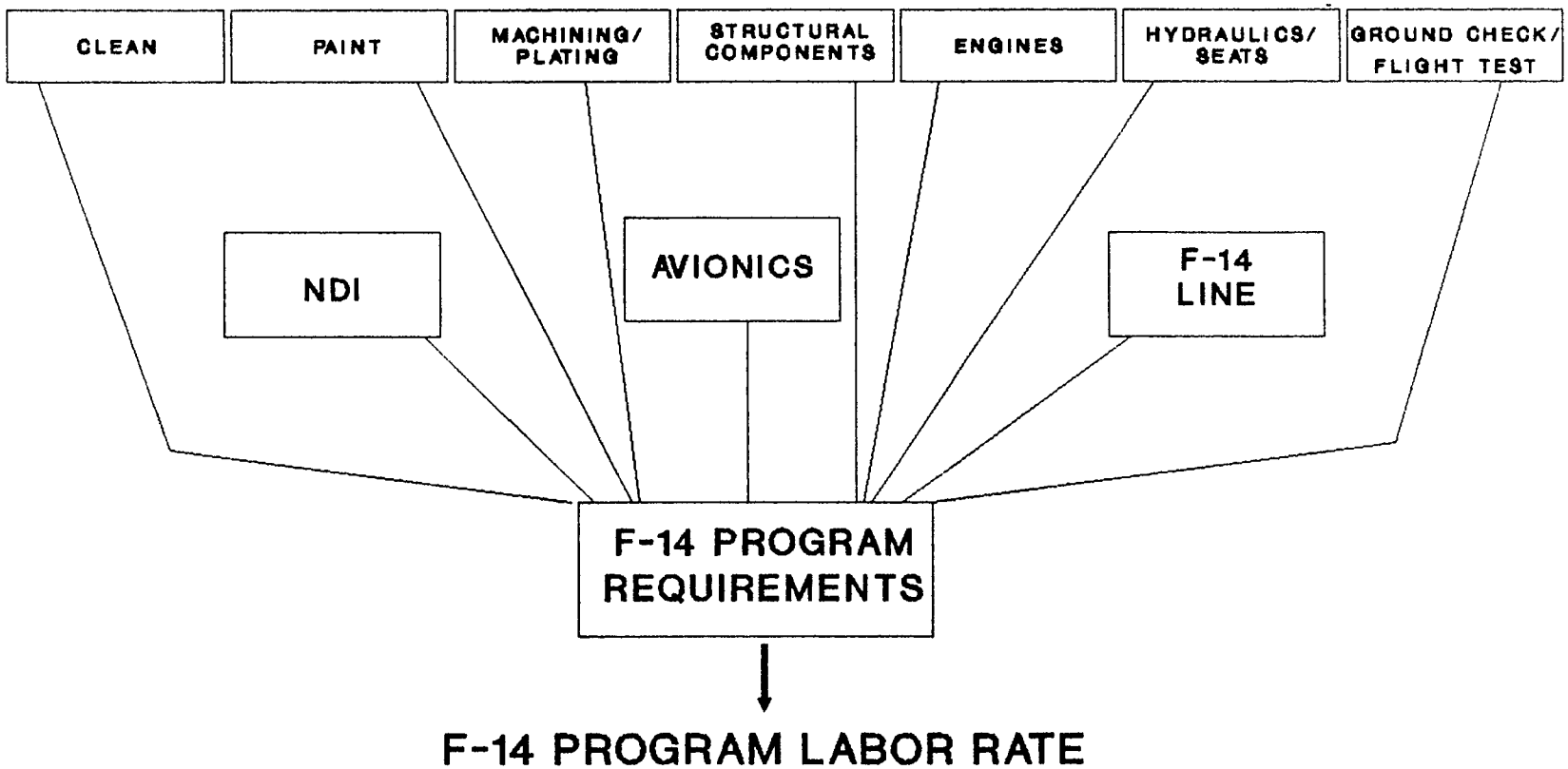



FIG. 6 - POST-COMPETITION PRODUCTION COST CENTERS

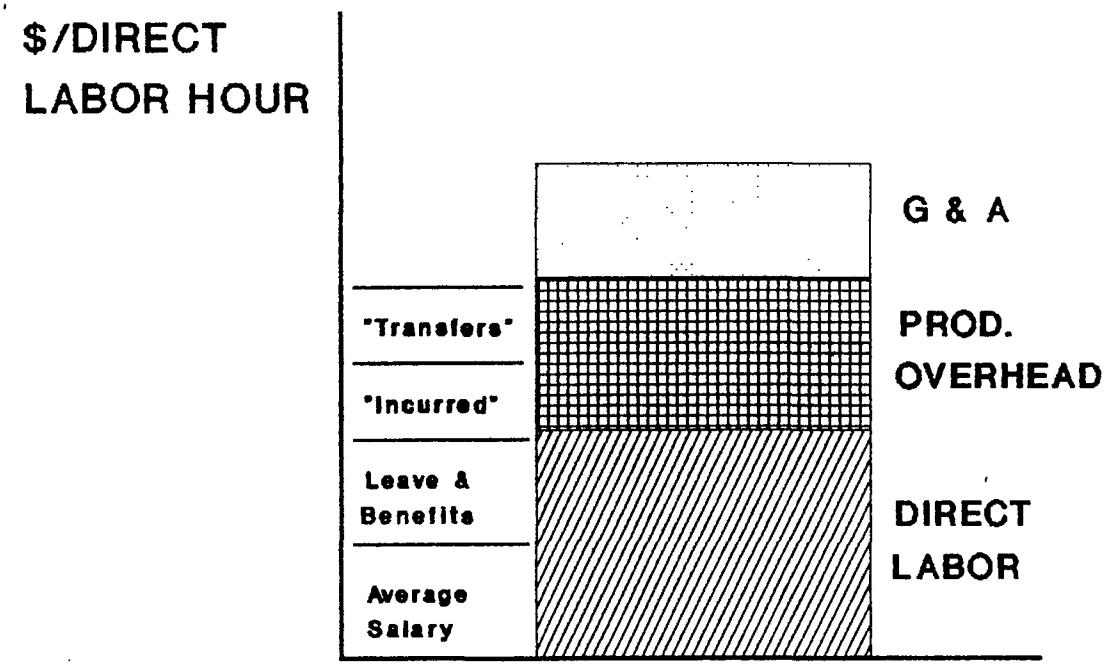



FIG. 7 - LABOR RATE COMPONENTS

this may sound like an obvious approach, for NADEP Norfolk it was a dramatic departure from past practice. In spite of the title "Cost Center Manager," as was noted earlier, the mechanics of how labor rates were developed were a virtual mystery to nearly all of the NADEP's Production Department managers. Traditionally their responsibilities had centered principally around functions not related to the cost center's labor rate (e.g. keeping aircraft/components on schedule, handling personnel matters, etc.) Therefore, before these managers could be expected to analyze their direct labor rate it was necessary to educate them relative to what factors influenced the average hourly salary of their direct employees. These factors are discussed below.

1- **Journeyman Level** - The cost center manager had a great deal of influence regarding how his employees' job descriptions were written. This, in turn, affected the skill requirements and the corresponding salaries associated with these employees. Obviously the higher the skill requirements were for the journeyman level position, the higher the journeyman level salary would be. Cost centers with relatively high journeyman levels tended to have relatively high overall direct average hourly salaries.

2- **Mix of Skills** - Cost centers with relatively high percentages of employees in journeyman level positions had higher overall direct average hourly salaries than cost centers having relatively high percentages of employees in pre-journeyman level positions.

**3- Unusual Shifts** - Employees assigned to work shifts outside the normal daytime shift receive premium pay. Therefore the more work that is done outside the normal workshift, the bigger the influence of the premium pay and the higher the overall direct average hourly salary for the cost centers.

**4- Overtime** - Employees assigned to work overtime receive premium pay. Increasing the use of overtime increases the overall direct average hourly salary for the cost center.

Armed with the knowledge of how their cost centers' direct labor rates were affected by the factors discussed above, and the realization that they would be held accountable for the results of the direct labor rate analysis and any changes made as a result of the analysis, the Production Department's cost center managers were forced to consider the impact of continuing some of their traditional managerial practices. For example, since they were traditionally <u>not</u> held accountable for rises in their cost center's rate, the Production Department's cost center managers had a tendency to seek ways of raising the journeyman level as high as possible. In many cases this was done with a hidden agenda of improving retention, improving the morale of the work force, etc. Now the cost center manager was forced to consider the trade-offs between his/her hidden agenda and the cost center's labor rate, recognizing that higher labor rates would hurt the NADEP's competitive position.

Once the analysis of the cost centers' direct average salaries was complete and any needed changes were made, these salaries were inflated

to cover leave and benefits available to the employees. The resultant inflated salaries became the Direct Labor component of the corresponding cost center's total labor rate. Since the inflation for leave and benefits was almost exclusively a function of federal law, cost center managers were not expected to become involved in reviewing this area of their labor rate. Accordingly, the inflation for leave and benefits was computed by the Management Controls Department relying heavily upon historical trends relative to what portion of the NADEP's employees opted to take advantage of the optional benefits (life insurance, health insurance, etc.). The inflation for leave and benefits covered the costs associated with the following items:

Annual leave

Sick leave

Holiday leave

Other leave

Retirement

Social Security

Life insurance

Health Insurance

Medicare

### Production Overhead

Production Overhead expenses include those costs necessary to complete work assigned to a cost center but which cannot be specifically linked with any one particular task (i.e. "indirect" expenses). As was illustrated in Figure 7, the Production Overhead

portion of the labor rate was subdivided into two elements - "Incurred" and "Transfers" (as the elements were referred to by NADEP Norfolk). Incurred expenses included the salaries of administrative personnel assigned to the cost center, bulk or expendable material, salary and tuition expenses for both administrative personnel and artisans assigned to the cost center, etc. As was the case in reviewing the average salaries, each cost center manager was assigned the responsibility of analyzing his/her own Incurred expenses. Although the preparation of indirect budgets had been a routine part of the Production Department's cost center managers' responsibilities for some time, these managers had been given little, if any, insight into the specific impact these indirect budgets had on their cost center's labor rate. Furthermore, since the NADEP had nearly tripled its Production Department cost centers, there were now new cost center managers who needed insight not only into the impact of their indirect budget on their cost center's labor rate, but also a listing of the specific elements which made up the cost center's Incurred expenses. In addition, both old and new cost center managers needed some numerical tools to use in analyzing their Incurred expenses. The following is a listing of the key contributors to Incurred expenses. Where applicable, the numerical tool used to assist the cost center manager in analyzing his/her relative performance in the applicable category is identified and explained.

1- **Grade Levels** - Just as the cost center manager found it necessary to challenge the skill levels of his/her direct employees

(i.e. journeyman level and mix of skills), the grade levels of his/her administrative employees also had to be challenged. Higher grade levels resulted in higher Incurred expenses.

**2- Supervision** - Another contributor to Incurred expenses was the number of supervisors assigned to the cost center. Historically, the tendency at the NADEP was to add more and more supervisors in order to minimize the average span of control. However, this trend not only increased the cost of doing business but it also contributed to unnecessary organizational layering.

