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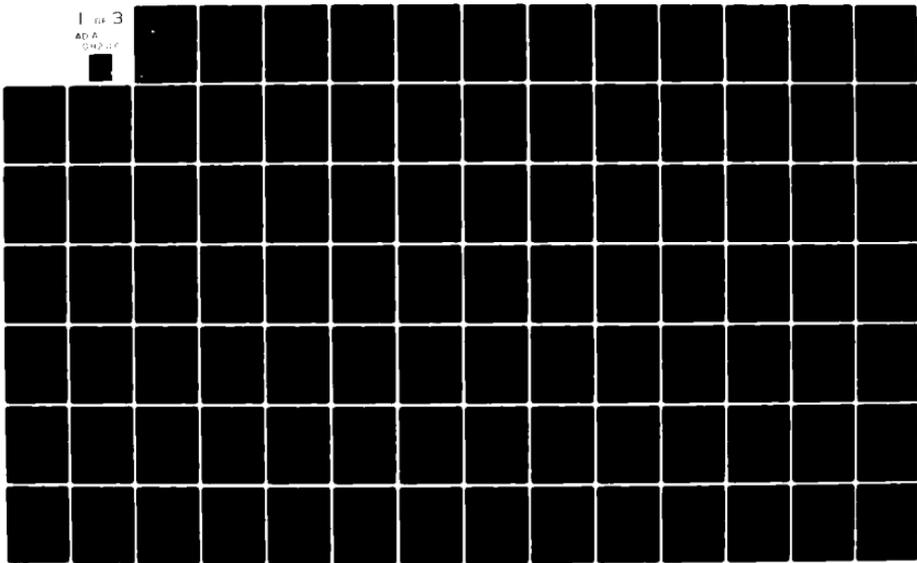
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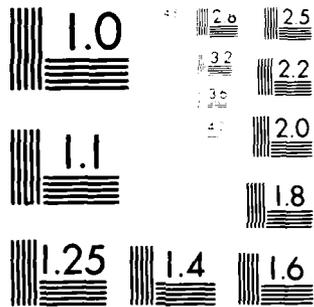
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2. The study identified those methodologies which have the greatest promise for use in determining officer manpower requirements for ships and aviation squadrons. Implementation of the alternatives described in the text should provide a systematic, standardized, and defensible mechanism for use in the determination process.

C. A. H. Trost

C.A.H. TROST
VICE ADMIRAL, U.S. NAVY
DIRECTOR, NAVY PROGRAM PLANNING

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The officer requirements study examined methodologies for determining officer requirements in the Navy, DoD, other government agencies, and private industry. Very few relevant methodologies were found to exist. Nonetheless, eleven alternative methodologies were developed, and a series of recommendations were presented to solve the officer requirements problem.		

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EXECUTIVE SUMMARY

The CNO Studies and Analyses Program (CSTAP) study, Development of Officer Requirements, was initiated as a result of concern for the defensibility of the methodologies used for determining officer requirements in the Navy. The first step in addressing this problem was the examination of the Armed Forces, other areas of government, and industry to locate any relevant methodologies previously developed which might be adapted for Navy use. Only methodologies which would effectively determine manpower requirements at the unit level of ships and aviation squadrons should be considered.

The data collection phase of the study involved the Navy, Air Force, Army, Marine Corps, Coast Guard, several foreign Navies, many other departments and agencies of government, and private industry. The results of the data search were limited; only a few techniques were identified which were useful to the Navy application. Only one relevant methodology which had been tested and was operational was located. Using this methodology and a series of other techniques and proposed approaches to the problem, eleven alternatives were developed for consideration by the CSTAP Working Group.

Using a scoring technique developed for use in this study, all eleven methodologies were evaluated by the members of the Working Group. The results of the scoring were tabulated and presented to the Working Group at a decision meeting. From the Working Group emerged a series of recommendations for improvement in the requirements determination methodologies for officers in the Navy, including:

- a technique for developing officer Staffing Guides for ships
- a simulation technique for evaluating shipboard officer requirements
- a point system for use in grade determination
- a simulation methodology for determining air crew requirements
- an approach to developing Staffing Guides for Ground Officer requirements.

The aforementioned recommendations were presented to the Advisory Committee. The Advisory Committee stated that "the narrow scope of the study argues against continuing implementation until the concept of determining total officer requirements is developed." After the concept for determining total officer requirements is developed, the following alternatives are approved for future development:

SHIPS

- Develop STAFFING GUIDES for each class of ship.
- Develop a POINT SYSTEM approach to grade level determination for ships.

AVIATION

- Continue the use of TACFLIER for computation of crew seat ratios.
- Develop STAFFING GUIDES for aviation ground officers.
- Develop a POINT SYSTEM approach to grade level determination for aviation squadrons.

CHAPTER ONE
INTRODUCTION

CHAPTER I
INTRODUCTION

BACKGROUND

The techniques for determining manpower requirements at the unit level have evolved considerably since the development of the Ship Manpower Document (SMD) program in the mid-1960s. The emphasis of the developments, however, have centered around the justification and documentation of enlisted requirements, with a minimum of effort devoted to the requirements for officers. Over ten years after the SMD methodology for measuring enlisted requirements achieved acceptability in the Navy, the approach to determining officer requirements is still rudimentary.

In June 1976, the development of officer manpower requirements was included in the Chief of Naval Operations (CNO) long range manpower determination goals.¹ The Deputy Chief of Naval Operations (Manpower) (OP-01) then tasked the Navy Manpower and Material Analysis Center, Atlantic (NAVMMACLANT) to formulate a plan for the development and documentation of officer manpower requirements for ships and afloat staffs.² In July 1977, the Commanding Officer, NAVMMACLANT responded, pointing out that "numerous offices have related and overlapping responsibilities with regard to officer manpower determination"; and he proposed: "In order to provide a complete and effective plan for the documentation of officer manpower requirements, it is highly recommended that the Chief of Naval Operations establish an ad hoc committee within the Navy Department chaired by the Director of Manpower Determination/Field Liaison Division (OP-12)."³

¹Office of the Chief of Naval Operations ltr Ser 124E/686878, Unclassified, 8 June 1976.

²Office of the Chief of Naval Operations ltr Ser 124E/195451, Unclassified, 14 March 1977.

³Commanding Officer, NAVMMACLANT ltr 5310 Ser 850/7, Unclassified, 5 July 1977.

OP-01 rejected the ad hoc committee approach in September 1977 and expanded the NAVMACLANT tasking to include the officer requirements for the aviation community and the shore establishment as well as senior enlisted, Warrant Officers, and Limited Duty Officers.⁴

NAVMACLANT responded to the expanded tasking by developing a plan for determining officer requirements in all communities using the existing manpower programs and the assets which were authorized at that time. The plan was submitted to OP-01 on 20 April 1978.⁵ Although there were discussions of the NAVMACLANT plan, there was no official response from OP-01 for over two years. In June of 1980, CNO originated a letter to NAVMACLANT and NAVMACPAC which approved the NAVMACLANT plan for determining officer requirements for ships, and requested a plan of action and milestones for the accomplishment of the tasking.⁶ A joint NAVMACLANT/NAVMACPAC interim response was submitted the following month indicating that both commands had reservations about the approach proposed in the 1978 plan, citing procedural conflicts. Alternative techniques involving more extensive workload measurement were recommended.⁷ The revised approach was approved by OP-01, and a new plan of action was requested.⁸ Although a joint plan of action was developed, action was deferred because of the impending CNO Studies and Analyses Program (CSTAP) study of the Development of Officer Requirements.

⁴Office of the Chief of Naval Operations ltr Ser 124E/195838, Unclassified, 30 September 1977.

⁵Commanding Officer, NAVMACLANT ltr 5310 Ser 716/7, Unclassified, 20 April 1978.

⁶Office of the Chief of Naval Operations ltr Ser 111C1/678731, Unclassified, 18 June 1980.

⁷Commanding Officer, NAVMACLANT/Commanding Officer, NAVMACPAC joint ltr 5310 Ser 1062 (LANT)/649 (PAC), Unclassified, 15 July 1980 (LANT)/11 July 1980 (PAC).

⁸Office of the Chief of Naval Operations ltr Ser 111D/679036, Unclassified, 20 August 1980.

