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A STRATEGY FOR IMPROVING OVERHEAD COST CONTROL

April 1983

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A STRATEGY FOR IMPROVING OVERHEAD COST CONTROL

EXECUTIVE SUMMARY

Prices for aircraft acquired from manufacturers by the Naval Air Systems Command (NAVAIR) on a noncompetitive basis are established by negotiation. Overhead costs, the costs necessary for the overall operation of a business but not readily identifiable to a particular contract, account for roughly one-third of those prices. While overhead costs are essentially within the control of the individual contractors, many Navy acquisition managers believe that they are not effectively controlled and that as a result, naval aircraft prices are too high.

To influence the level of overhead costs, NAVAIR personnel must be able to forecast, negotiate and monitor overhead costs incurred by NAVAIR's contractors. The negotiation process is fragmented, extremely complex and in need of objective norms for determining the reasonableness of proposed overhead costs.

To alleviate these problems, we offer four recommendations. Each is preceded by statement of the finding to which it responds.

- The current division of responsibility between NAVAIR headquarters personnel and NAVAIR field personnel for negotiation of contractor overhead rates creates unnecessary impediments to effective negotiation.

We recommend that NAVAIR create a centralized office to coordinate all NAVAIR activities relating to overhead costs of major aircraft contractors.

- The opportunities for training and the availability of training aids are inadequate for preparing personnel to forecast, negotiate and monitor contractors' overhead costs.

We recommend that NAVAIR increase opportunities for training of personnel involved in overhead determinations, and take action to update and provide the DoD-NASA "Guide for Monitoring Contractor's Indirect Costs" to all such personnel. - Existing forecasting and negotiating tools and techniques are not sufficient for NAVAIR negotiators to deal with this complex process.

We recommend that NAVAIR sponsor a research program to provide additional tools and techniques for use in forecasting and negotiating overhead costs.

- The requirement for initiatives that require a unified Navy or DoD position limits NAVAIR's effectiveness in negotiating overhead.

We recommend that NAVAIR seek Navy or Defense Department approval of such initiatives as contracting with industrial engineering firms to examine contractor overhead functions and developing a Navy or DoDwide policy on the extent to which contractors' wage packages will be recognized in contract pricing.



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1. INTRODUCTION

Overhead costs constitute a significant portion of the contract prices for naval aircraft. As part of the overall contract price negotiations, Naval Air Systems Command (NAVAIR) personnel must be able to forecast, negotiate and, to some extent, influence the level of these costs incurred by NAVAIR's contractors and allocated to its contracts. Since overhead costs are within the control of the individual contractors, NAVAIR negotiators' concerns regarding these costs are first, to motivate the contractor to exercise sufficient controls so as to keep overhead costs at the lowest reasonable level and second, to include in contract prices overhead costs projections that are reasonable and properly allocable to those contracts. Many DoD acquisition managers believe that defense contractors' overhead costs are not effectively controlled and, as a result, prices for defense items may be higher than necessary.

NAVAIR negotiators have few tools to use when forecasting and negotiating the amount of overhead costs to be included in noncompetitive prices for naval aircraft. Literally hundreds of functions are included in overhead cost accounts. Many overhead costs are to a large extent discretionary, for example, those reflecting management planning and timing for introducing new products or penetrating new markets. Other categories of overhead costs are allocations from corporate offices, outside the control of the contracting entity. Few objective norms exist for determining the reasonableness of proposed overhead costs. The primary techniques and procedures used for determining acceptable forecasts of overhead costs are described below:

- <u>Budgetary analyses</u>. A contractor's plan to incur overhead costs is prepared, accepted and monitored as part of his budget process.

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Analysis of that budget process can provide an indication of the reliability and reasonableness of proposed overhead costs.