The gauge used to monitor a cost center's supervision was the supervisory to non-supervisory ratio. This ratio was developed for each cost center. Since there were now a relatively large number of cost centers in the Production Department, the supervisory to non-supervisory ratio became a very useful tool in comparing one cost center to the next. Through its effort in this area, the NADEP was able to eliminate an entire level of supervision throughout the Production Department.

One additional, somewhat artificial, change that was made in this area was to convert the NADEP's first line supervisors in cost centers performing aircraft "line" type work to "direct" employees. This was done principally to more closely align the NADEP's accounting procedures with those of its commercial competitors, while conforming with generally accepted accounting principles which permit direct charges for any work performed in support of a uniquely identifiable end product. Since first line supervisors in a cost center which performs aircraft "line" type work only have two or three aircraft

assigned to their cost center at any one time, it is relatively easy to associate their efforts with one of those aircraft (end items) at any one time. Furthermore, since a first line supervisor's duties are considered more technical than administrative, it is easy to conclude that his/her efforts contribute directly to the completion of the assigned task(s). On the other hand, second level and higher supervisors whose responsibility distributes over many more than two or three aircraft and whose duties tend to be more and more administrative cannot appropriately be charged as direct employees. In addition, in the "backshop" cost centers, even though the first line supervisor's duties tend to be predominantly technical, the number of components assigned to his/her cost center tend to be relatively large, making it administratively impractical for the supervisor to charge his/her time directly to any one item for a reasonably large period of time. For this reason the NADEP has not yet extended the direct charging of first line supervisors to its "backshops."

**3- Indirect Employees** - In addition to indirect supervision, the NADEP employed other indirect employees to perform clerical, staff assistant, and other administrative type duties. Here the cost center manager was challenged with reducing, wherever possible, the total number of indirect personnel assigned to his/her cost center. The gauge used to monitor this area was the ratio of indirect employees to direct employees assigned to the cost center. Just as was the case with the supervisory to non-supervisory ratio, the indirect to direct ratio was compared from cost center to cost center in order to identify those most/least efficiently organized. Cost center managers in the

more efficiently organized cost centers were then encouraged to share "lessons learned" with their less efficient counterparts in other cost centers.

**4- Indirect Charges by Direct Employees** - Direct employees routinely perform some indirect tasks (e.g. attend shop meetings, attend training schools, inventory their tool boxes, perform general shop clean-up duties, etc.). To control budgeting for this area of Incurred expense the Labor Rate PAT reviewed applicable historical expenditures from several different cost centers to aid the development of a targeted level of expenditures for each cost center, expressed as a percentage of a direct employee's total available on-the-job man-hours (i.e. excluding leave). Each Production Department cost center manager was then challenged to meet or beat the target or provide supporting rationale to the Labor Rate PAT to justify a higher percentage.

**5- Indirect Material** - Indirect material typically includes material purchased in bulk quantities and/or material which is expended during the course of performing a task. At the NADEP this included such items as nuts, bolts, washers, rivets, paint, masking tape, oil, grease, etc. Because of the unique nature of indirect material from cost center to cost center, each cost center manager was challenged to identify ways to cut the quantity as well as unit cost associated with indirect material routinely used by his/her cost center.

**6- Contractual Expenses** - Some Production Department cost centers at the NADEP used contractual support provided from sources outside the NADEP to support work performed by its employees (e.g. uniform

cleaning/rental, engineering and technical support from the equipment's manufacturer, maintenance service contracts, etc.) Each cost center manager was tasked with reviewing his/her contractual expenses and identifing ways to minimize these expenses.

7- **Travel Expenses** - Many of the NADEP's Production Department cost centers incurred travel costs associated with sending "field teams" to military bases to perform on-site repairs, sending employees to equipment manufacturer's training schools, etc. Each cost center manager was challenged with finding ways to minimize these costs for his/her cost center.

The one area in which NADEP Norfolk made its most dramatic changes was in the category of "Transfers." **Transfers** are expenses which originate outside a particular Production Department cost center but which are provided for the specific benefit of the Production Department cost center. Typically these transfers originate within one of the NADEP's Service Groups (e.g. Personnel, Management Controls, Production Engineering, Material, etc.). When a specific benefitting Production Department cost center can be identified, the cost associated with the Service Group's support is "transferred" to the applicable Production Department cost center to become a part of that cost center's Production Overhead rate. This process is graphically illustrated in Figure 8.

Prior to the NADEP's preparation for competition, very little work had been done in trying to identify the specific benefactors of Service Group support. Most of this support was simply considered a General

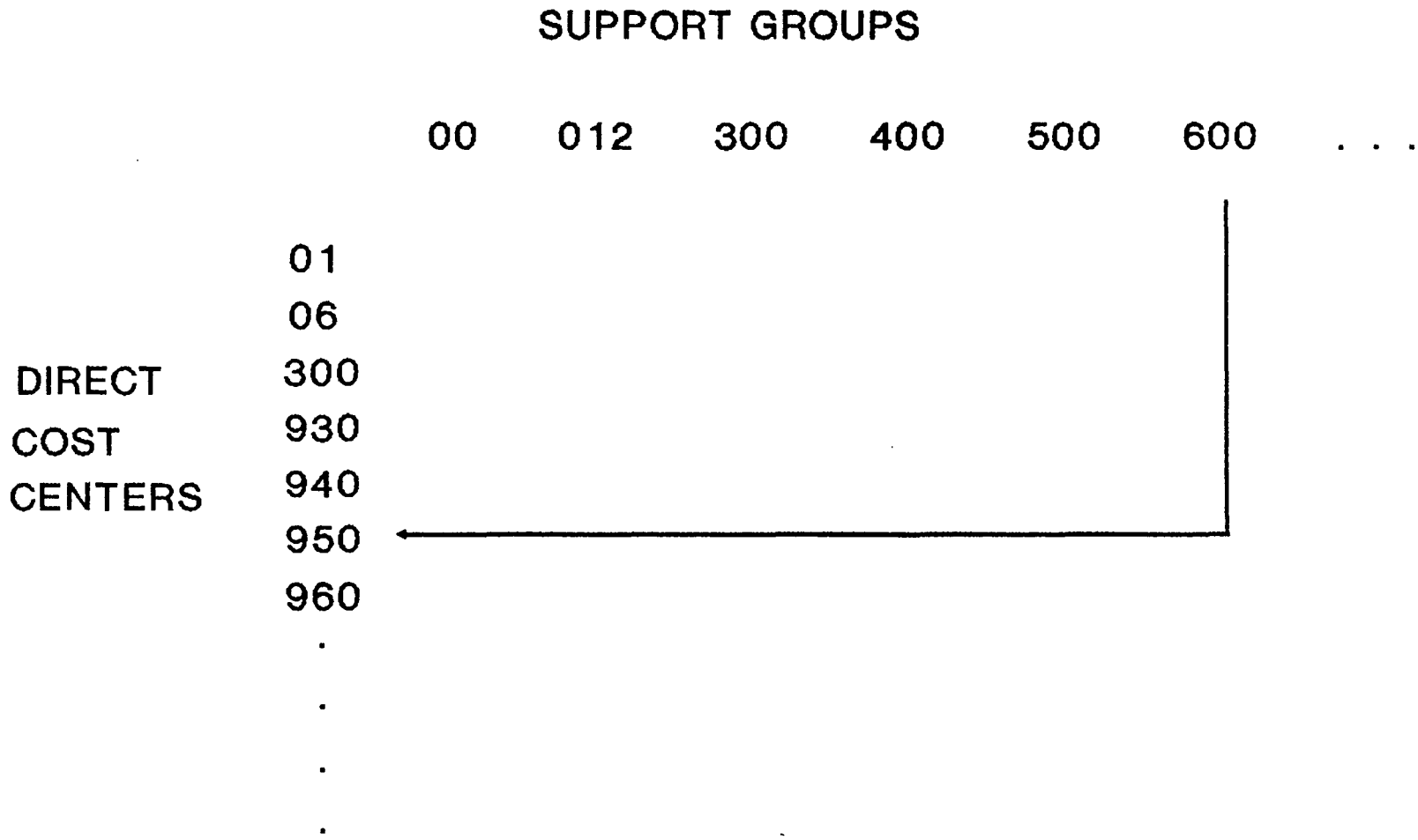



FIG. 8 - TRANSFER RELATIONSHIPS (LABOR, MATERIAL, CONTRACTUAL AND OTHER EXPENSES)

and Administrative expense and uniformly charged against every direct hour expended in support of the NADEP's customers. Service Group staffing levels were established through negotiations between the Service Group's cost center manager and the NADEP's Executive Officer. However, in preparing for the F-14A SDLM competition, the NADEP concluded that uniform distribution of Service Group expenses was unfair to some Production Department cost centers since the demand for and use of Service Group support was not uniform across the Production Department. The solution to this problem was the development of a more accurate Transfer process.

Since very little meaningful and applicable historical data existed relative to Transfers, the NADEP established a negotiation process which brought the corresponding Production Department and Service Group cost center managers face-to-face to discuss types and levels of support required by the Production Department's cost centers. The negotiation form illustrated in Figure 9 was used to facilitate the negotiation process. In the event that the two cost center managers were unable to agree on the proper level of transfer support, the Executive Officer was called upon to serve as an arbitrator.

In addition to developing the negotiation process, the NADEP also changed the way it charged some of its Transfer-type support. By taking a more aggressive look at what constituted direct labor charges, the NADEP converted those Service Group expenses attributable to a specific end product to a direct charge. These including the following:

## *(RECEIVING)* COST CENTER SUPPORT FROM *(PROVIDING)*

| SERVICE(S) PROVIDED | MANYEARS REQUIRED |
|---|---|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6.<br>.<br>.<br>.<br>.<br>.<br>. | |
| TOTALS | |

FIG. 9 - TRANSFER NEGOTIATION FORM

1- **Engineering** labor associated with evaluating the serviceability of, or developing repair procedures for damaged aircraft structure or components

2- **Quality Assurance** labor expended to comply with mandatory inspection requirements called for at key points in the processing of the airframe or components

3- **Planner and Estimator** labor expended in preparing a variety of required correspondence and documentation associated with the aircraft being processed

4- **Examination and Evaluation** labor expended in evaluating the condition of the aircraft and calling for appropriate processing to correct discovered defects

5- **Production Control** labor expended in controlling the processing of aircraft assigned to the applicable cost center

Because so many variables affected the Production Overhead rate and since so many inexperienced people had been brought into the process, the need for some type of Decision Support System (DSS) was identified. In order to illustrate how this DSS was constructed and utilized, a hypothetical organization has been created. (See Table 1) Using the type of information contained in Table 1 along with the results of the Transfer negotiations and the General and Administrative review (which will be discussed later), the Labor Rate PAT developed an analytical tool it titled an "Analysis Report." A separate Analysis Report was developed for each Service Group. (See Table 2 for an example of an Analysis Report using data constructed for the Planning (500) cost