The study requirement to identify and analyze the methodologies used for determining officer and executive requirements was initiated by OP-01 and was approved for inclusion in the FY-80 CSTAP Program. The Study Directive (Appendix A) was issued on 30 May 1980 and a contract for conducting the study was issued to Resource Consultants, Inc. of McLean, Virginia. The Study Plan (Appendix B) was approved on 3 February 1981.

THE PROBLEM - SHIPS

Ship Manpower Documents (SMD) identify the manpower, officer and enlisted, necessary to perform the mission requirements specified in the Required Operational Capabilities (ROC) and Projected Operational Environment (POE) statements. Most of the official information regarding the requirements determination methodology does not differentiate between officers and enlisted; but indeed they are quite different. For example, the OPNAV Instructions of the 5320 series (which promulgate SMDs) state:

"The Chief of Naval Operations is engaged in the development of individual manpower documents for each ship or class, using a methodology which applies established workload standards and selected work measurement techniques to quantify basic manpower requirements for operation, maintenance, training, support, and administrative functions. These documents display the total manpower requirements for the ship or class addressed, predicated upon individual ship configuration, established workload standards, computed maintenance workload, and required operational capabilities."

The instructions further indicate that the promulgated SMD:

"...shall be used for manpower planning. The organization and billet assignment shown in the SMD is (sic) predicated on work study and detailed analysis."

These statements apply to the enlisted requirements in the SMD; they do not apply to the officer requirements. In fact, officer requirements in SMDs are throughputs of the Navy

Manpower Requirements System (NMRS), which produces the manpower documents. The source of the officer billet data for the NMRS is the Manpower Authorization. In effect, this operates the system in reverse. The Manual of Navy Total Force Manpower Policies and Procedures, OPNAV Instruction 1000.16E, establishes the relationship between the SMD and the Manpower Authorization as follows:

"The SMD serves as the basis for the Manpower Authorization (MPA) (OPNAV 1000/2)."⁹

This is true for enlisted requirements; it is not true for officer requirements. Under the currently followed procedures, the Manpower Authorization serves as the basis for the SMD in the case of officers.

As a result of these issues there are two major problems associated with the current technique for determining and documenting manpower requirements for officers in ships.

- The SMD is intended to reflect the unconstrained requirements for officers necessary to perform the mission requirements of the Required Operational Capabilities and Projected Operational Environment which provide the baseline for mobilization. Manpower Authorizations consist of funded billets - a manning level often below the manpower requirements level. Since the Manpower Authorizations are used as the basis for SMD officer requirements, the baseline for mobilization is lost.
- The Defense Officer Personnel Management Act (DOPMA) establishes manpower levels for officers in the Navy. Changes to these levels will require supporting justification which is considered acceptable in the Congressional environment. Current procedures for determining officer requirements in ships do not produce the type of justification which has been considered adequate by Congress.

⁹Office of the Chief of Naval Operations Instruction 1000.16E, Unclassified, 2 March 1981.

THE PROBLEM - AVIATION SQUADRONS

The processes for determining officer requirements for aviation squadrons is quite different from those described above for ships, but there are problems in the squadron area as well. Basically the Navy employs two techniques for determining officer requirements in squadrons. The first addresses the requirements for flight crew personnel: pilots and Naval Flight Officers (NFOs); the second deals with Ground Officers.

Officer flight crew requirements are determined by the application of crew seat ratios for the type of aircraft in question to the seat factors and number of aircraft in the squadron. For example, if a squadron of 12 F-14 aircraft (2 seats) had a crew seat ratio of 1.5, the officer flight crew requirements would be:

$$\begin{aligned}\text{Off. Flt. Crew Rqmnts.} &= \text{CSR} \times \text{SF} \times \# \text{ Aircraft} \\ &= 1.5 \times 2 \times 12 = 36 \text{ officers}\end{aligned}$$

Where:

CSR = Crew Seat Ratio
SF = Seat Factor.

This approach to determining requirements by applying Crew Seat Ratios is a generally accepted technique used by the Air Force and the Marine Corps. However, an analysis of the officer requirements determination process, directed by the Deputy Chief of Naval Operations (Manpower, Personnel and Training) and the Deputy Chief of Naval Operations (Air Warfare), made the following general statement regarding the process:

"Determination of aviation officer manpower requirements is an unspecified process comprised of both quantitative and non-quantitative determinants that result in a somewhat incongruous community composition. Overall results indicate that many if not all of the determinants are of questionable validity or, at best, in need of significant updating.

Furthermore it appears that overall community requirements possess a vague relationship to the operational aircraft inventory and that the tripartite basis (aircraft, manpower, flight hours) for a viable aviation community may not be receiving compatible consideration."¹⁰

Specific conclusions regarding the Crew Seat Ratio process included the following:

"The current Crew Seat Ratio (CSR) determination process was found to be based on faulty criteria. Minor criteria errors were found to have substantial cumulative effects on total requirements.

Navy crew seat ratios (CSR) lack documentation and require clarification as to the relative importance (weight) given various factors.

Aviation officer requirements appear to be founded upon either a numerical Crew Seat Ratio (CSR) calculation or on a commanding officer's judgment of perceived need. The latter determination process is almost impossible to validate."

The analysis further concluded:

"Investigative audits of aviation officer requirements, training rates, inventories, operational flying requirements, supervisory/staff requirements and flight hour funding by agencies external to the Navy have created the need for increased justification of aviation officer requirements."

The other problem area in Aviation Squadrons involves the determination of Ground Officer requirements. Ground Officers are assigned to squadrons to impart technical expertise to the Maintenance Department and to keep the squadrons operating smoothly during periods of heavy flight activity. Examples of the types of billets which might be assigned to Ground Officers because of the need for technical expertise are:

- Assistant Maintenance Officer
- Maintenance Material Control Officer

¹⁰"Aviation Officer Requirements Analysis", Vol. II, Final Report, May 1979.

- Avionics Officer
- Aviation Ordnance Officer
- Tactical Intelligence Officer.

These types of ground officer requirements are well-established and are based upon aircraft type and complexity. Other ground officer requirements are identified to assist in the administrative workload of the squadron.

The current approach to the specification of Ground Officer requirements involves the application of the Ground Officer Algorithm to each squadron. The Algorithm employs a subjective approach to requirements determination, using historical precedent and professional judgment, and also considers the needs of the officer specialty communities which form the ground officer contingents. The methodology used is not sufficiently quantitative in nature to provide adequate justification for the ground officer requirements. In Fleet Readiness Squadrons, instructor requirements (pilot, NFO, simulator operator) are determined using the squadrons's most recent submission of the Planning Factors FRS data (OPNAVINST 3760.13 series).

PURPOSE OF THE STUDY

Recognizing the problems associated with the determination of officer requirements in ships and squadrons and the intensified pressure caused by DOPMA for justifying officer requirements, the Deputy Chief of Naval Operations (Manpower, Personnel and Training) initiated the requirement for this study. The earlier proposed actions to resolve the officer requirements problems were based upon the application of techniques which had been used successfully to determine enlisted requirements in the Navy.

This study was intended to serve as a "front end" analysis of the problem which examines the methodologies that have been used in the Navy and elsewhere to solve this problem. The purpose of the study is the identification of those alternatives which hold the highest probability of successful application to the officer requirements determination process.

STUDY APPROACH

The principal aspects of the study were data collection and data analysis. The data collection effort involved both literature search and interview techniques, both of which were considered important to the success of the study.

The literature search focused upon known sources of relevant reports which included various offices of the Office of the Chief of Naval Operations; the Navy Manpower and Material Analysis Center, Atlantic; the USAF Tactical Air Command; Headquarters, Department of the Army; Headquarters, U.S. Coast Guard; Headquarters, U.S. Marine Corps; and others. The major conventional data sources used included:

- National Technical Information Service
- Defense Technical Information Center
- Defense Logistics Studies Information Exchange
- Research and Development Information System
- Library of Congress
- General Accounting Office.

As an additional aid in the data collection phase, a professional industrial engineer was consulted to enable the data search to focus upon the most productive areas.