- Industrial engineering analyses. Government personnel cognizant of contractors' operations generally include industrial engineers who provide professional advice on the adequacy and reasonableness of proposed staffing for many overhead-type functions.
- Government audit reviews. Individual cost items in proposed overhead plans are reviewed by Government auditors to verify their allowability under existing cost principles. The allocability of such costs to Government work is also verified. To a much lesser extent, auditors can assess reasonableness, although challenges to reasonableness of overhead costs are rarely sustained.
- Projections from previously incurred costs. A high level of confidence comes from comparing proposed cost levels to the previous levels incurred. For many overhead costs, previous experience is a very realistic measure of probable future costs (e.g., scrap ratios, production planning). For others, previous experience may be much less of an indicator of future expenditures (e.g., maintenance, computer services).

The process by which overhead costs are allocated to individual contracts is complex and varies from one contractor to another. The task of the NAVAIR negotiator is complicated by factors such as:

- The complexity of contractors' accounting systems which often include numerous overhead cost pools and a multiplicity of bases for allocating overhead costs.
- The fact that aircraft contracts may take three or more years to perform, necessitating forecasting of business volume and overhead cost levels that far into the future.
- The time pressures which accompany annual purchases of aircraft and the need to award contracts promptly, but limited availability of people to perform adequate analyses of proposed costs.
- The cost-based profit policy of DoD which provides no incentive to contractors to reduce the costs of performing contracts, and which, in fact, may encourage contractors to keep costs at levels high enough to maintain desired profit objectives.

Significant efforts were made in some prior years to assure that overhead costs were effectively controlled at the contractor level and that Government procurement personnel had adequate tools for use in determining the amounts of overhead costs to be included in individual contract prices. Current concerns indicate a need for renewing such efforts to accomplish these objectives. Descriptive comments about a number of publications that could be useful to NAVAIR in negotiating and monitoring overhead costs are included in Appendix A.

2. AREAS FOR IMPROVEMENT

The process by which NAVAIR personnel establish the amount of overhead costs to be included in contract prices involves a significant number of factors, all of which may influence the final result. An analysis of the major factors involved in that process led to identification of areas where improvements appear possible. These areas are organization, personnel, negotiating tools and techniques, and acquisition policy.

ORGANIZATION

Current DoD policy is for the Administrative Contracting Officer (ACO), in this case, the NAVAIR plant representative, to negotiate forward pricing rate agreements (FPRAs) for overhead costs whenever a significant volume of contractor pricing proposals is expected to be processed. This situation prevails at the NAVAIR aircraft contractors' plants where one or more major procurements occur each year and result in hundreds of supplemental transactions for spare parts, publications, specification changes, special handling equipment, technical services and the like. The major procurements are negotiated by headquarters personnel and the supplemental transactions are negotiated by field personnel.

The headquarters personnel are not required to use an FPRA. In some instances, the negotiation of an FPRA may not be concluded in time for use in a major procurement action, thus the headquarters negotiator must forecast and negotiate overhead rates for use in that specific procurement. Once this happens, the contractor has little incentive to reach an agreement with the ACO on an FPRA for use in pricing the numerous field transactions (which are the ACC's responsibility), because contract procedures allow the contractor provisional payment for such work even though firm prices are not established.

PERSONNEL

In addition to split responsibility in the overhead rate negotiation process, the ACO's responsibility for other contract administration functions and the lower personnel grade structure of the ACO's offices tend to reduce both the time and the talent available to complete this process. Further, the ACO is generally perceived to be at a disadvantage at the negotiating table where NAVAIR field personnel are pitted against high-level corporate officers.

Recognizing the need for proper training of personnel responsible for overhead cost negotiation and monitoring, DoD offers an indirect cost monitoring course through the Air Force Institute of Technology. Scarce training and travel funds tend to limit the access of NAVAIR personnel to this course.

In 1975, the DoD issued its "Guide for Monitoring Contractors' Indirect Costs." This guide serves as a basic desk tool for the Government person dealing with any or all aspects of contractor overhead costs. It is a particularly useful <u>educational</u> <u>tool</u> for new personnel. Yet it is out of print and, because of changed circumstances in both business and Government policies and procedures, it is also out of date.