TABLE 1

HYPOTHETICAL ORGANIZATION

| COST CENTER | FUNCTION | DIRECT OR INDIRECT | DIRECT MANHOURS S/T | DIRECT MANHOURS O/T | DIRECT MANHOURS TOT | DIRECT MANHOURS O/T % | INDIRECT O/T % |
|---|---|---|---|---|---|---|---|
| 200 | FINANCIAL | INDIRECT | - | - | - | - | 8.0 |
| 500 | PLANNING | INDIRECT | - | - | - | - | 7.0 |
| 700 | MATERIAL | INDIRECT | - | - | - | - | 9.0 |
| 930 | COMPONENTS | DIRECT | 400,000 | 32,000 | 432,000 | 8.0 | - |
| 940 | AVIONICS | DIRECT | 500,000 | 35,000 | 535,000 | 7.0 | - |
| 950 | AIRCRAFT | DIRECT | 800,000 | 24,000 | 824,000 | 3.0 | - |
| 960 | ENGINES | DIRECT | 200,000 | 8,000 | 208,000 | 4.0 | - |
| | | | | | 1,999,000 | | |

ASSUME 1750 MANHOURS ARE AVAILABLE PER YEAR PER EMPLOYEE

**TABLE 2**

**ANALYSIS REPORT**

**DIRECT WORKLOAD SPREAD BY COST CENTER**

| COST CENTER | 930 | 940 | 950 | 960 | TOTAL |
|---|---|---|---|---|---|
| A. DIRECT O/T RATE % | 8.0 | 7.0 | 3.0 | 4.0 | - |
| B. MANHOURS PER YEAR | 1,890 | 1,873 | 1,803 | 1,820 | - |
| C. PROJECTED DIRECT MANHOURS | 432,000 | 535,000 | 824,000 | 208,000 | 1,999,000 |
| D. EQUIVALENT MAN-YEARS | 228.6 | 285.6 | 457.0 | 114.3 | 1,085.5 |
| E. INDIRECT BY DIRECT % | 20.0 | 15.0 | 17.0 | 25.0 | - |
| F. DIRECT STAFFING REQUIRED | 274.3 | 328.4 | 534.7 | 142.9 | 1,280.3 |
| G. % OF DIRECT LABOR HOURS | 21.6 | 26.8 | 41.2 | 10.4 | 100.0 |

**********

**SOURCE: 500**

H. INDIRECT O/T RATE (%): 7.0

I. MANHOURS PER YEAR: 1873

J. INDIRECT LABOR RATE: $25.00

**LABOR TRANSFERS TO COST CENTER:**

| COST CENTER | 930 | 940 | 950 | 960 | TOTAL |
|---|---|---|---|---|---|
| K. MAN-YEARS | 61.6 | 59.1 | 75.2 | 21.8 | 217.7 |
| L. INDIRECT LABOR HOURS | 115,377 | 110,694 | 140,850 | 40,831 | 407,752 |
| M. % OF LABOR TRANSFERS | 28.3 | 27.2 | 34.5 | 10.0 | 100.0 |
| N. COST TO COST CTR ($/DLH) | $ 6.68 | $ 5.17 | $ 4.27 | $ 4.91 | |

**********

**GENERAL AND ADMINISTRATIVE LABOR COSTS:**

| COST CENTER | 930 | 940 | 950 | 960 | TOTAL |
|---|---|---|---|---|---|
| O. G&A AS % OF TOTAL | 23.0 | 31.4 | 32.2 | 13.4 | 100.0 |
| P. EQUIVALENT MANYEARS | 4.9 | 6.7 | 6.9 | 2.8 | 21.3 |
| Q. INDIRECT LABOR HOURS | 9,176 | 12,527 | 12,846 | 5,346 | 39,895 |
| R. COST TO COST CTR ($/DLH) | $ 0.53 | $ 0.59 | $ 0.39 | $ 0.64 | |

**********

**TOTAL LABOR COSTS TO COST CENTER:**

| COST CENTER | 930 | 940 | 950 | 960 | TOTAL |
|---|---|---|---|---|---|
| S. EQUIVALENT MANYEARS | 66.5 | 65.8 | 82.1 | 24.6 | 239.0 |
| T. INDIRECT LABOR HOURS | 124,553 | 123,221 | 153,696 | 46,177 | 447,647 |
| U. COST TO COST CTR ($/DLH) | $ 7.21 | $ 5.76 | $ 4.66 | $ 5.55 | |

center). The following is a line by line description of the information contained in the Analysis Report.

**A. Direct O/T Rate %** - taken directly from Table 1

**B. Man-hours Per Year** - (available man-hours per employee per year) X (1+A/100); NOTE: Available man-hours per employee per year was assumed to be 1750 for this example

**C. Projected Direct Man-hours** - taken directly from Table 1

**D. Equivalent Man-Years** - C/B; This number represented the equivalent full-time direct staffing requirements for the corresponding cost center, excluding the impact of indirect tasks performed by direct employees.

**E. Indirect by Direct %** - figure developed during review of Incurred requirements for indirect labor expenditures by direct employees

**F. Direct Staffing Required** - (D)(1+E/100); This number represented the full-time direct staffing requirement for the corresponding cost center, including the impact of indirect tasks performed by direct employees.

**G. % of Direct Labor Hours** - (C/ΣC)(100); This number reflected the percentage of the NADEP's total direct workload which was projected to be performed in the applicable cost center.

**Note:** The preceding information was common for each Analysis Report prepared for each Service Group. The following information is unique

to just one of these Service Groups, the Planning Department (500), and is illustrative of the other Service Groups' Analysis Reports.

**H. Indirect O/T Rate (%)** - taken directly from Table 1

**I. Man-hours per year** - (1750)(1+(H/100))

**J. Indirect Labor Rate** - developed by the Management Controls Department from applicable cost center budgeting information supplied by the Planning Department

**K. Man-years** - taken from the applicable transfer negotiation sheets

**L. Indirect Labor Hours** - (K)(I)

**M. % of Labor Transfers** - $(L/\Sigma L)(100)$; This number was very useful in determining whether the Production Department cost center was paying for "its fair share" of the Labor Transfers from the applicable Service Group. This was done by comparing this number with the corresponding number on Line G. Although this was not always expected to be a direct match due to variations in Production Department cost center requirements for Service Group support, it did provide a good reference point for future negotiations and/or adjustments to the appropriate level of transfer support which should be provided by the Service Group. Furthermore, these percentages were used by the Management Controls Department to distribute the non-labor expenses (e.g. material, contractual, travel, per diem, etc.) which originated within each of the Service Groups.

**N. Cost to Cost Ctr ($/DLH)** - (J)(L)/C

**O. G&A as % of Total** - developed from G&A distribution method discussed later in this paper (refer to column K of Table 6)

**P. Equivalent Man-years** - $(\Sigma P)(I)(O)$

**Q. Indirect Labor Hours** - $(O/100)(\Sigma P)$; Note: $\Sigma P$ is determined through negotiations with the individual(s) assigned responsibility for G&A expenses

**R. Cost to Cost Ctr ($/DLH)** - $(Q)(J)/C$

**S. Equivalent Man-years** - K+P; This number represented the total applicable Service Group staffing being supported by the corresponding Production Department cost center

**T. Indirect Labor Hours** - L+Q

**U. Cost to Cost Ctr ($/DLH)** - $(T)(J)/C$; This number represented the total labor cost impact of the applicable Service Group on the rate of the corresponding Production Department cost center.

Another group of Transfers which was not the subject of face-to-face negotiations involved a series of expenses associated with services originating outside the NADEP. These included such items as Maintenance Service Agreements (MSAs) associated with maintaining specific equipment owned by the NADEP, property maintenance, utility costs, etc. A variety of distribution methods was used to distribute these costs to the various Production Department cost centers - % of items being serviced, for MSAs; % of square footage occupied, for property maintenance; % of cubic footage occupied, for heating and cooling costs; etc.

Once the Incurred and Transfer analyses were complete, the results were turned over to the Management Controls Department for priceout. The results of these priceouts were then taken by the Labor Rate PAT and displayed in a new "Overhead Rate" spreadsheet as illustrated on the left hand side of Table 3. Then, by dividing these costs by the number of direct man-hours projected to be spent by the corresponding Production Department cost center, each of the expenses on the left hand side of Table 3 was converted to a cost per hour as illustrated on the right hand side of the spreadsheet. A separate spreadsheet was developed for each cost center in the Production Department.

The rate information displayed in the far right hand column of each of the "Overhead Rate" spreadsheets was then displayed in a summary spreadsheet which the Labor Rate PAT titled the "Cost Report." (Refer to Table 4) The "Cost Report" proved very useful to the Labor Rate PAT as well as the cost center managers by providing a means by which efforts aimed at trimming cost within the cost center could be prioritized. By reviewing the column of data associated with his/her cost center, the cost center manager was able to identify overhead expenses representing the greatest potential payback. Furthermore, by reviewing any row of data associated with a specific source of indirect expense, the cost center managers were able to assess their position relative to other cost centers.

The "Overhead Rate" and "Cost Report" spreadsheets were then distributed to the corresponding cost center managers for review. These reviews prompted successive negotiations for Service Group Transfers, continuing reviews of Incurred expenses, communications

TABLE 3

OVERHEAD RATE FOR 930

PROJECTED DIRECT LABOR HOURS: 432,000

| SOURCE OF INDIRECT EXPENSE | DOLLARS[1] | | | | | DOLLARS PER DIRECT LABOR HOUR[2] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LABOR | MATL | CONT | OTHER | TOTAL | LABOR | MATL | CONT | OTHER | TOTAL |
| 200 | $ 26,728 | $ - | $ 155,520 | $ 17,280 | $ 199,528 | $ 0.06 | $ - | $0.36 | $0.04 | $ 0.46 |
| 500 | 2,884,425 | 34,560 | 8,640 | 95,040 | 3,022,665 | 6.68 | 0.08 | 0.02 | 0.22 | 7.00 |
| 700 | 285,120 | 8,640 | 8,640 | 25,920 | 328,320 | 0.66 | 0.02 | 0.02 | 0.06 | 0.76 |
| AWARDS | 43,200 | - | - | - | 43,200 | 0.10 | - | - | - | 0.10 |
| INCURRED | 2,358,720 | 648,000 | 17,280 | 2,332,800 | 5,356,800 | 5.46 | 1.50 | 0.04 | 5.40 | 12.40 |
| MSA | - | - | 129,600 | - | 129,600 | - | - | 0.30 | - | 0.30 |
| PROP MAINT | - | - | 259,200 | - | 259,200 | - | - | 0.60 | - | 0.60 |
| UTILITIES | - | - | 1,036,800 | - | 1,036,800 | - | - | 2.40 | - | 2.40 |
| TOTALS | $5,598,193 | $691,200 | $1,615,680 | $2,471,040 | $10,376,113 | $12.96 | $1.60 | $3.74 | $5.72 | $24.02 |

NOTES:

(1) From Management Controls Priceout

(2) (Dollars/Projected Direct Labor Hours)

TABLE 4

COST REPORT

TOTAL PRODUCTION OVERHEAD COST ($/DLH)[1] TO COST CENTER:

| SOURCE | 930 | 940 | 950 | 960 |
|---|---|---|---|---|
| 200 | $ 0.46 | $ 0.51 | $ 0.51 | $ 0.52 |
| 500 | 7.00 | 5.44 | 4.76 | 5.15 |
| 700 | 0.76 | 1.30 | 0.95 | 1.17 |
| AWARDS | 0.10 | 0.10 | 0.09 | 0.12 |
| INCURRED | 12.40 | 17.05 | 5.50 | 15.60 |
| MSA | 0.30 | 1.50 | 0.30 | 1.00 |
| PROP MAINT | 0.60 | 0.60 | 0.60 | 1.00 |
| UTILITIES | 2.40 | 2.00 | 0.30 | 5.50 |
| TOTAL | $ 24.02 | $ 28.50 | $ 13.01 | $ 30.06 |

NOTE:
(1) From "Overhead" Report

between cost center managers to share creative ways of reducing costs, etc. Changes prompted by these reviews were passed back to the Management Controls Department for successive priceouts. Twelve iterations of cost center rate development were conducted by the time the Labor Rate Review was complete.