The data analysis task required an initial sorting of methodologies to ensure that detailed analysis be conducted on those which had relevance to the problem. A scoring technique was devised which permitted a panel of experienced personnel to evaluate each methodology on the same basis. The results of the scoring were then analyzed and presented to the CSTAP Working Group for its consideration. The Working Group then selected (and, in some cases, modified) the alternatives to recommend to the Study Sponsor.

REPORT CONTENT

After this introduction, the Study Report discusses the methodology in Chapter II, examining the study objectives, the data collection phase, and the analysis phase. Chapter III presents the study results by way of a discussion of each

of the methodologies considered by the Working Group. Chapter IV addresses the conclusions reached by the Working Group and the recommendations which were presented to the Advisory Committee. Chapter V summarizes the Advisory Committee's decisions. In those cases where greater detail or support documentation appeared sufficiently relevant to the study, appendixes were added. Appendix A is the Study Directive and Appendix B is the Study Plan. The text of three proposed methodologies which originated at the Navy Manpower and Material Analysis Centers are included in Appendixes C, D, and E. Appendix F provides a description of the Air Force TACFLIER model. A description of a point system developed by the Army to assist in billet descriptions is contained in Appendix G. Appendix H provides brief summaries of interviews with representatives of 8 NATO navies. Amplification on the use of the Ground Officer Algorithm is included as Appendix I. The final Appendix, J, is a list of references.

CHAPTER TWO
METHODOLOGY

CHAPTER II

METHODOLOGY

STUDY OBJECTIVES

The study was initiated to analyze the methodologies used by the Navy, other Services, and Department of Defense agencies to determine the manpower requirements for officers. Similarly, any documented processes used by other government agencies and industry to determine the requirements for executives would also be analyzed. The objective of the analysis was the identification of alternative methodologies applicable to the determination of officer requirements for ships and aviation squadrons. Any methodologies encountered in the course of the study which the Working Group considered to be cost-effective techniques for improving the Navy's approach to determining officer requirements would be recommended to the Study Sponsor for implementation. Developmental cost data should accompany the recommendations.

DATA COLLECTION

The data collection discussion is subdivided into the major source categories. The focus of this section is upon the useful data located, rather than an exhaustive presentation of where data was sought. In some cases, however, a report of negative results is appropriate because the data source was stated or implied in the Study Directive or the Study Plan.

U.S. Navy

The first information of consequence acquired from the Navy involved the verification of the methodologies currently in use for determining officer requirements in ships and aviation squadrons. The current approaches are not discussed in detail at this time, but are presented as alternatives later in this section in exhibit 2-1 (ships) and exhibit 2-9 (aviation squadrons).

In April 1978, in response to a tasking from the Deputy Chief of Naval Operations (Manpower, Personnel and Training), the Commanding Officer, Naval Manpower and Material Analysis Center, Atlantic developed and submitted an approach to the development of officer requirements. The main portion of that plan relevant to this study addressed ships. It began with an identification of directed billets, then examined the mission-related requirements to account for the operational manpower associated with the various readiness conditions. A copy of this plan is included in Appendix C. An expanded version of this approach was developed as an alternative for ships and is documented in Chapter III under the heading of Mission-Oriented Requirements and in exhibit 2-4.

A joint effort by NAVMACLANT and NAVMACPAC in the summer of 1980 produced another approach in response to a tasking by OP-01. The proposed technique involved workload measurement using the factors which are defined for the measurement of enlisted workload. An assumption was made that officer hours are not expended on maintenance functions; therefore, the components of officer workload to be measured would be Operational Manning and Own Unit Support (OUS)/Customer Support (CS). The text of this methodology is included as Appendix D. A modified version of the approach was presented as an alternative for ships and may be found in Chapter III as Measurement of OUS/CS and Watchstanding and in exhibit 2-2.

Another methodology originated in 1978 at NAVMACLANT was developed by an analyst and was submitted within NAVMACLANT for consideration. It was also based upon workload measurement--but it was less constrained by the components of work than the methodology previously described. It considered directed billets, those identified by law or competent authority, as requirements. It then examined the quantitative and qualitative requirements for watchstanders for the operational manning workload. The third major category was the documentation of workload for officers in terms of primary duties, collateral

duties, and training duties. The examination of workload in these more familiar terms was expected to result in greater understanding and cooperation during the measurement phase. The development of this approach was completed a month after NAVMMACLANT had submitted the Mission-Oriented Requirements plan. As a result, this plan was never submitted to OP-01 for consideration. The text of this approach is included in Appendix E, and a modified version was developed as an alternative for consideration in this study. This alternative is addressed in Chapter III and is entitled Officer Workload Measurement.

The one Navy methodology which has been accepted as a defensible methodology by Congress (other than the SMD and SQMD programs for enlisted requirements) is the Shore Requirements, Standards and Manpower Planning System (SHORSTAMPS). This program was examined to ascertain its relevance to the determination of officer requirements for ships and aviation squadrons. The work measurement techniques of SHORSTAMPS are compatible with the techniques of the SMD and SQMD programs, and all of these programs produce documents via the Navy Manpower Requirements System (NMRS). The SHORSTAMPS program, however, determines requirements by functional area and identifies requirements at all levels necessary to accomplish the function in question. Attempting to apply this concept to "officers only" would, at best, define only a small portion of the officer workload in that there are few functions which would be accomplished by "officers only". The appropriate way to employ the SHORSTAMPS approach to ships and squadrons would be to include all functions and all associated manpower of the ship or squadron. This concept was rejected for several reasons, such as:

- The SHORSTAMPS program is currently overtaxed and fully committed to its primary responsibility of documenting manpower requirements for the shore establishment.
- The time and cost required to document the officer requirements for ships and squadrons would be excessive and unacceptable.

- Replacing credible programs like the SMD and SQMD programs with a developing program like SHORSTAMPS at this time would not be logical.

Accordingly, the use of the SHORSTAMPS methodology as a solution to the problem of determining officer requirements for ships and aviation squadrons was not recommended.

U.S. Air Force

The data collection efforts with the Air Force were considered important to this study because the Air Force has methodologies which are considered acceptable by Congress. Therefore, answers to the following questions were sought:

- Is the USAF methodology for determining air crew requirements translatable to the Navy?
- Can the USAF methodology for determining ground officer requirements be translated to the Navy?
- Does the Air Force have other relevant methodologies which should be considered?

The Aviation Officer Requirements Analysis Final Report of May 1979 (jointly sponsored by OP-01 and OP-05) provided the answer to the first question. The Air Force TACFLIER simulation model had been examined during that study and was considered to be basically compatible with the Navy system, and the study recommended:

"That a feasibility analysis of the USAF TACFLIER Crew Seat Ratio (CSR) model be conducted with an assessment for U.S. Navy application. NAVMACLANT has expressed a willingness to coordinate this appraisal."¹¹

TACFLIER is a computer simulation model developed by the Tactical Air Command of the Air Force. It uses a variety of hostile action scenarios to create the most demanding conditions for manpower. It simulates discrete events and generates the probabilities of those events occurring. The inputs to the model are Operational Parameters and a Flight Schedule. The model generates a crew seat ratio as its output.

¹¹Aviation Officer Requirements Analysis, Final Report Volume II, Unclassified, May 1979.

TACFLIER was designed as a stand-alone model, except that it depends on the Tactical Air Command's Logistics Composite (LCOM) model to generate one of the inputs, the flight schedule. The TACFLIER methodology has been accepted by OSD and Congress.

As a result of the 1979 study recommendations, action was initiated to modify TACFLIER as necessary to create a Navy version of the model. This has been completed and the new version is now independent of the LCOM and undergoing testing in the Navy. A general description of the model and its logic is included as Appendix F.

The Ground Officer question produced different results. Operational Maintenance functions which are responsibilities of Navy operational squadrons do not have a direct parallel in the Air Force. In the Air Force, operational maintenance is performed by maintenance squadrons which have maintenance as the primary responsibility. The manpower requirements determination methodology used for these Air Force squadrons is similar to the approach used in the SHORSTAMPS program for documenting officer and enlisted requirements. As mentioned earlier, this approach is not considered to be of value for ships or squadrons at this time.