NEGOTIATING TOOLS AND TECHNIQUES

As noted previously, few tools are available to assist the NAVAIR negotiator in forecasting and negotiating the amount of overhead costs to be included in noncompetitive prices for naval aircraft and related items. To forecast overhead rates it is necessary to determine the probable reasonable level of expenditure for a large number of indirect functions and the probable business volume over the period(s) of time during which contract performance will take place.

Establishing the volume of business and, thereby, the base over which overhead costs are spread to determine overhead rates is an area of major difficulty in forecasting and negotiating overhead. The lower the business volume forecast, the higher the overhead rate; the higher the volume, the lower the rate. Since the rate determines the amount of overhead allocated to each portion of work as it is individually priced, accuracy in forecasting volume is highly desirable. Current practice does not pr de for recording or measuring the historical accuracy or reliability of eit or the contractor or the NAVAIR negotiator in the performance of this functic

In addition to the large number of cost accounts and the frequently large number of subdivisions of the business base (e.g., manufacturing labor, engineering labor, tooling labor, material, etc.) the forecaster must consider the degree to which each cost account may vary in response to changes in various elements of the business base. While the cost of labor benefits may vary in an almost constant ratio to increases in the direct labor cost base, the cost of operating the accounts payable office will almost certainly not vary in a direct ratio to purchases. Calculations of the potential changes in fixed, variable and semi-variable costs as a result of changes in the total, or in the mix of the various pieces of the business volume base, are so numerous and complex as to make automated assistance mandatory. Earlier attempts to forecast overhead cost levels, using previous cost experience and degrees of variability of costs, have led to extremely complex automated programs. Universal models have not proven to be useful. Models of individual contractor costs may be of significant assistance in forecasting overhead rates.

All forecasts that start with previously incurred costs are based on the assumption that these costs were reasonable and necessary. An objective norm

or standard is needed for assessing the reasonableness of proposed overhead costs. In a study performed in 1963, McKinsey & Company proposed a system for intercompany functional head count comparisons. Using a list of approximately 200 separate manpower classifications developed by the aerospace industry, McKinsey grouped the classifications according to logically separate work assignments. This classification system used detailed definitions of the kind of work performed by each functional class. McKinsey combined the detailed manpower categories into 27 functional groupings and devised a meaningful measure of work performed in each function. The study recognized that the volume of work reflects managerial policy and technical differences that cannot be completely eliminated but that can be minimized. This is done by converting head counts to a ratio relating number of personnel in a function to the volume of work in that function. Intercompany comparisons of the ratios can provide a measure of objectivity in reviewing proposed overhead costs. For example, a significant variation between contractors in the ratio of numbers of people in the purchasing function to dollars of material purchased would indicate a need for further investigation to determine if inefficiency or overstaffing might be the cause. The disposition of this study is unclear. It is somewhat out of date, but the concept appears to warrant further consideration now.

The uncertainty inherent in forecasting business volume for defense contractors appears to be a major obstacle to prompt conclusion of overhead rate negotiations. Development of a contractual arrangement that would allow the contracting parties more protection for variations in the overhead rates due to changes in the business base might remove this impediment and expedite conclusion of overhead rate negotiation.

The use of a cost-based profit policy, combined with the long-standing practice of basing overhead forecasts on historical cost experience, provides

contractors with a negative incentive for reducing overhead costs. A contractual mechanism could be developed for use in conjunction with firm-fixedprice contracts to provide contractors an incentive to reduce overhead costs. ACQUISITION POLICY

Some possibilities for improving overhead cost control have implications beyond NAVAIR's contracting community. One technique for determining reasonableness of overhead costs uses industrial engineering personnel to review a contractor's staffing or operation plans. Only limited numbers of industrial engineering personnel are available to NAVAIR, but it may be possible to contract for outside industrial engineering assistance to review the contractor's operation.