## General and Administrative

General and Administrative (G&A) expenses are those indirect expenses necessary for the operation of the NADEP for which no specific benefitting Production Department cost center can be identified. Examples of G&A expenses include costs associated with maintaining Occupational Safety and Health (OSH) and Equal Employment Opportunity (EEO) offices, Service Group support provided to other service groups, general NADEP ADP services, etc.

At the same time the Production Department cost center managers were working to trim their Production overhead expenses, a subcommittee of the Labor Rate PAT worked to trim G&A expenses. This subcommittee was chaired by the NADEP's Executive Officer who became known as the "G&A cost center manager."

In much the same way that the Production Department cost center managers reviewed their Production Overhead expenses, the G&A subcommittee reviewed G&A expenses. Highlights of the subcommittee's review are as follows:

**1-Service Group Staffing** - Each service group cost center manager was challenged to justify any staffing he/she was not able to "sell"

during transfer negotiations with Production Department cost center managers.

**2-Indirect Material, Tuition and Travel** - Those costs projected to be expended in support of the NADEP at large, were reviewed and, where considered unnecessarily high, reduced.

**3-Contractors** - These projected costs were reviewed prompting several changes. Some of the ADP services routinely contracted out were found to be more economically providable by in-house resources. It was also discovered that some other services routinely contracted out (e.g. minor property maintenance, transportation services, some janitorial services, etc.) could be performed with employees assigned to the Command Work Center. In addition, by reducing its second and third shift operations and consolidating some of its operations, the NADEP was able to reduce its utility expenses.

After the G&A subcommittee finished its review of G&A expenses, the results were passed to the Management Controls Department for priceout. The results of the priceout were then passed back to the Labor Rate PAT which displayed the information in spreadsheet format identical to that used in the "Overhead Rate" spreadsheets. (See Table 5) As was the case in the review of Production Overhead expenses, the G&A subcommittee used the information displayed in Table 5 to prioritize its cost cutting efforts in successive iterations.

Another discovery made during the G&A review was that the NADEP was using one of the least preferred methods of allocating G&A expenses - uniformly across each direct man-hour. A more preferred method, and the one eventually adopted by the NADEP, allocated G&A expenses based

TABLE 5

GENERAL AND ADMINISTRATIVE EXPENSES
(AFTER TRANSFERS)

PROJECTED DIRECT LABOR HOURS: 1,999,000

| Source of Indirect Expense | DOLLARS[1] | | | | | DOLLARS PER DIRECT LABOR HOUR[2] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LABOR | MATL | CONT | OTHER | TOTAL | LABOR | MATL | CONT | OTHER | TOTAL |
| 200 | $2,998,502 | $299,850 | $3,998,000 | $499,750 | $ 7,796,102 | $1.50 | $0.15 | $2.00 | $0.25 | $3.90 |
| 500 | 997,375 | 99,950 | 999,500 | 99,950 | 2,196,775 | 0.50 | 0.05 | 0.50 | 0.05 | 1.10 |
| 700 | 2,398,800 | 39,980 | 59,970 | 199,900 | 2,698,650 | 1.20 | 0.02 | 0.03 | 0.10 | 1.35 |
| Awards | - | - | - | - | - | - | - | - | - | - |
| MSA | - | - | 299,850 | - | 299,850 | - | - | 0.15 | - | 0.15 |
| Prop Maint. | - | - | 599,700 | - | 599,700 | - | - | 0.30 | - | 0.30 |
| Utilities | - | - | 1,999,000 | - | 1,999,000 | - | - | 1.00 | - | 1.00 |
| TOTALS | $6,394,677 | $439,780 | $7,956,020 | $799,600 | $15,590,077 | $3.20 | $0.22 | $3.98 | $0.40 | $7.80 |

NOTES:
(1) From Management Controls Priceout
(2) (Dollars/Projected Direct Labor Hours)

on the total cost of operation. Total cost at the NADEP was defined as the sum of Direct Labor, Production Overhead, and Direct Material for each Production Department cost center. Using the projected direct man-hour expenditures, the Direct Labor and Production Overhead rates developed as described earlier in this case study, coupled with historical information relative to Direct Material rates, the Labor Rate PAT developed its "G&A on Total Cost Report" as illustrated in Table 6. Unlike many private companies which deal with G&A as percentage of total cost, because of the way the NADEP's accounting system was set up, it was necessary to compute a unique "G&A labor rate" for each Production Department cost center. (See column M of Table 6) However, to illustrate that this yields results which are consistent with the percentage figures used by private companies, it is only necessary (referring again to Table 6) to divide any number in column L by the corresponding number in column J to see that the G&A "surcharge" is consistently applied to each Production Department cost center.

## Total Labor Rate

Once all the components of each of the Production Department's cost centers had been developed, the components were displayed and summed to arrive at the corresponding total labor rate for each cost center. (See Table 7). These rates were then applied to the corresponding man-hours developed by the Work Content PAT to develop the NADEP's Cost Proposal for performing F-14A SDLM.

TABLE 6

G&A ON TOTAL COST REPORT

G&A EXPENSE: $15,590,077[1]

| | | | | COST CENTER RATES | | | | COST | | | | G&A | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DIRECT HOURS[2] | | | DIRECT[3] | | | | | | | % OF NADEP | | |
| CC | S/T (A) | O/T (B) | TOTAL (C) | S/T (D) | O/T (E) | POH[4] (F) | DM[5] (G) | S/T[6] (H) | O/T[7] (I) | TOTAL[8] (J) | TOTAL[9] (K) | C.C. COST[10] (L) | C.C. RATE[11] (M) |
| 930 | 400,000 | 32,000 | 432,000 | $22.00 | $33.00 | $24.02 | $19.00 | $26,008,000 | $2,432,640 | $ 28,440,640 | 23.03 | $ 3,590,541 | $ 8.31 |
| 940 | 500,000 | 35,000 | 535,000 | 26.00 | 39.00 | 28.50 | 17.00 | 35,750,000 | 2,957,500 | 38,707,500 | 31.35 | 4,886,699 | 9.13 |
| 950 | 800,000 | 24,000 | 824,000 | 20.00 | 30.00 | 13.01 | 15.00 | 38,408,000 | 1,392,240 | 39,800,240 | 32.23 | 5,024,654 | 6.10 |
| 960 | 200,000 | 8,000 | 208,000 | 24.00 | 36.00 | 30.06 | 25.00 | 15,812,000 | 728,480 | 16,540,480 | 13.39 | 2,088,183 | 10.04 |
| | | | | | | | | | | $123,488,860 | 100.00 | $15,590,077 | |

NOTES:

(1) From "General and Administrative (after transfers)" spreadsheet
(2) From "Hypothetical Organization" sheet
(3) From Management Controls
(4) From "Overhead" report
(5) From Management Controls
(6) H = (D+F+G)(A)
(7) I = (E+F+G)(B)
(8) J = H+I
(9) K = J / ΣJ
(10) L = (K)(G&A Expense)
(11) M = L / C

TABLE 7

TOTAL LABOR RATES

| | 930 | 940 | 950 | 960 |
|---|---|---|---|---|
| DIRECT LABOR(1) | $ 22.81 | $ 26.85 | $ 20.29 | $ 24.46 |
| PRODUCTION OVERHEAD(2) | 24.02 | 28.50 | 13.01 | 30.06 |
| G&A(3) | 8.31 | 9.13 | 6.10 | 10.04 |
| TOTAL | $ 55.14 | $ 64.48 | $ 39.40 | $ 64.56 |

(1) $\frac{\text{(S/T HRS)(S/T RATE)+(O/T HOURS)(O/T RATE)}}{\text{(S/T HOURS)+(O/T HOURS)}}$

(2) From "Overhead Rate" Report

(3) From "G&A on Total Cost" Report

# CHAPTER 3

## LESSONS LEARNED

The success of NADEP Norfolk's efforts in competing for F-14A SDLM workload was underwritten by a total commitment to the task. This commitment was characterized by the following:

1- **Top Management Attention** - The commitment to the NADEP's cost reduction efforts was clearly and continuously communicated from the Commanding Officer and other senior level managers throughout the life of the project. As a result, it was typically easy for the Work Content and Labor Rate PAT team leaders to obtain required levels of support in a timely fashion. Without this commitment the success of the effort would have been jeopardized.

2- **Clear Lines of Responsibility** - With the development of a competition organization chart, each person's responsibility and relationship to other phases of the effort were clearly and visually documented. As a result, potential problems associated with challenges of authority were minimized.

3- **Collocation of Key Players** - The F-14A SDLM competition ultimately involved more than seventy people to a substantial extent. Due to the size of the effort as well as the need to draw upon people, data, etc. from throughout the NADEP, complete consolidation of all the team members was impractical. Instead, a nucleus of key individuals (including the Competition Manager, the Technical and Cost proposal

team leaders, as well as a small administrative staff) was assembled and collocated during the course of the effort. This facilitated open and frequent communication among the key players involved in the preparation of the NADEP's proposal.

The concept of public/private competition was not only new for the NADEP, it was also new for the government contracting officials responsible for developing the solicitation as well as establishing the ground rules by which the public and private bidders would compete. As a result, new information and clarification of previous guidance was received on a frequent basis. The collocation of the Competition Manager and the two proposal team leaders minimized the communication delays which might have occurred had they not been working in the same spaces. As new guidance was received by the two team leaders, it was quickly passed on to those persons affected by the guidance.

**4- Clear Plan of Action** - From the outset it was clear that the proposal team had a great deal of work to accomplish in a short period of time. In order to organize its efforts, the NADEP developed a Plan of Action and Milestones (POA&M) which listed all of the individual subelements of the overall task, projected time durations, and assigned organizational responsibility for the completion of each subelement. This POA&M was instrumental in measuring and monitoring task progress.

**5- Frequent Status Reviews** - Informal status reviews were independently provided on a daily basis by the Technical and Cost proposal team leaders to the Competition Manager. Formal status reviews were conducted on a weekly basis to provide all key players an overview of progress made against the POA&M and identify sources of any potential delays.