The Air Force has also worked with a grade determination methodology which was considered in this study. The initial research on the Officer Grade Requirements program occurred from 1963-1966. The methodology involved the study of a large sample of job descriptions by a board of colonels to identify factors which could be scored and related to the grade level requirements for the job. The factors selected at that time were:

- special training and experience
- communication skills
- judgment and decision making
- planning
- management.

Four other variables were worked into the equation:

- mean grade rating from raters
- organizational level of the job
- level of the job within the organization
- supervisor's judgment of grade.

Five other factors were rated but they did not enter the policy grade equation. They were:

- formal education
- working conditions
- originality, ingenuity, and creativeness
- interpersonal skills
- risk.

Although the research results were quite promising, the approach was not adopted. In 1974 the results of the earlier work were validated in another study, and the project was carried further to determine if the Management Engineering Teams (METs) could achieve reasonable results as scorers. As a result of this study, the following conclusion was drawn:

"Based upon present findings, METs using the grade evaluation technology assigned essentially the same grade levels to 485 officer positions as did the 1964 Policy Board of highly experienced colonels (validity = .90). It appears that MET raters can effectively replicate the work of the original Policy Board in determining officer grade requirements."¹²

The study group made the following recommendation:

"The grade evaluation technology tested demonstrated that METs can successfully determine grade requirements based upon job content and responsibilities. The technology is supported by years of research and is one of the most defensible systems developed. Based upon the findings of this report it is recommended that MET application of the officer grade evaluation technology be adopted."¹²

The results of this study, supported by a study subsequently sponsored by the Army, led to the development of the alternative discussed in Chapter III as the Point System.

¹²Determination of Officer Grade Requirements by Management Engineering Teams; Stacy, William L.; Matthews, Gary N.; Hazel, Joe T.; Air Force Human Resources Laboratory, December 1975.

U.S. Army

Examination of the Army's requirements determination processes did not produce any methodologies which would contribute to this study. The Department of the Army has, however, sponsored a study which has developed a technique for determining whether an established billet should be specified as a civilian position or a military billet. The technique is then further applied to determine whether those identified as military billets should be officer, warrant officer, or enlisted billets. The initial technique, which addresses military or civilian, is presented in Appendix G. The approach to differentiating between the officer, warrant officer, or enlisted billets is based upon the scoring methodology developed by the Air Force and discussed earlier. This Army project also contributed to the development of the Point System alternative discussed in Chapter III.

U.S. Marine Corps

The Marine Corps determines flight crew requirements for aviation squadrons through the use of crew seat ratios using a methodology similar to that currently used by the Navy. Officer requirements in non-aviation units are established by historical precedent, fiat, and best judgment. Data collection in the Marine Corps did not produce methodologies for further consideration in this study.

Other Government Agencies and the Private Sector

In order to optimize the data collection effort outside the Department of Defense, the consulting services of an industrial engineer, Marvin E. Mundel, Ph.D., P.E.¹³ were used. Through his assistance, the data search was limited to those areas most likely to produce results for the study. Among the agencies reviewed in the study are: U.S. Coast Guard, Veterans Administration, Federal Aviation Administration,

¹³Dr. Marvin E. Mundel, former President, National Association of Industrial Engineers, has taught at Bradley University and Purdue University, where he was Professor and Chairman of Industrial Engineering. He organized and was the first Director of the Army Management Engineering Training Agency.

Social Security Administration, Merchant Marine, Department of Interior, Department of Agriculture, AT&T Long Lines, Midas Corporation, and others. The results from the search in these areas were quite limited. In some ways the study confirmed a status report to OP-01 on this subject in 1979:

"...The establishment of officer (executive) requirements is basically an undeveloped manpower area. Recent informal liaison with United Air Lines, Litton Industries and Olivetti indicates they do not have a program or system per se - they hire what they feel they need to get the job done."¹⁴

The Coast Guard has not experienced the need for a requirements determination process for officers in ships. The mission and design of the ships lead to an organizational structure which requires supervisory or management billets identified for officers or warrant officers. The Coast Guards' primary officer problem in recent years has been the inability to provide the numbers of officers needed to meet requirements. As a result, the manpower pressures in the Coast Guard have focused upon supply rather than demand.

Several agencies have sponsored manpower studies which examine long range requirements for particular skill areas. For example, the Veterans Administration, National Institute of Health, the Public Health Service, and several individual states have studied the long range requirements for medical and dental personnel. This type of study did not relate to the problems of determining requirements at the unit level. Similarly, shorter range studies of manpower requirements for professionals who perform clearly defined and predictable functions such as lawyers for the Department of Interior and veterinarians for the Department of Agriculture did not employ techniques which were translatable to use for ships or squadrons. Still other manpower work which addressed functions with a relatively narrow scope, such as clerical

¹⁴ Director Total Force Planning Division memorandum Ser 111C1/73-79, Unclassified, 1 October 1979.

functions at the Social Security Administration or meat inspector at the Department of Agriculture, did not relate well to Naval officer functions.

One study which did have translatable concepts involved the function of Ward Secretary at Veterans Administration hospitals. The point of that study relates to operational manning or watchstanding. It indicated that some positions are justified by the hours the position must be manned rather than the work to be accomplished; and the application of work measurement techniques to such a position would be misleading.

NATO Navies

In an attempt to ascertain whether other navies had experienced similar problems in the officer requirements field, the opinions of several NATO navies were solicited. Interviews with selected officers from these countries were conducted and documents reviewed. The individuals interviewed were not manpower specialists but they generally had a good understanding of the major manpower issues of their organizations. Brief summaries of the interviews are included in Appendix H.

This phase of the data collection did produce information for consideration. Some of the ideas concerning the recognition of junior officer training impacts on manpower in ships were built into the alternative entitled Pipeline Considerations. Another item of interest is the trend toward specialization in marine engineering and weapons systems engineering in shipboard organizations. Both the Royal Navy and the Canadian Navy considered specialization important to successful shipboard operations because of the continuing increase in complexity in equipments and systems. They emphasized the importance of establishing a viable career path for specialists.

Nearly all of the interviewees expressed surprise at the concern and involvement in the methodology for determining officer requirements for the Navy by the Legislative Branch.

Data Collection Summary

The data collection efforts were aimed at locating and documenting an inventory of military and non-military officer and executive manpower requirements determination methodologies and processes. The initial effort involved examining existing methodologies used in Navy ships, squadrons, and the shore establishment. Data from a variety of ship classes and squadron types as well as the SHORSTAMPS program were considered. Other than the existing techniques which are in use in the Navy, the search produced only one completely translatable methodology which had been used successfully: the Air Force TACFLIER simulation model. A number of processes were identified, however, which had relevance to the problem and deserved further consideration. It was from these processes that the majority of alternatives addressed in the Data Analysis phase were developed.

DATA ANALYSIS

The Data Analysis Phase is subdivided into three segments for discussion. The first is Scorecard Development; the second is Methodology and Alternatives Development; and the final part is Methodology Scoring.

Scorecard Development

In order to evaluate the methodologies encountered in the data collection phase, a scoring system or "Scorecard" was developed shortly after the Study Plan was approved. The intent was the quantification of the evaluation process and the assurance of consistency in considering judgmental factors. Figure 2-1 is the scorecard initially developed. The first step in the use of the scorecard was the determination of relative weights of all the factors identified and

**OFFICER MANPOWER REQUIREMENTS DETERMINATION
METHODOLOGY EVALUATION**

EVALUATION FACTORS		WEIGHTING FACTORS	SCORE					WEIGHTED FACTOR SCORE
			1	2	3	4	5	
DATA	Availability of Data							
	Validity + Consistency of Data							
	Ease of Handling of Data							
	Ease of Understanding of Data							
	Compatability of Data Format							
SOUNDNESS	Sample Selection Factors							
	Reliability of Stat. Techniques							
	Realism of Results							
	Confidence Results							
RELEVANCE	Applicability to Ship case							
	Applicability to Squadron case							
	Ease of Update and Revision							
	Accuracy of Results							
USER	Value in Current Application							
	Value to Navy Officer case							
IMPLEMENTATION	Cost							
	Time							
	Manpower/Skills							
OPERATIONS	Cost							
	Time							
	Manpower/Skills							
OTHER								
TOTAL METHODOLOGY SCORE								

Figure 2-1
Scorecard

the assignment of weighting factors. The next step required the completion of the Officer Requirements Determination Data Sheets (Figure 2-2) for all methodologies to be scored. The final step would be the scoring process itself. The plan required the presentation of each methodology to the Working Group and the delivery to the Working Group members of the Data Sheets and Scorecards. Each member would then assign a score of 1 to 5 to each of the Evaluation Factors. The Weighted Factor Scores would be the product of the Weighting Factors and the Factor Scores. The Total Methodology Score would be the sum of all Weighted Factor Scores.