Currently, the amounts of contractors' wage and benefits packages are viewed as a pass-through to the Government. Recent studies by the Office of the Secretary of the Air Force and the Air Force Systems Command indicate these costs may not be realistic, but they are rarely challenged. It may be appropriate for the DoD to advise contractors that the portion of wage and benefits packages which DoD considers excessive will not be included in pricing noncompetitive contracts.

3. STRATEGY

In the previous chapter we have identified the areas where improvements appear possible in the process of forecasting, negotiating and controlling overhead cost. To accomplish these improvements, a strategy consisting of the following elements is proposed:

- 1. An organization change to elevate coordination of all NAVAIR activities relating to major aircraft manufacturers' overhead from the field level to the headquarters level.
- 2. An educational program to provide all NAVAIR personnel involved in overhead cost forecasting, negotiating and monitoring with the formal training currently available in DoD.
- 3. A research program consisting of discrete areas of investigation to be conducted by NAVAIR, by the Naval Postgraduate School, Monterey, or by outside contractors, as deemed appropriate, to provide better forecasting and negotiating tools to NAVAIR personnel.
- 4. NAVAIR-sponsored initiatives to the Navy or DoD secretariat on major policy changes to improve NAVAIR's position in negotiating overhead costs, which may have significance beyond NAVAIR.

The actions necessary to execute this strategy are set forth below. The time span for execution of the strategy will depend on the financial and personnel resources available to NAVAIR. The estimated length of time and the level of effort needed to accomplish the research tasks are given following each research task.

1. Create a NAVAIR office, within the contracts group, for centralized coordination and control of all actions relating to forecasting, negotiating, monitoring and controlling aircraft contractors' overhead costs.

Whether full- or part-time personnel assignments are used to staff such an office, its charter should include: (a) the gathering and maintenance of aircraft contractor overhead data; (b) providing assistance, when appropriate, to field personnel in overhead negotiations and providing a headquarters presence in those negotiations as warranted; (c) providing an exchange of data between field offices on approaches to dealing with overhead rate negotiations problems; (d) coordinating the timing of overhead rate negotiations between headquarters and field personnel to minimize duplication of efforts; and (e) initiating and coordinating research efforts and other actions to improve NAVAIR's ability to forecast, negotiate and influence the levels of contractors' overhead costs.

- 2. Make maximum utilization of the DoD Indirect Cost Monitoring Course. Request Naval Material Command to take action to have the DoD "Guide for Monitoring Contractors' Indirect Costs" updated and reissued. (In the interim, DLA's Contract Overhead Management Office has copies of this guide that might be reproduced for use by NAVAIR personnel.)
- 3. The following research tasks are recommended:
 - Identify for NAVAIR aircraft manufacturers the driving explanatory variables for the major overhead cost accounts. Develop standardized regression analysis techniques for predicting the effects on cost accounts of changes in explanatory variables. Investigate the potential for using the ratios of explanatory variables to cost accounts for intercontractor comparisons as measures of the reasonableness of proposed costs or of the relative efficiency of contractors in performing various indirect functions. (Assign to: Naval Postgraduate School Monterey (NPG) or an outside contractor. Estimated level of effort required: 6 person months.)
 - Establish a system for measuring the comparative historical accuracy of the business base forecasts made by each major aircraft manufacturer and the cognizant NAVAIR negotiator for each prospective annual overhead rate negotiation. (Assign to: NAVAIR Overhead Control Office or NPG. Estimated level of effort required: 3 person months.)
 - Explore the feasibility and practicability of updating the McKinsey & Company functional head count comparison technique for use in evaluating the relative efficiency and reasonableness of aircraft manufacturers' proposed indirect staffing and other indirect costs. An exploratory phase is necessary as much of the underlying data may be out of date and/or no longer available. This investigation should be directed towards determining (a) whether the McKinsey approach can be updated and used; or (b) whether a similar but modified technique can be developed using the basic concept of functional head count comparisons. (Assign to: NPG or an outside contractor. Estimated level of effort: Exploratory phase, 4 person months; update McKinsey approach, 15 person months; develop modified approach, 20 person months.)
 - Develop a contractual mechanism that will eliminate the risk to both parties from changes that occur in the volume of business used to establish overhead rates. This proposal envisages a separate contractual arrangement negotiated annually as part of the overhead rate negotiations. It would establish a formula by which the amounts included in contract prices for overhead would