**6- Full Time Reassignment** - Much of the work associated with the Work Content and Labor Rate PATs demanded full time reassignments for key employees within the NADEP. Though these reassignments had a temporary negative impact on some of its other work, the NADEP "bit the bullet" to follow through with its total commitment to give the effort its best shot. These reassignments had the obvious advantage of avoiding conflicting demands for an employee's time between his/her normal duties and those demanded by the competition effort.

**7- Seriousness of Threat** - Unlike most competitive situations, NADEP Norfolk was forced to compete for work which had previously been planned for the NADEP and around which it had already built its labor rates. Therefore, the NADEP viewed the loss of the F-14A SDLM competition as the beginning of a "death spiral." Since the NADEP was forced to bill its customers using rates set two to three years in advance, and since its then current rates included the F-14A work for which it was competing, the loss of the competition would have resulted in fewer and fewer man-hours over which to spread its overhead expenses (many of which were fixed) and a corresponding rise in the rates it would have to charge its customers. This was seen as a threat to the NADEP's ability to attract or compete for future work, which would have additional adverse impact on its rates. A never ending cycle was projected. Because each successive loss of workload would be accompanied by a corresponding loss of jobs, it was not difficult to convince NADEP employees of the seriousness of the threat. By communicating this concern from the highest levels of management, the NADEP was able to maximize the dedication of anyone called upon to support the competition effort.

Although preparing the competition proposal proceeded as smoothly as could have been expected for a completely new task of the magnitude of that required to prepare the competition proposal, such was not the case in moving into the execution phase. Problems were encountered in the following areas:

1- **Management Initiatives** - During the course of developing its cost reduction strategy, the NADEP realized that a series of specific changes would have to be made to the pre-competition mode of operation if it was to succeed in operating within the cost projections made for completing F-14A SDLM. Although these changes were documented by the competition team, their implementation was slow to take place. Many of the characteristics which were so instrumental in guaranteeing that the NADEP would submit the best proposal disappeared after the award was made.

2- **Competition Team** - After the NADEP was awarded the F-14A SDLM contract, most of the full time personnel reassignments were terminated and the employees returned to their permanent jobs. Only a "skeleton crew" was left behind to perform routine administrative duties associated with maintaining custody of and interpreting the NADEP's proposal. As a result, the breadth and depth of involvement which was present during the preparation of the NADEP's proposal was dramatically diminished after the contract award.

3- **Top Management Attention** - The top management commitment which was so visible during preparation of the NADEP's proposal faded. Little more than "lip service" was given to the need for following

through with the management initiatives which had been documented as essential to the NADEP's successful execution of the plan it submitted with its proposal. The attitude that was displayed by top management seemed to suggest that the NADEP's competition work was finished when, in many respects, it had just began.

**4- Transition of Responsibility** - Responsibility for the implementation of the management initiatives identified by the Work Content and Labor Rate PATs was passed to the head of the NADEP's Planning Department after the competition team was disbanded. As a result of diminished top management attention and the absence of the competition team, efforts to implement the management initiatives slipped into a "business as usual" mode to compete for priority attention with all of the other work performed by the NADEP.

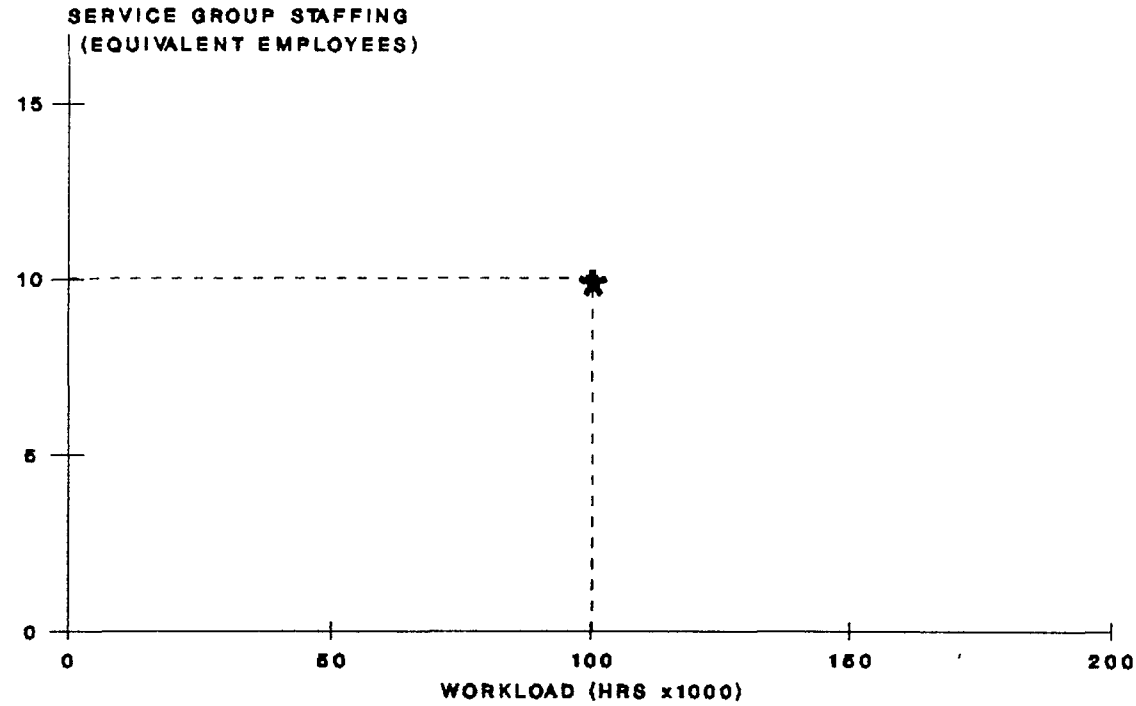
**5- No POA&M** - Unlike the structure which was employed so successfully in accomplishing all of the work necessary to prepare the NADEP's proposal, no corresponding structure characterized the post award period. No implementation Plan of Attack and Milestones (POA&M) was developed to facilitate the implementation of the documented management initiatives. This further contributed to the "business as usual" approach which characterized the post award phase.

**6- Transfer Levels** - In addition to the problems encountered in implementing the management initiatives, difficulty was experienced in determining proper levels of Service Group Transfers. The Transfer methodology developed for F-14A SDLM competition was characterized by the projection of a specific distribution of direct workload across the Production Department's cost centers which became the basis upon which negotiations with Service Groups were conducted. The results of these

negotiations were then used to develop Production Overhead rates for the corresponding Production Department cost centers. The relationship between a Production Department cost center's workload and one of the Service Groups providing Transfer support is "generically" displayed in Figure 10. The corresponding impact on the Production Department's cost center is also displayed.

The Transfer methodology developed by the NADEP was expected to be used for preparing a "snapshot" set of Production Overhead rates to be used only in the preparation of the F-14A SDLM cost proposal. However as the NADEP experienced workload shifts between its cost centers after the F-14A public/private competition proposal was submitted, no changes were made to the Transfer levels negotiated for during the F-14A public/private competition effort. As a result, with Transfer levels frozen and workload shifting, Production Overhead rates began to fluctuate as illustrated in Figure 11.

In order to adjust Transfer support as workload shifts occurred, the NADEP first assumed a direct relationship between the level of Service Group support required and the amount of workload (in man-hours) assigned to the corresponding Production Department cost center. Using this assumption, the Transfer support would rise as the workload assigned to the Production Department cost center rose, or fall as the workload fell. Therefore, rather than holding the Service Group staffing constant and varying the Production Overhead rate, this new approach held the Production Overhead rate constant while varying the Service Group staffing. This new approach is graphically displayed in Figure 12.



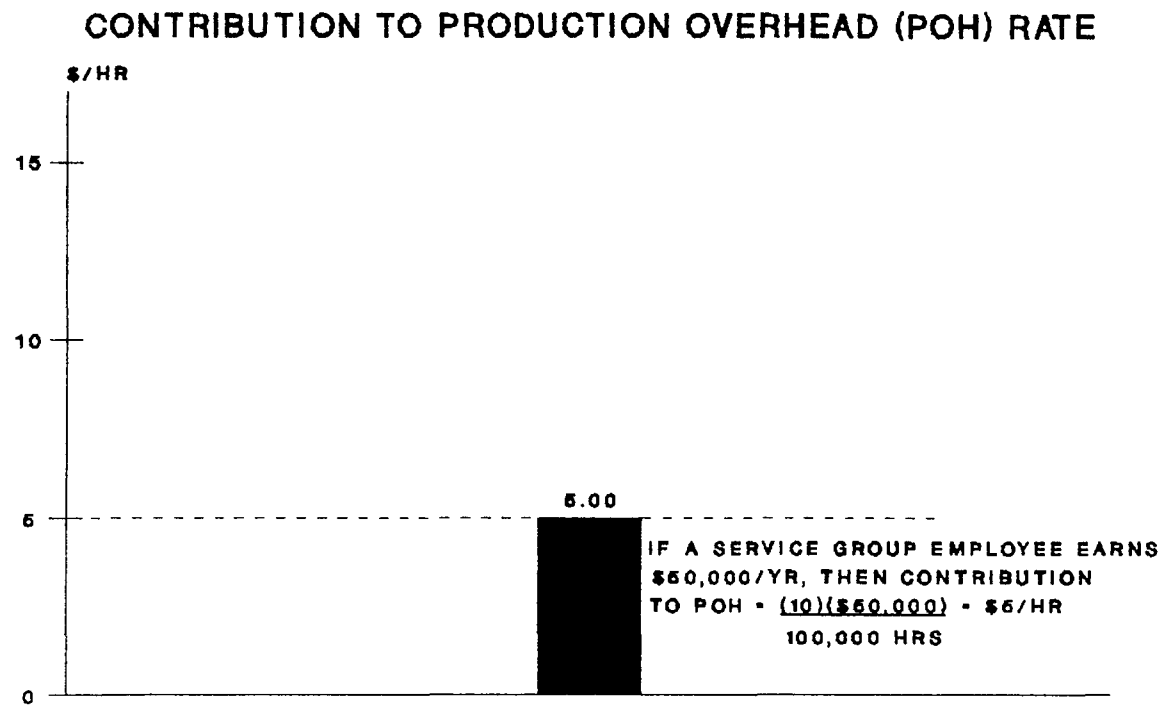
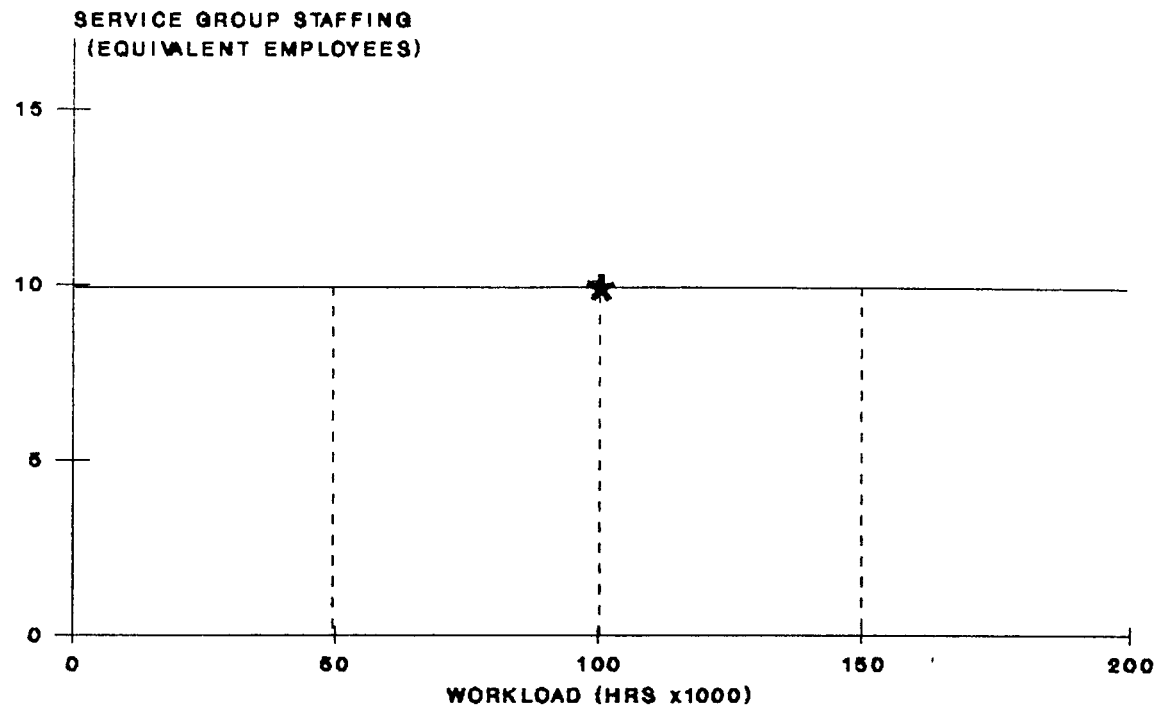