The Scorecard and the techniques for its use were initially approved, but, as the results of the Data Collection phase were considered, problems with the scoring technique emerged. The Scorecard was designed to evaluate a number of complete methodologies which had usage data. The data collection effort did not produce this type of result. Also, the scores of processes which were less than complete methodologies would probably be low even though the processes had value in solving a part of the requirements determination problem.

Consideration of these factors led to the development of a second Scorecard, Figure 2-3, which was more tailored to the data and the priorities of the Working Group. Although all questions appearing on the Scorecard were considered relevant to the decision factors of the Working Group, the results of questions 7, 9, and 10 would be examined most closely to understand the opinions of the Group toward the individual alternatives.

Methodology and Alternatives Development

As a result of the data collection a series of alternative methodologies were developed for consideration and scoring by the Working Group members. In all, there were eleven methodologies prepared. The first was the current approach used for ships. The second was developed from the joint NAVMACLANT/NAVMMACPAC proposal to measure Own Unit

the assignment of weighting factors. The next step required the completion of the Officer Requirements Determination Data Sheets (Figure 2-2) for all methodologies to be scored. The final step would be the scoring process itself. The plan required the presentation of each methodology to the Working Group and the delivery to the Working Group members of the Data Sheets and Scorecards. Each member would then assign a score of 1 to 5 to each of the Evaluation Factors. The Weighted Factor Scores would be the product of the Weighting Factors and the Factor Scores. The Total Methodology Score would be the sum of all Weighted Factor Scores.

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OFFICER REQUIREMENTS DETERMINATION

DATA SHEET

IDENTIFICATION:

CODE: _____

SOURCE OF INFORMATION:

TO BE SCORED? YES _____ NO _____
RATIONALE:

DATA REQUIREMENTS: (Data availability, validity, consistency,
handling, understandability, format)

SOUNDNESS OF METHODOLOGY: (Sample selection, statistical techni-
ques, realism of results, confidence
in results)

RELEVANCE OF METHODOLOGY: (Applicability to ships/squadrons,
ease of update, accuracy of results)

Figure 2-2. Data Sheet

USER PERCEPTIONS: (Value in current application, translat-
ability)

IMPLEMENTATION CONSIDERATIONS: (Cost, time, manpower/skill)

OPERATIONAL CONSIDERATIONS: (Cost, time, manpower/skill)

MAJOR STRENGTHS/WEAKNESSES:

OTHER:

Figure 2-2 (Continued). Data Sheet

ALTERNATIVE: SHIPS # _____

SQUADRONS # _____

SCORECARD

1. What type of system is this methodology?
 - a. Manpower Requirements Determination System
 - b. Manpower Distribution System
2. What environment was the technique used in?
3. Has the technique been used successfully?
 - a. Yes
 - b. No
 - c. Don't know
4. Can the technique be used by the Navy?
 - a. Yes
 - b. No
5. Cost of Implementation? Rate each on a 5 point scale:

a. Dollars	5 - Too high
b. Manpower	4 - High
c. Hardware	3 - Medium
d. Time	2 - Low
	1 - None
6. Does the methodology measure a work count/end product?
 - a. Yes
 - b. No
7. Can the manpower requirements which are developed using this system be audited/defended?
 - a. Yes
 - b. No
8. Is the methodology responsive to policy changes?
 - a. Yes
 - b. No
9. How much confidence do you have that this methodology, or part thereof, could provide the Navy with accurate officer manpower requirements?
 - a. Low
 - b. Medium
 - c. High
10. Should this alternative be developed for use in the Navy?
 - a. Yes
 - b. No
 - c. Yes, in part (please explain in remarks)
11. Remarks.

Figure 2-3. Revised Scorecard

Support, Customer Support, and Watchstanding requirements. The third methodology, which also involved work measurement, emerged from an idea recommended by a NAVMACLANT analyst in 1978. The next four alternatives were developed from ideas from various sources in the Data Collection phase. The eighth alternative, the last one for ships, was originated as a part of this study. The final three addressed aviation squadrons: first, the current approach; second, the use of the Air Force TACFLIER simulation model; and third, a technique to improving the approach to documenting requirements for Ground Officers.

Exhibits 2-1 through 2-11 present these alternatives in the same format delivered to Working Group members for scoring.

Exhibit 2-1

SHIPS ALTERNATIVE #1

Title: Current Approach

Description: Currently the officer requirements for ships are generated by the Navy Manpower Requirements System (NMRS) as throughputs of the system. The sources of the input data are manpower authorizations.

This approach is intended to support a historical methodology encompassing vessel mission capability; extent of supervision, management, and leadership; technical complexity of systems and operations; and vessel size. These parameters are evaluated by the Resource Sponsor to determine the quantity, level of training, and grade of officers required for each shipboard task. The final product, the SMD, is approved by the DCNO (MP&T).

As implemented, however, the availability of manpower and financial constraints are playing a much more significant role than the actual requirements for officers to operate a ship in a fully ready condition. As a result, the approach of entering authorization data into the NMRS will accomplish neither the objective of the methodology nor the objective of the NMRS.

Measurement
Technique:

As the system is implemented, measurement is not used in the determination of requirements for officers aboard ships.

Implementation
Time:

None

Implementation
Cost:

None

Training:

None

Advantage:

1. System is currently operational.

Disadvantages:

1. Manpower requirements for a ship should be regarded as the baseline for a fully ready unit. In this system, where requirements for officers can change as a result of a change in authorization, the baseline is lost.
2. If challenged, the current system could not be effectively defended in OSD or Congress.
3. An audit of officer requirements for ships could not be accomplished effectively because of a lack of backup data.

Exhibit 2-2

SHIPS ALTERNATIVE #2

- Title: Measurement of OUS/CS and Watch Standing
- Description: Develop officer requirements for ships by the measurement of officer workload. The workload components in the NMRS include Operational Workload (watch station and special condition requirements), Maintenance Workload (PM, CM, FM), Own Unit Support (OUS) (administration, command, utility tasks, evolutions, etc.) and Customer Support (CS) (e.g., services provided by a tender to a ship alongside). In this approach, Maintenance workload is not considered relevant to officer requirements. Therefore, operational workload and OUS/CS will be measured using accepted industrial engineering techniques to be identified and specified in the first phase of the three-phase approach normally employed by the SHORSTAMPS program (preliminary phase, measurement phase, and computation phase). The results of the study would be standards which could be integrated into the NMRS system.
- Measurement Techniques: To be determined during the preliminary phase of the project (probably would include work sampling and operational audit; probably would not use time study).
- Implementation Time: 4 - 5 years
- Implementation Cost: 10 - 12 manyears
- Training: All personnel assigned to the project must be experienced Management Engineers, or they must attend the 8-week Management Engineering Course and 8-12 weeks of OJT.
- Advantage:
1. Officer billets would be generated based upon work measurements which are considered acceptable by OSD and Congress.
- Disadvantages:
1. Time to implement is high.
 2. Cost is high.
 3. It is doubtful that the measured workload would support an officer level which would be acceptable to sponsors and claimants. This would drive the cost and time to implement upward.

SHIPS ALTERNATIVE #2

Exhibit 2-2 (Continued)

Comments:

1. The work measurement techniques which would be used have been used successfully in the past.
2. This methodology is not currently in use for determining officer requirements.

Exhibit 2-3

SHIPS ALTERNATIVE #3

Title: Officer Workload Measurement

Description: This methodology requires the measurement of officer workload using accepted industrial engineering techniques. Because of the differences in officer and enlisted responsibilities and type of work performed by each, the method of officer workload determination will differ from present SMD practices in enlisted workload determination. Officer workload will be categorized as primary duties, collateral duties, watch standing, and training responsibilities.