be adjusted annually to compensate for variations in overhead rates caused by differences between forecast and actual business volume. (Assign to: NAVAIR Overhead Control Office. Estimated level of effort required: 6 person months.)

- Develop a contractual mechanism that will offer contractors an incentive to reduce overhead costs. This proposal would build on the foregoing. It would offer contractors rewards or penalties for improvement or degradation of performance in managing overhead costs as measured from negotiated target overhead costs. (Assign to: NAVAIR Overhead Control Office. Estimated level of effort required: 4 person months.)
- 4. Prepare position papers for submission to the Chief of Naval Material (CNM), requesting CNM either approve or seek OSD approval for those initiatives for influencing overhead costs which have policy implications of such a nature that NAVAIR alone should not attempt to introduce them. At this time, two such initiatives appear warranted. First, to contract with industrial engineering firms, as a supplement to NAVAIR's in-house capabilities, to assess the reasonableness of NAVAIR's aircraft manufacturers' proposed staffing of major overhead functions. Second, to develop a DoD-wide policy on the extent to which the aircraft manufacturers' employee wage and benefit packages will be recognized in contract pricing.

The timing for the execution of this strategy will depend on the personnel and financial resources available for application to the necessary actions. A proposed time schedule is set forth in Figure 1.

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APPENDIX A

RELEVANT DATA SOURCES AND LITERATURE

DATA BASES

Irrespective of any new methods or techniques that might become available for use in improving overhead cost control, historical cost data for individual contractors, for the aircraft industry and possibly for other segments of the economy all have value for overhead cost calculations. The only uniform data base which could provide a useful tool in NAVAIR overhead determination is that provided by the Contractor Cost Data Reporting (CCDR) System. Some refinements in the detailed data provided by CCDR's Form 1921-3 may be warranted, but the existing data can and should be placed in computer storage to facilitate automated processing of these data and enhance their utility in overhead negotiations.

LITERATURE

The problem of how to influence or control costs under noncompetitive contracts is inherent in DoD contracting. Reasonable bases exist for estimating what the direct costs of an item should be, and many efforts have been made to develop similar tools for indirect costs. While none has been particularly successful to date, the knowledge gained from such efforts is worthwhile if only to help avoid previously discovered pitfalls.

Besides overhead, the relationship between the Government and the contractor in connection with indirect costs has been studied. These studies range from emphases on audit-type reviews of incurred cost, through "surveillance" and review of contractor management practices, to negotiating techniques. Studies about the contractual relationships also include various proposals for techniques by which contractors could be given more appropriate incentives to control indirect costs.

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There also are studies dealing specifically with aircraft manufacturers. A large group deals with actual costs. Various analytical techniques have been used to develop cost-estimating relationships by which the cost of new airframes or engines can be predicted even before they have been fully developed. Finally, studies of some airframe manufacturer overhead costs deal with specific companies and specific times.

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The following notes describe a number of the more relevant papers considered in the development of this report:

Ebert, Walter, "Negotiation of Contractors' Overhead Costs," Air War College Professional Study No. 4115, November 1970.

This paper emphasizes that there are five main functions: (1) pricing of proposals, (2) review of incurred costs, (3) review of management practices, (4) advance agreements, and (5) settlement of final overhead rates. The study deals primarily with the potential advantages of a single manager for all these overhead-related functions. The study analyzes organizational implications of various possible solutions.

Gambrill, Jack, with Wayne Brothers and Eugene Schwartz, "Direct Cost Estimating Model," February 1974.