FIG. 10 - TRANSFER SUPPORT TO A PRODUCTION COST CENTER
(AS OF F-14A SDLM COMPETITION)



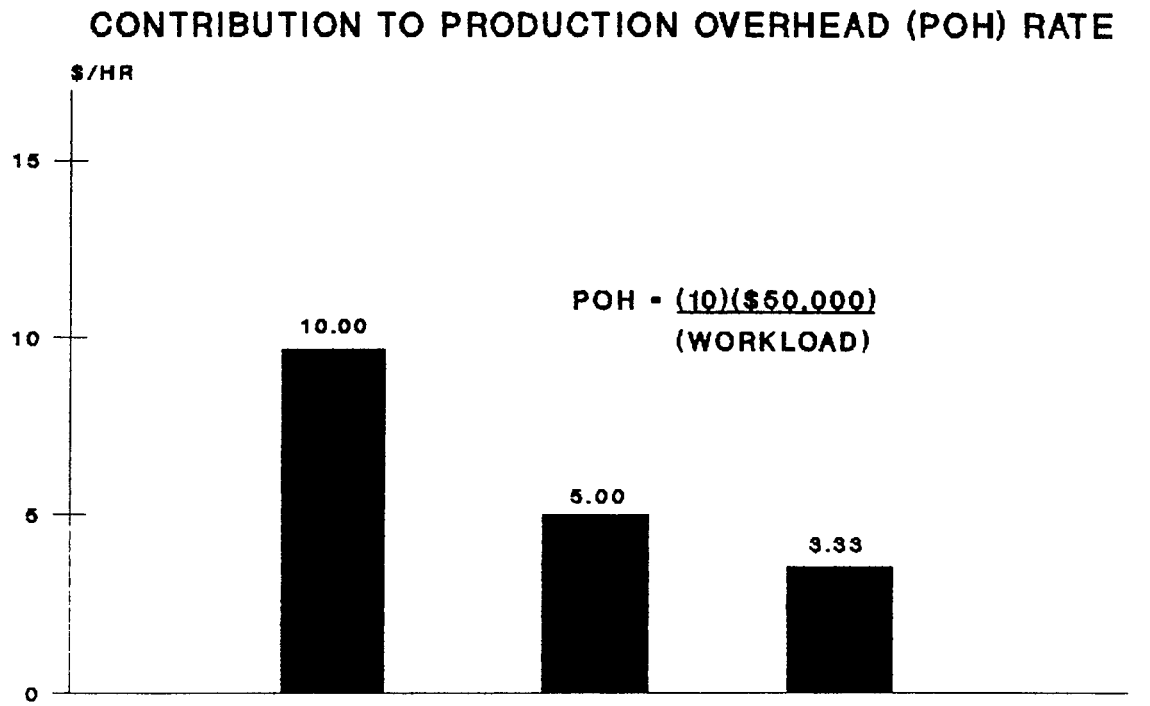
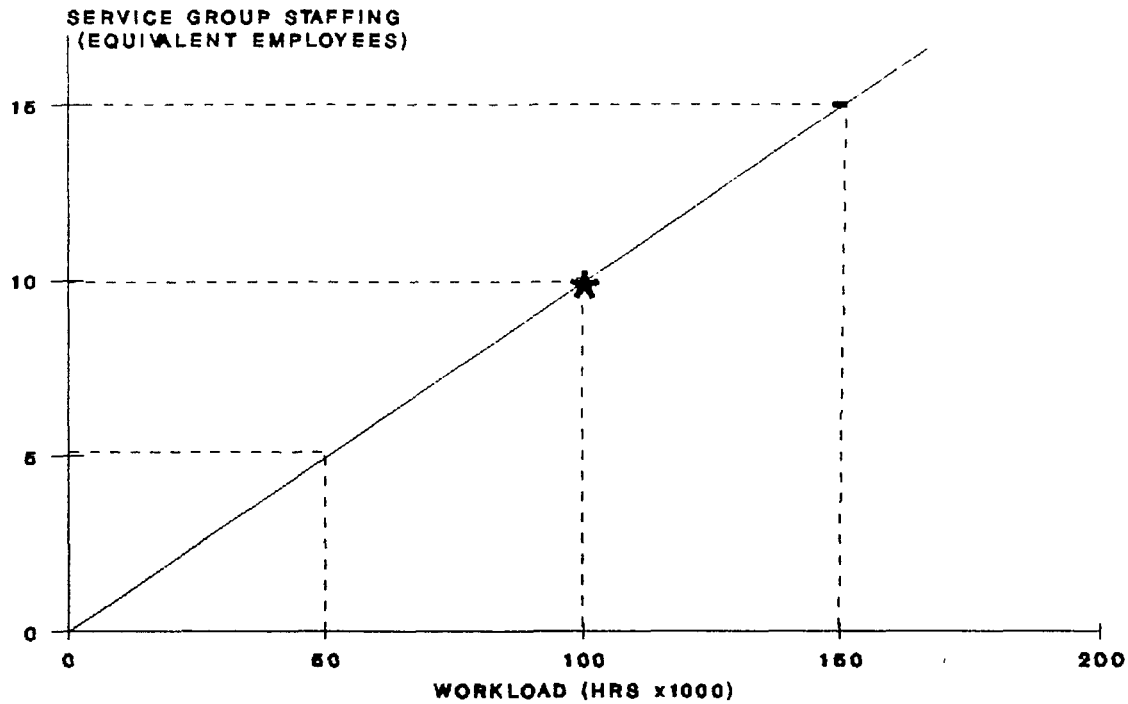




FIG. 11 - TRANSFER SUPPORT TO A PRODUCTION COST CENTER
(AFTER F-14A SDLM COMPETITION)



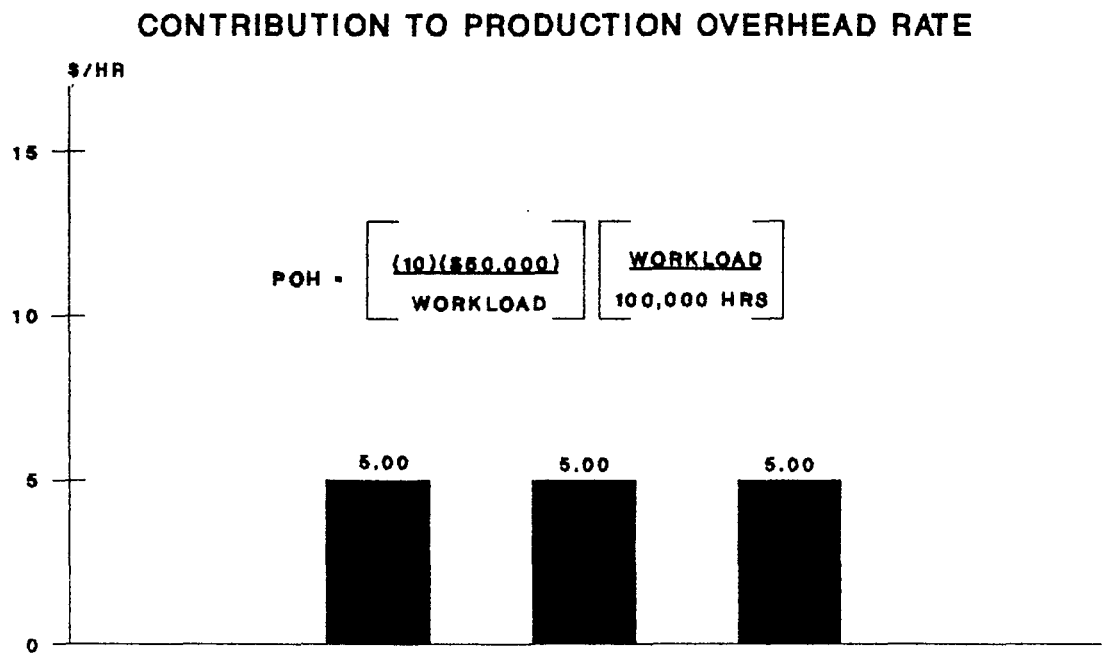




FIG. 12 - TRANSFER SUPPORT TO A PRODUCTION COST CENTER (DIRECTLY VARIABLE TRANSFER LEVELS)

Although the directly variable Transfer scheme solved the Production Overhead rate fluctuation problem, it was not accepted as the vehicle by which Transfer support levels should be determined. The reason for this was the realization that the levels of Transfer support agreed to during the negotiation process represented a variety of services. Some of these services were acknowledged as varying directly with workload shifts but others were not. To solve this problem the NADEP modified its negotiation process to recognize both fixed and variable services provided by the respective Service Groups. Accordingly, the negotiation form was modified to identify the fixed and variable Transfer services. (See Figure 13) Using the information obtained from the new negotiation forms, the NADEP then constructed a hybrid relationship between Service Group Transfers and the corresponding Production Department Cost Center's workload. This hybrid Transfer relationship and its impact on the Production Overhead rate are illustrated in Figure 14.