The steps to develop the requirements for officers are as follows:

- Determine directed billets (Title 10 US Code/OPNAVINST 3120.32A)
- Determine quantity and quality of watch standers (OPNAVINST 3120.32A, historical data, interview)
- Determine billets required for organizational management and special evolutions. (ROC/POE/OPNAVINST 3120.32A, Battle Bill)
- Determine and document officer workload (Leadership, management, and administrative responsibilities of primary duties, collateral duties, and training duties will be documented)
- Billet quality will be evaluated to determine designator, grade, NOBC, subspecialty (if required), and AQD Code (if required). To supplement the data gathered by interview and historical review, a point system as discussed in Ships Alternative #6 should be considered.

The principal technique to be employed in the collection would be operational audit. The analysts will use OPNAVINST 3120.32A as a starting point to identify the content of each officer's workload. Additional workload will be recorded at the time of the interview. To aid in developing average weekly workload, analysts should use: ships logs, watch bills, ODCR, SORM, Battle Bill, Training Records, etc.

In addition to the workload identified, Service Diversion and Training (SD&T) Allowance and Productive Allowance (PA) will be applied to officers. The actual SD&T time spent per officer will be examined during the on-site interviews. Initially, a Productive Allowance of 20%, applied to officer primary duties, will be tested.

SHIPS ALTERNATIVE #3

Exhibit 2-3 (Continued)

Description:
(Continued)

It is proposed that the methodology test be conducted aboard two small combatants, with two analysts on board each ship a maximum period of two weeks. The data reduction and report writing would take an estimated three months. If the technique can be demonstrated to be effective, it would lead to the employment of the measurement across a wide range of ship classes to implement the methodology Navy-wide.

Measurement
Technique:

Operational Audit

Implementation
Time:

2 - 3 years

Implementation
Cost:

8 - 12 manyears

Training:

Only trained, experienced management analysts could be used in the measurement of officer workload as proposed.

Advantages:

1. Addresses the measurement of workload using techniques well within the state of the art.
2. If the methodology test demonstrates the techniques to be effective, the methodology would be well-received in OSD and Congress.

Disadvantage:

1. Relatively expensive.

Exhibit 2-4

SHIPS ALTERNATIVE #4

Title: Mission-Oriented Requirements

Description: This methodology examines officer requirements from three directions. The first includes those required by law or by OPNAVINST 3120.32A - and considers these as directed requirements. The second direction requires an examination of the ship's mission as expressed in the Required Operational Capabilities (ROC) and Projected Operational Environment (POE). Officer requirements emerging from an analysis of the ROC and POE will be specified and, when possible, grade requirements or ranges will be assigned. For example, if the POE for a destroyer requires "Continuous Readiness Condition III at sea", that may translate into (among other things) a requirement for three qualified Officers of the Deck, Underway, Qualified for Task Force Operations - grade O-2.

The third consideration requires an examination of historical data to account for other officer requirements which support prudent organizational management and control (such as certain division officer assignments).

The requirements from the three categories would then be integrated in such a way as to meet all requirements with the minimum of officer billets. Qualitative aspects would be assigned as a result of this integration process.

Initially, ship class or type documents would be developed to utilize economies of scale. After initial coverage by class, documents could be developed for individual commands by a process similar to the existing SMD fleet review.

Measurement
Technique:

Operational Audit

Implementation
Time:

1 - 2 years

Implementation
Cost:

1 - 4 manyears (see comment 1)

Training:

None required.

SHIPS ALTERNATIVE #4

Exhibit 2-4 (Continued)

Advantages:

1. May be accomplished with in-house or contractor resources in relatively short time.
2. Relatively low cost.

Disadvantage:

1. There will probably be a tendency to justify "what we have" rather than "what we need".

Comments:

1. Because the methodology for ascertaining quality of the officer requirements has not been specified in detail, the cost of implementation has a relatively broad range.
2. This represents an approach to justifying officer requirements proposed by NAVMACLANT in 1978.

Exhibit 2-5

SHIPS ALTERNATIVE #5

Title: Span of Control

Description: The major feature of this methodology is the establishment of a span of control relationship between numbers of enlisted requirements and the numbers of officer requirements, by department, modified, where appropriate, by the number of divisions in a department. To accomplish this, ship classes would be examined by department to identify officer/enlisted patterns. For example, using the data on the attached sheet and considering the Supply and Engineering Departments, a staffing table could be constructed to provide for the best matching of data of numbers of enlisted vs. numbers of officers. As shown, in the Supply Department, if there are 0-20 enlisted, 1 officer is required; 21-50 enlisted would generate 2 officer requirements; etc. The Supply Department table fits all 7 ships shown on the attached sheet. The Engineering Department table hits on only 5 of the 7 ships (the A0 and AD fall outside the range and would have to be grouped with another set of ship classes).

DEPT. \ OFF.	1	2	3	4	5	6
SUP.	0-20	21-50	51-100	101-150	151-200	201-250
ENG.	0-20	21-40	41-53	54-75	76-100	101-135

In some cases, it may be determined that a department of a class does not fit into a pattern because it is organized into more or fewer divisions. If so, this could be worked into the resultant matrix. The matrices would be incorporated into the NMRS, and the CO/XO requirements would be entered as directed requirements.

Inasmuch as the matrices would be developed using actual data from existing ships, watch standing requirements would be accounted for. However, if the system is used to project officer requirements for a new ship, the results would require analysis to ensure that all watch standing requirements are met.

Measurement Technique: Operational Audit

Implementation Time: 1 year

SHIPS ALTERNATIVE #5

Exhibit 2-5 (Continued)

Implementation

Cost: 2 - 3 manyears

Training: No special training required.

Advantages:

1. May be implemented relatively quickly.
2. Is relatively inexpensive.

Disadvantages:

1. The attached table shows enough inconsistencies of data to require the development of a series of matrices to ensure a "fit" of the data to the approach.
2. This approach assumes the adequacy of the existing span of control; that is, it builds tables using existing officer requirements data.

Comments:

1. Initially there were two approaches being considered: the first would base the officer requirements on enlisted measured workload by department. The second based the officer requirements on enlisted billets by department. Inasmuch as enlisted billets are based upon enlisted workload, these approaches have been combined, and enlisted billets were selected as the basis for consideration.

DEPT. SHIP TYPE	OPERATIONS OR OFS./NAV.	NAVIGATION	ENGINEERING	WEAPONS COMBAT SYSTEM	DECK	SUPPLY	REPAIR OR AIMD
DDG	4/83/3	1/15/1	4/73/4	7/89/4	-	2/42/2	-
AO	1/24/3	1/8/1	3/84/5	-	2/55/3	2/23/2	-
AD	2/44/4	-	4/115/5	1/29/2	2/83/3	5/200/6	12/549/8
LPD	6/87/4	1/7/1	6/125/5	-	4/80/3	3/83/4	-
SSN	2/18/3	-	4/55/5	3/29/4	-	1/13/2	-
SSBN	2/20/3	-	3/51/5	3/47/5	-	1/14/2	-
DD	4/84/4	1/7/1	4/85/4	5/75/6	-	2/32/4	-

Notes: 1. Numbers represent #Officers /#Enlisted/#Divisions.
2. All departments from all ships not shown.

Exhibit 2-5 (Continued)

Exhibit 2-6

SHIPS ALTERNATIVE #6

Title: Point System

Description: This approach initially requires the development of a methodology for evaluating all shipboard leadership/management primary duty positions identified in the Standard Organization and Regulations of the U.S. Navy. It would involve a point system which would require a scoring of factors such as educational requirements, technical background, leadership, management experience, span of control, etc. An iterative scoring process using officers with appropriate shipboard experience would lead to a quantitative/qualitative structure by class which differentiates between the various grades of officers, warrant officers, and senior grade enlisted. The information should then be collated and used to develop a Ship Supplement to the NOBC which would address shipboard billets qualitatively. At the same time the data could be organized into tables for inclusion in the NMRS to be used as the source for documented officer requirements.

Measurement Technique: Operational Audit

Implementation Time: 2 years

Implementation Cost: 4 manyears

Training: Only personnel well trained in Navy manpower systems could perform this approach effectively.