The PIECOST program develops estimated overhead, but only after it has been given estimates for relevant direct cost measures. This paper describes a specific computer program for providing the needed input values. It has separate phases for head count projection, historical comparison, turnover evaluation, rate projection, direct material and cost of sales.

Jones, Thomas, and Volpe, Richard, "An Analysis of Forward Pricing Rates and Their Effectiveness in Indirect Cost Management," Masters Thesis at AFIT, June 1978.

This study covers (1) contractor-proposed rates, (2) negotiated FPRAs, and (3) actually incurred overhead rates. Rates were studied for three years, for five types of overhead pools, and at 15 AFPROs. There was no statistically significant tendency for any particular differences between proposed rates, negotiated rates, and actually incurred rates. The authors conclude that these findings show lack of effectiveness in the "monitor" function.

Kaitz, Edward & Associates, Inc., "Overhead Costs and Rates in the U.S. Defense Industrial Base," October 1980.

A comprehensive collection of data for 72 industry groups, for the period 1961-1977. "Overhead" is defined as sales less the sum of direct labor and direct material costs. (Direct labor costs are wage payments to production-line laborers, including pay for time not worked.) "Overhead"

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thus includes engineering labor, profit, and the costs of contractual services. Overhead rates (overhead cost divided by direct labor costs) reported in this publication should not be misunderstood as comparable with overhead rates derived by other techniques. The overhead rate, as defined here for the aircraft industry, went up from about 200 percent to about 300 percent over the period studied, while the "labor intensity" (direct labor cost as a percentage of sales) in the aircraft industry dropped from about 20 percent to about 15 percent.

Lynch, Patrick J., and Pace, John M., "An Analytical View of Advance Incentivized Overhead Agreements in the Defense Industry," Masters Thesis at AFIT, September 1977.

Interesting analysis of concepts related to incentive-type advanced agreements on overhead. Contains a good summary of history, including PIECOST and MODE (Monitoring Overhead through Discrete Evaluation). The particular proposal considered involves creation of a special fund to be used by the ACO to pay any incentive awards earned and to collect the penalties for overruns. The analysis recognizes risks of year-to-year gaming, problems of application where there are other incentives in the contract, and other possible weaknesses. Report includes an impressive bibliography.

Martinson, Otto B., "Classification System for Indirect Costs of Defense Contractors," U.S. Air Force Academy, July 1969.

This thesis develops a grouping of eleven categories of indirect cost, defined in terms of object of expenditure. After considerable work with individual aircraft company accounting systems, actual cost data were analyzed. Specific cost estimating models were developed.

McKinsey & Co., Inc., "Strengthening Overhead Cost Management in the Air Force Systems Command," June 30, 1965.

An excellent study on possibilities for strengthening overhead cost management in the Air Force Systems Command. A major feature is a specific proposal for intercompany comparisons. This 1965 report is still timely. Chapter 2, which deals with efforts to identify opportunities for cost reductions, says the need exists because of: (1) absence of standards for evaluating overhead costs, (2) evidence of selected major opportunities for improvement, and (3) manpower shortages in the Government. The need still exists. The comparison technique suggested is based largely on head counts rather than dollars, and the key measurements do not depend on the contractor accounting system. Report also includes consideration of contractor motivation.

Talley, Dorsey, "Dollar Rewards From an Innovative Approach to Management," in Defense Management Journal, page 52, January 1978.

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A summary of the Air Force's approach to the cost monitor function. Because the AFPRO staff cannot review everything in detail, the effort is toward a systems approach, to understand how much reliance can be placed on the contractor's management attention. The shift to cost avoidance (from after-the-fact disallowance) is reported to be effective. Wynn, Franklin, "Examination of USAF's Policies for Controlling Contractor Overhead Costs," Research Paper at Air University, May 1975.

This survey comments on the shift from after-the-fact reviews to cost avoidance, and also on the decentralization of some responsibilities from Tri-Service Negotiators to the AFPROs.

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