The creation of the hybrid Transfer scheme has resulted in two major benefits. First, as can be seen from Figure 14, it has succeeded in dampening the fluctuations in the Production Overhead rate. In addition, by incorporating the mathematical relationship between Transfer service levels and workload into the "Analysis Report" spreadsheets illustrated in Table 2, the NADEP has established a decision support system which can minimize, if not eliminate, the number of future face-to-face negotiations which must be conducted as the NADEP's workload rises and falls.

_____ SUPPORT OF _____

(SERVICE GROUP) (PRODUCTION C.C.)

| FUNCTIONS | FUNCTIONAL COST CLASS | MAN YEARS (1) | FUNCTION CODE (2) (A or B) |
|---|---|---|---|
| TRANSFERS (SUPPORTS THIS PRODUCTION C.C.) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| TOTAL (3) | | | |

FIGURE 18
(Sheet 1 of 2)

FIG. 13 - MODIFIED TRANSFER NEGOTIATIONS FORM (Sheet 1 of 2)

_____ SUPPORT OF DEPOT (OR OTHER SERVICE GROUPS)

(SERVICE GROUP)

| FUNCTIONS | FUNCTIONAL COST CLASS | MAN YEARS | FUNCTION CODE (2) (A or B) |
|---|---|---|---|
| G&A (SUPPORTS THE ENTIRE NADEP) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | TOTAL | | |

NOTES:

(1) To the nearest tenth of a man year

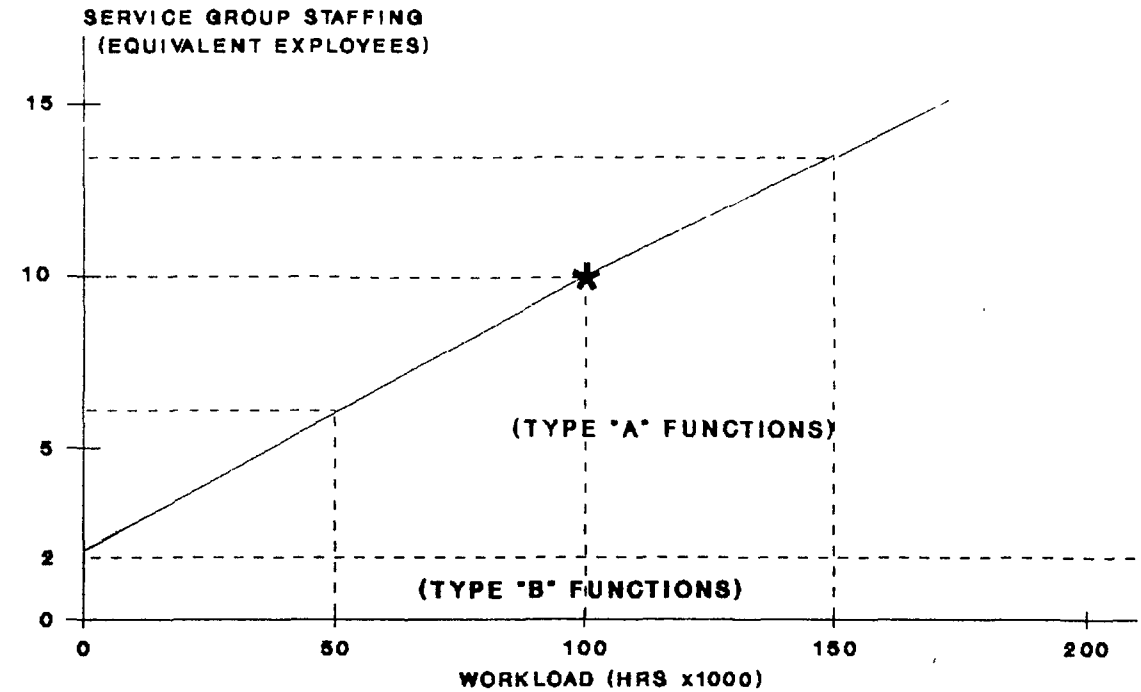
(2) Function codes (Pick the one code which fits best)

A. The Service Group's staffing for this function should rise and fall as the staffing, workload, or inductions fluctuate within the Production Cost Center.

B. The Service Group's staffing for this function is constant regardless of what happens to the Production Cost Center's staffing, workload or inductions.

(3) Unless otherwise agreed to, this figure will be inflated by 15% to cover supervision and clerical support in the Service Group

FIG. 13 - MODIFIED TRANSFER NEGOTIATIONS FORM (SHEET 2 of 2)



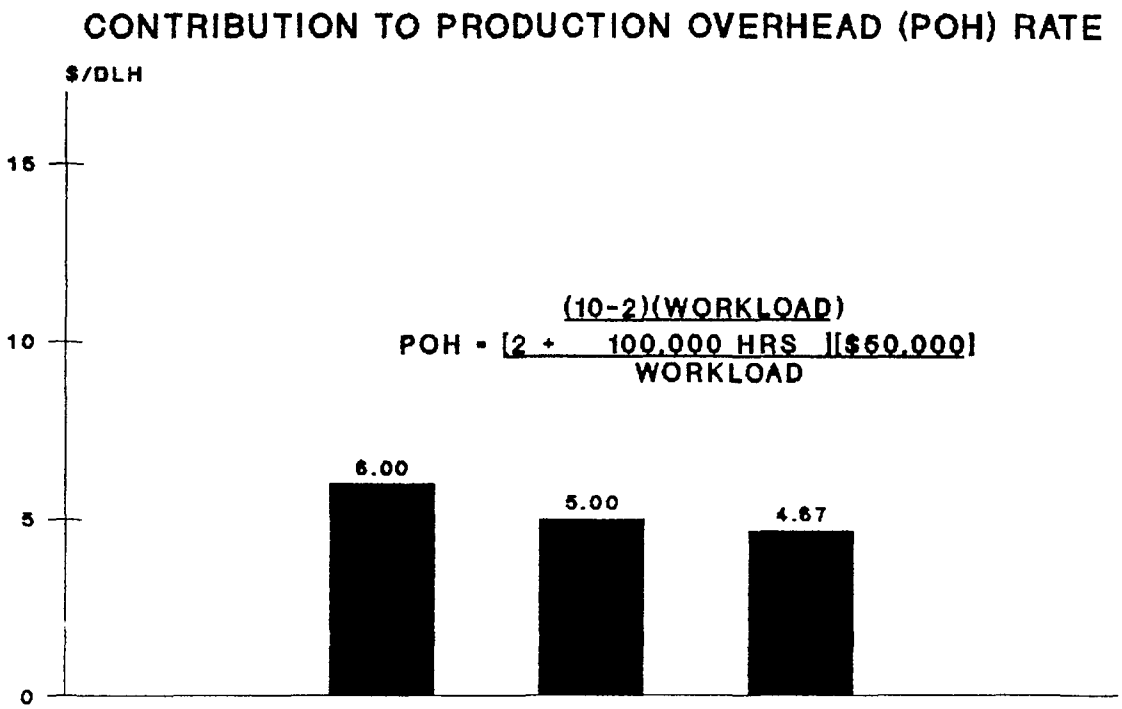




FIG. 14 - TRANSFER SUPPORT TO A PRODUCTION COST CENTER
(FIXED AND DIRECTLY VARIABLE TRANSFER LEVELS)

# CHAPTER 4

# RESULTS

The cost reduction methodology developed by NADEP Norfolk and documented by this case study yielded two basic categories of results - those general enough to be of interest to other businesses contemplating a cost reduction effort; and those unique to NADEP Norfolk which underscore the success achieved through the application of their methodology.

## General Results

1- **Emphasized customer-supplier relationships** - This was accomplished in two ways. First, the approach used by the NADEP illustrates the need to thoroughly review and understand exactly what the company's customers want. Giving them more than what they want, at a higher price, may result in the loss of many customers. Secondly, the case study demonstrates how a customer-supplier relationship can be developed within a company by setting up a negotiation process between Production Cost Centers (the "customers") and Service Groups (the "suppliers.")

2- **Solved the "Accounting Puzzle"** - To understand the cost reduction methodology documented by this case study requires little, if any, financial background. Therefore, it may serve as a good primer for those managers who need to develop a better understanding of the basic concepts related to the cost of running a business and producing

products or services. Furthermore, it may also serve as a good reference guide for a project leader tasked with directing a cost reduction effort similar to that undertaken by NADEP Norfolk - particularly if the project leader does not have a strong financial background.

**3- Created Decision Support Systems** - Analyzing the costs of operating a business requires access to substantial amounts of data. More importantly, however, this data must be assembled, digested and presented in such a way as to provide meaningful information upon which project leaders, managers and analysts can make sound financial decisions. This case study provides specific examples of Decision Support Systems developed to facilitate cost analysis at the NADEP. However, the formats presented herein are general enough to be adaptable to virtually any business.

**4- Broadened Ownership of "the process"** - Since the NADEP's cost reduction efforts involved employees representing such a broad cross-section of functional areas, general ownership of the resulting changes was enhanced. Therefore, since so many of the "key players" were involved in the applicable decisions to cut costs, the fingerpointing which so often accompanies the unexpected problems resulting from the changes, was minimized.

**5- Enhanced Internal Communication** - This was accomplished in several ways. By involving more people in the process of developing manhour estimates associated with applicable tasks, fresh approaches to the "old ways of doing things" were identified. Close working relationships were developed between employees who would be responsible for implementing and executing the changes agreed to during the cost

reduction evolution. From the labor rate side of the picture, as was mentioned earlier, the Transfer negotiation process forced the Service Group cost center managers to view themselves as "suppliers." This in turn raised the level of communication between the Service Groups and their corresponding "customers," the Production cost centers, in order to fully explain the full range of services provided by the Service Group and to sell the customer on the appropriate level of staffing required to provide the desired services. Furthermore, because of the increased emphasis being placed on costs and rates, there has been an increase in the communication between Production Department cost centers as each seeks new ways to reduce operating costs. By using the computer generated information provided by the "Cost Report," Production Department cost center managers and their staff assistants can quickly spot the most efficiently run cost centers and target them as good sources from which to learn how to make improvements in their own cost centers.

6- **Improved Efficiency** - By establishing a Command Work Center, the NADEP was able to significantly reduce the number of direct manhours charged to delayed or completed work by temporarily idled employees. Furthermore, it permits the reassignment of those temporarily idled employees to other tasks currently understaffed, or to low priority or low skilled tasks historically contracted out.

7- **Changed Focus** - The threat of losing work due to unattractive cost estimates, coupled with the NADEP's success in educating its managers in labor rate development, paved the way for a change of focus. Where managers had traditionally concentrated on such aspects as schedules, manhours, and indirect-to-direct manhour ratios, they now

focus on the net cost impact of virtually everything done within their cost centers - grade levels, charges to completed jobs, Transfer support, etc. Cost center managers are finally performing like cost center managers.

With growing pressure focused on cutting Defense spending, a commitment by Department of Defense activities to cut their costs of doing businesses is seen as a desirable alternative to reducing work assignments and laying off employees as has typically been the approach used in past efforts. Having prepared, and successfully competed, for a significant portion of its workload changed the focus of the NADEP to one which keys on the cost of doing business. A cost consciousness now exists which probably could not have been achieved without having gone through such an exercise.