Advantages:

1. It uses and expands upon the organizational experience which is reflected in the existing OPNAVINST 3120.32A.
2. It addresses the difficult problem of differentiating between officer/warrant/E-8/E-9 billets in a quantitative way.

Disadvantages:

1. There will be many "close calls" in quality differentiation which will require negotiation involving claimants and sponsors.
2. This approach assumes that the organizational requirements of OPNAVINST 3120.32A are adequate.

SHIPS ALTERNATIVE #6

Exhibit 2-6 (Continued)

Disadvantages:
(Continued)

3. New ships with new organizational requirements (e.g., FFG) will require special analysis.

Comments:

1. A point system developed by the Army to differentiate between Officer, Enlisted, and Civilian positions would provide some useful input to the development of the point system required for this methodology.
2. This approach may be used effectively to determine the qualitative aspects of officer requirements in conjunction with other methodologies which identify the quantitative requirements.
3. Whether or not this approach is selected, the development of the Ship Supplement of the NOBC to address the qualitative aspects of shipboard officer requirements should be considered.

Exhibit 2-7

SHIPS ALTERNATIVE #7

Title: Pipeline Consideration

Description: In this methodology the CO and XO are directed requirements. The mission of the ship leads to the establishment of the departmental organization - and department heads are identified as billets for well-qualified, experienced officers (e.g., lieutenants on a destroyer). These billets are identified in the Standard Organization and Regulations Manual.

The remaining organizational positions below the department heads are composed of a mix of junior officer, warrant officer, and senior enlisted billets. The process of delineating which category of manager/supervisor should be assigned to which billet could be a best judgement, historical approach, or a point system similar to that described in Alternative 6. Those billets which are judged to be officer billets but which require a depth of technical experience are identified as warrant officer billets.

Factored into this process of determining the quality aspects of these requirements should be a junior officer training consideration. The aggregate of department head requirements in the Navy (by warfare specialty) should be analyzed to determine the "pipeline" of junior officers required to sustain the afloat organization. These training requirements would then be apportioned to all ships to ensure that the future key shipboard officer requirements will be supportable. An officer could be in a trainee status for, perhaps, the first year of a three-year tour. His primary responsibilities would be to become a qualified watch stander and to learn the nature of shipboard operations.

Measurement
Technique: Operational Audit

Implementation
Time: 1 - 2 years

Implementation
Cost: 3 - 4 manyears

Training: No special training requirements.

Advantages:

1. Capable of being implemented relatively quickly.
2. Openly addresses the training aspects of junior officer requirements.

SHIPS ALTERNATIVE #7

Exhibit 2-7 (Continued)

Disadvantage: 1. The acceptability of such a methodology to OSD and Congress is unknown.

Comments: 1. If this approach is not selected, it might be worthwhile to consider addressing the training issue as a part of the alternative selected.

2. This methodology is a modified form of the approach used by the Royal Navy and the Canadian Navy.

Exhibit 2-8

SHIPS ALTERNATIVE #8

Title: Simulation

Description: One of the problems associated with other methodologies for determining officer requirements is the difficulty in specifying requirements in an "at-sea at-war" condition. Any techniques which rely on data collection from operational units will tend to receive data which reflects conditions as they exist, rather than how they would be in a wartime scenario.

This methodology involves the development of an interactive computer simulation model which will quantify the demand for officers in a family of wartime scenarios which encompass the more taxing aspects of the ROC and POE. A thirty day scenario period would be used with the option to increase the period in thirty day increments. Routine administrative workload of officers would be incorporated into the model with "ability to defer" factors assigned to each element of the taskings. Enlisted workload would not be a factor in this simulation, but the areas where senior enlisted may be called upon to relieve excessive demand on officers would be considered.

The principal inputs to the model would be ship class (which would call up a sample organization to test), ROC (which would identify the relevant scenarios), and POE (which would define the conditions to be tested). The output would be a report examining the utilization of officers during the simulated period which would permit an effectiveness evaluation of the organization assigned.

In order to introduce the necessary randomness of occurrences, it is anticipated that the Monte Carlo technique would be used. Efforts should be directed to prevent the model from becoming unnecessarily complex - and expensive. An approach which involves a "build a little - test a little" technique will tend to keep the development on track.

Measurement
Technique:

Stochastic modeling

Implementation
Time:

2 years

SHIPS ALTERNATIVE #8

Exhibit 2-8 (Continued)

Implementation

Cost:

8 - 10 manyears

Advantage:

1. This approach is a quantitative approach which would address officer requirements in a wartime environment.

Disadvantage:

1. Relatively high cost.

Exhibit 2-9

SQUADRONS ALTERNATIVE #1

Title: Current Approach

Description: Aviation officer requirements are also developed on a base of proven historical methodology which encompasses:

- A. Crew seat ratio.
- B. Extent of supervision, management, and leadership (scope of responsibility).
- C. Technical complexity of function area.
- D. Unit size and mission.
- E. The ground officer algorithm for aviation squadrons.

The crew seat ratio for determining the number of aviators is evaluated by the Resource Sponsor (Warfare) in conjunction with manpower specialists both in the field and at the Headquarters level. For aviation officers, the crew seat ratio is analyzed in relationship to parameter B, C, and D listed above to determine the level of training and grade of officer required to fill each functionary role. For non-aviation officers, the ground officer algorithm applied to each aviation unit determines the manpower requirement. An additional factor which is applied to this process is current officer career development concepts.

In the NMRS, the pilot and NFO billets are computed as follows:

SEAT FACTOR X CREW RATIO X #ACFT = TOTAL FOR EACH TYPE OF ACFT

After the number of pilot, NFO and aircrew billets are computed for each type aircraft, these totals are summed to give totals for the entire squadron. For pilot and NFO billets, the CO and XO are normally paygrade O-5, the Department Heads are normally paygrade O-4 and the remaining billets are normally split 1/3 to paygrade O-3 and 2/3 to paygrade O-2. Billet titles, being somewhat arbitrary beyond a certain point, are assigned in view of the squadron's organization and mission. NOBCs are assigned in accordance with the NOBC Manual.

Measurement
Technique:

Operational Audit

SQUADRONS ALTERNATIVE #1

Exhibit 2-9 (Continued)

Implementation
Time:

None

Implementation
Cost:

None

Training:

Not applicable

Advantages:

1. No implementation cost.
2. The methodology of using a crew seat ratio for computing flight officer billets has general acceptance and is used in all services.

Disadvantage:

1. The Aviation Officer Requirements Analysis of May 1979 drew the following conclusions:

The current Crew Seat Ratio (CSR) determination process was found to be based on faulty criteria. Minor criteria errors were found to have substantial cumulative effect on total requirements.

Navy crew seat ratios (CSR) lack documentation and require clarification as the relative importance (weight) given various factors. The USAF TACFLIER model appears to be adaptable to U.S. Navy use.

Aviation officer requirements appear to be founded upon either a numerical Crew Seat Ratio (CSR) calculation or on a commanding officer's judgement of perceived need. The latter determination process is almost impossible to validate.

2. The Ground Officer Algorithm would be difficult to defend as a requirements determination process in that it is not sensitive to changes in the POE. It is related, however, to the inventory of Ground Officers.

Comments:

1. Since the publication of the Aviation Officer Requirements Study, the Navy has validated its crew-seat ratios with the TACFLIER Model.
2. A separate independent study is planned to revalidate all Navy crew-seat ratios.

Exhibit 2-10

SQUADRONS ALTERNATIVE #2

Title: TACFLIER

Description: This approach addresses the use of a Navy version of the Air Force TACFLIER computer simulation model for determination of air crew requirements. TACFLIER simulates the operations and aircrew functions of an operational unit during a period of sustained flying activity. The principle product of the model is a crew seat ratio for a specific type of aircraft. The inputs to the model include operational parameters (such as attrition, medical disqualification rate, scheduled crew rest, etc.) and flight schedule parameters (such as flight length, cycle time, number of aircraft and standbys required for each launch, deck abort rate, etc.). The Air Force version of TACFLIER requires the Logistic Composite Model (LCOM) to generate the flight schedule. The outputs of the model, crew ratios, may be used as inputs to the Navy Manpower Requirements System (NMRS) to document aircrew requirements.