**8- Eliminated Subsidization** - Through the break up of its large conglomerate cost centers, NADEP Norfolk was able to eliminate the subsidization of expensive functions by inexpensive ones. The NADEP is now in a position to pay the right price for the applicable function.

**9- Established Framework for Varying Service Group Staffing** - Prior to its exposure to competition, Service Group staffing levels were considered to be virtually fixed. Even when substantial reductions in assigned workload were realized, little change in Service Group staffing was seen, or even suggested. However, with the advent of the Transfer negotiation process and the Variable Transfer concept, the need for adjusting Service Group staffing has been highlighted and an appropriate Decision Support System has been developed to facilitate the identification of the appropriate levels of change.

**10- Established Systematic Approach** - Historically, cost reduction efforts conducted by the NADEP focused on short term improvements without developing methods by which costs and rates could be measured and monitored. Having developed Decision Support Systems to aid in cost reduction efforts aimed at preparing for F-14A SDLM competition, the NADEP now has tools in place to support future rate development and analysis efforts. In fact, the NADEP now evaluates major cost initiatives in terms of changes to labor rates and their resultant impact on the cost of completing its major repair efforts.

NADEP Norfolk has established quarterly reviews of cost center labor rates at which time cost center managers must be able to explain any deviations from their previous quarter's budget as well as defend any significant changes proposed for the succeeding quarter's budget. To support them in this effort each cost center manager has been assigned a Management Analyst (MA) who is responsible for continuously monitoring actual expenditures against the planned budget. Should deviations occur it is the responsibility of the MA to seek-out the source of the deviation and provide recommendations to his/her cost center manager as to how to correct the problem.

## Unique Results

In addition to the general results discussed above, several other results unique to the NADEP's effort will provide some insight into the level of improvement which might be achievable through application of the NADEP's methodology to other businesses. These unique results are summarized below.

1- **Reduced F-14A SDLM Cost** - Prior to posturing itself for competition the cost of an F-14A SDLM at NADEP Norfolk was approximately $1.8 million per aircraft. Since making the changes prompted by competition the NADEP is completing F-14A SDLMs at a cost of approximately $1.0 million - more than a 40% reduction.

2- **All Cost Center Rates Fell** - Even though subsidization was eliminated by breaking up the large conglomerate pre-competition cost centers, enough improvement was made in reducing overhead expenses that every new cost center's rate was lower than the composite rate which existed in its parent cost center before it was broken up. (See Fig. 15).

3- **All Program Costs Fell** - Because the NADEP chose to take a systems approach to its cost reduction efforts, by reducing its individual cost center rates, the cost of all programs supported by these cost centers fell. This helped NADEP Norfolk achieve cost savings of $173 million over the last three years.

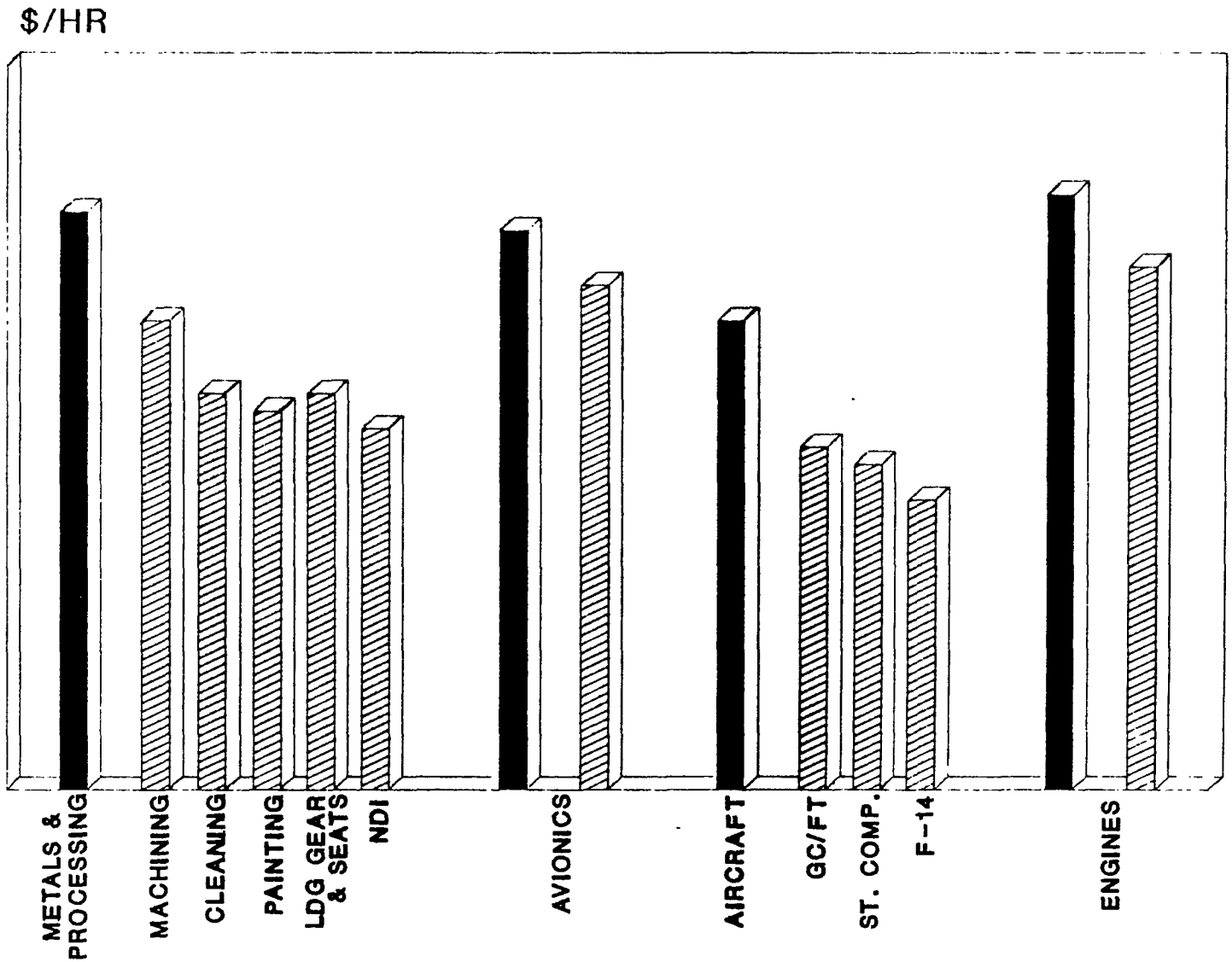



Fig. 16 - Cost Center Rate Comparison
(Before & After Competition Initiatives)

# CHAPTER 5

## SUMMARY AND FURTHER RESEARCH

In general, the NADEP's cost reduction efforts paid big dividends - both tangible and intangible. Costs were reduced, the accounting puzzle was solved, communication improved and the NADEP's customer focus was enhanced. However, as might be expected in a task of this magnitude, the potential for further improvement seems likely. In an effort to simplify the Transfer process the NADEP only considered Transfers from Service Groups to Production Cost Centers and chose to ignore Transfers between Service Groups. Robert Brown and Larry Killough (1988) describe this approach as the direct method of cost allocation. They warn, however, that this method frequently represents an oversimplification of the process, thus leading to distorted allocations. As a result, "there are many instances where management decisions are made, contract amounts paid, funds awarded, and results reported based on cost figures that contain substantial amounts of allocated costs. In many of these cases, the allocated costs are not correct because the proper allocation procedures were not used." In view of these potential pitfalls more study needs to be conducted in order to evaluate the decision not to transfer costs between Service Groups.

John Sheridan (1988) suggests that there needs to be a cause-and-effect relationship between overhead expenses and a company's products. He suggests that allocating overhead to the product, rather

than the manhours expended to process the product, will result in more accurate allocations. Due to the fact that most of what the NADEP does involves repair rather than manufacturing may mean his suggestion has little application for NADEP Norfolk. Nevertheless it should be thoroughly evaluated before being discounted.

The Variable Transfer methodology discussed in Chapter 3 is, at present, still "on the drawing board." Implementation is planned but this may lead to unforeseen problems. The NADEP needs to press on, "work out the bugs" and refine its process of upsizing and downsizing its Service Group staffing as direct workload assignments vary.

This case study concentrates on the mechanics of conducting a cost reduction effort. In view of the changes potentially brought about by such an effort, further research (perhaps another case study) into the behavioral aspects associated with these changes would be desirable. Some of the NADEP's managers appeared threatened during the course of the development and application of the methodology documented herein. Knowing better what to expect in the way of reaction to the changes brought about by the application and implementation of this methodology would help to prepare the cost reduction project leader for dealing with those managers who might feel threatened by the changes.

Finally, further study into ways to motivate managers to make changes in the absence of the threat faced by the NADEP would also be desirable. Despite the dramatic accomplishments documented by the NADEP, the level of enthusiasm exhibited by other organizations toward the adoption of the NADEP's approach has been relatively low. Informal feedback suggests the reception of the NADEP's approach suffers from the "not invented here" stigma as well as the attitude that, though

implementation of the process has some potential benefits, it involves too much work and "we like business as usual." Achieving wider acceptance for the NADEP's methodology will require the identification of ways to break down these barriers of resistance.

The U.S. Navy has achieved significant cost savings by exposing some of its traditionally noncompetitive major maintenance work to public/private competition. Because of its success, the potential for further public/private competition for Naval maintenance work is very high. Furthermore, as the resultant success stories spread throughout the government, more and more agencies are likely to explore the merits of public/private competition. The methodology documented by this case study provides a framework by which other government agencies can prepare for what appears to be an inevitable exposure to competition. Those agencies faced with this prospect would do well to anticipate the "opportunity" afforded by competition by applying the methodology documented by this case study to enhance their cost effectiveness and competitive position.

## BIBLIOGRAPHY

1. Brown, Robert M. and Larry N. Killough. "How PCs Can Solve the Cost Allocation Problem." Management Accounting, November 1988, pp. 34-38.

2. Brunton, Nancy M. "Evaluation of Overhead Allocations." Management Accounting, July 1988, pp. 22-26.

3. Collender, Stanley. (Director of Federal Budget Policy) - in remarks made during a presentation to the "Capitol Hill Workshop," Oct 3, 1989.

4. Friedrichs, Jurgen and Harmut Ludtke. Participant Observation. Lexington, Massachusetts; Lexington Books, D. C. Heath & Co., 1975.

5. Hoshower, Leon B. and Robert P. Crum. "Controlling Service." Management Accounting, November 1987, pp. 44-48.

6. Richmond, Tom. "Talking Cost." INC, February 1986, pp. 105-108.

7. Rutherford, Jack. "Ten Ways to Take the Pain Out of Cost Cutting." Working Woman, February 1989, pp. 20-22.

8. Sheridan, John H. "Attacking Overhead." Industry Week, July 18, 1988, pp. 49-55.

9. Tatikonda, Lakshmi U. "Production Managers Need a Course in Cost Accounting." Management Accounting, June 1987, pp. 26-29.