Measurement Technique: Operational Audit

Implementation Time: None

Implementation Cost: None

Training: None

Advantages:

1. The TACFLIER methodology has been accepted by OSD and Congress, and was recommended for consideration by the Navy in the Aviation Officer Requirements Analysis.
2. The model has been adapted for Navy use and tested. Thus the time, cost and extra training required for implementation are not factors for consideration.

Disadvantages:

1. The Navy version of the TACFLIER model is operational on the CINCLANT Honeywell 6060 (series) WMMCCS computers. If the model were moved because of priority of operations, there would be operational costs incident to computer time, storage, and data base maintenance.

SQUADRONS ALTERNATIVE #3

Title: Span of Control

Description: This alternative is intended to address the problem of identifying total officer requirements rather than addressing the flight crew and ground officer requirements separately. It develops officer requirements quantitatively by using organizational span of control relationships.

The initial requirement is to conduct a study of each type of squadron to ascertain the officer-to-enlisted ratio required to meet the operational/maintenance requirements of the squadron. It would require the definition of all officer billets to be filled whenever a squadron is formed. It would then identify and prioritize the billets which would be filled with officers as the squadron grew in size. This approach assumes that the current approach to the development of enlisted requirements in the NMRS continues (i.e. enlisted billets are generated by enlisted workload which evolves from man-hour per flight-hour, number of aircraft, and other POE data). The study should also identify those positions which must be filled by ground officers-and a prioritized listing of positions to be filled by ground officers as they are assigned by the system.

The philosophy is to have the NMRS generate officer requirements as follows: -

- A. Input the normal POE data into the NMRS and have the system generate the enlisted requirements by department and work center.
- B. Using the officer to enlisted ratio data developed by the study mentioned above, the system will generate total officer requirements.
- C. Using the accepted crew seat ratio methodology, determine the number of flight crew officers required. They will be assigned in accordance with a billet priority table (with quality requirements).
- D. Those ground officer requirements which are considered essential, regardless of squadron size, are assigned as directed requirements.

Exhibit 2-11 (Continued)

- E. From the total requirements determined in step B, subtract the flight crew requirements (step C) and the directed ground officer requirements (step D). If the result is 0 or minus, the process is completed. Otherwise the result will be the additional ground officer supplement required.

Measurement
Technique:

Operational Audit

Implementation
Time:

2-3 years

Implementation
Cost:

5-10 Manyears

Training:

None

Advantages:

1. This methodology would address officer requirements with a methodology which is completely independent of inventory. The constraints of inventory would be addressed in the development of authorizations.
2. The prime drivers of officer requirements would be flight crew requirements and enlisted requirements (based upon workload measurement).

Disadvantage:

1. Relatively expensive.

Methodology Scoring

The alternatives were distributed to all Working Group members with Scorecards and a Summary Sheet, Figure 2-4. Working Group members scored the alternatives, and the results of the scoring were presented at the Working Group decision meeting. The results provided an initial indication of preferences.

Ships Alternative #1

Perhaps the key question in the scoring of the methodology currently used by the Navy for determining officer requirements in ships was this: can the requirements be audited and defended? 79% of the group felt that they could not.

Can requirements be audited/defended	Yes - 21%
	No - 79%
Level of confidence in methodology	Low - 36%
	Med - 36%
	High - 29%
Should alternative be developed for use in Navy	N/A

Ships Alternative #2

Although 93% of the scorers considered that the Measurement of OUS/CS and Watchstanding technique could be audited and defended, over half (53%) did not feel that the technique should be developed for use in the Navy.

Can requirements be audited/defended	Yes - 93%
	No - 7%
Level of confidence in methodology	Low - 40%
	Med - 13%
	High - 47%
Should alternative be developed for use in Navy	Yes - 27%
	No - 53%
	Part - 20%

SUMMARY SHEET

NAME: _____

TELEPHONE: _____

ORGANIZATION: _____

The following alternatives should be presented in greater detail at the next meeting:

SHIPS - _____

SQUADRONS - _____

The following alternatives merit further considerations:

SHIPS - _____

SQUADRONS - _____

The following alternatives should be rejected:

SHIPS - _____

SQUADRONS - _____

Other comments and recommendations:

Figure 2-4. Summary Report

Ships Alternative #3

Although the Officer Workload Measurement technique received strong support and good grades on confidence, there was a mixed reaction to the commitment to development of the approach for use in the Navy.

Can requirements be audited/defended	Yes - 100%
	No - 0%
Level of confidence in methodology	Low - 23%
	Med - 23%
	High - 54%
Should alternative be developed for use in Navy	Yes - 33%
	No - 33%
	Part - 33%

Ships Alternative #4

Initially this alternative (Mission-Oriented Requirements) had only modest support, but it became well supported later.

Can requirements be audited/defended	Yes - 73%
	No - 27%
Level of confidence in methodology	Low - 36%
	Med - 43%
	High - 21%
Should alternative be developed for use in Navy	Yes - 36%
	No - 36%
	Part - 29%

Ships Alternative #5

The Span of Control approach was considered defensible - but low on confidence.

Can requirements be audited/defended	Yes - 83%
	No - 17%
Level of confidence in methodology	Low - 43%
	Med - 36%
	High - 21%
Should alternative be developed for use in Navy	Yes - 8%
	No - 62%
	Part - 31%

Ships Alternative #6

The Point System scoring was also mixed and tended to indicate some misunderstanding regarding the alternative.

Can requirements be audited/defended	Yes - 91%
	No - 9%
Level of confidence in methodology	Low - 42%
	Med - 50%
	High - 8%
Should alternative be developed for use in Navy	Yes - 15%
	No - 46%
	Part - 38%

Ships Alternative #7

A general lack of enthusiasm in the Pipeline Considerations alternative was reflected in the vote.

Can requirements be audited/defended	Yes - 75%
	No - 25%
Level of confidence in methodology	Low - 23%
	Med - 54%
	High - 23%
Should alternative be developed for use in Navy	Yes - 38%
	No - 46%
	Part - 15%

Ships Alternative #8

The Simulation alternative was initially not well understood and did not fare well in the scoring. Amplification of the idea later caused a dramatic change in acceptability of this approach.

Can requirements be audited/defended	Yes - 82%
	No - 18%
Level of confidence in methodology	Low - 31%
	Med - 46%
	High - 23%
Should alternative be developed for use in Navy	Yes - 25%
	No - 58%
	Part - 17%

Squadrons Alternative #1

The current approach for squadrons initially did not have a high rejection rate.

Can requirements be audited/defended	Yes - 63%
	No - 38%
Level of confidence in methodology	Low - 17%
	Med - 50%
	High - 33%
Should alternative be developed use in Navy	N/A

Squadrons Alternative #2

The TACFLIER model approach made the strongest showing of all alternatives.

Can requirements be audited/defended	Yes - 100%
	No - 0%
Level of confidence in methodology	Low - 0%
	Med - 30%
	High - 70%
Should alternative be developed for use in Navy	Yes - 77%
	No - 8%
	Part - 15%

Squadrons Alternative #3

The final alternative, Span of Control for squadrons drew a divided response.

Can requirements be audited/defended	Yes - 78%
	No - 22%
Level of confidence in methodology	Low - 45%
	Med - 45%
	High - 9%
Should alternative be developed for use in Navy	Yes - 33%
	No - 33%
	Part - 33%

The alternatives were discussed among the members of the Working Group, and additional data was provided where required. The members then voted on each alternative, and modified alternatives where they considered it appropriate. The output of the Working Group is presented in the next chapter as the results of the study.

CHAPTER THREE
RESULTS

CHAPTER III

RESULTS

GENERAL

This section provides a report of the actions taken by the CSTAP Working Group on the eleven alternatives developed by the Study Group and initially evaluated by the Working Group members as reported in Chapter II. These results led to the recommendations made to the Study Sponsor and the Advisory Group which are summarized in Chapter IV. This section also provides an amplification of some methodologies beyond that which was initially presented to the Working Group.

CURRENT APPROACH - SHIPS

Alternative #1 for ships used data from the manpower authorizations as inputs to the Navy Manpower Requirements System (NMRS) for the generation of Ship Manpower Documents (SMDs). The SMD is designed to specify manpower requirements at Organizational Tasking levels not at the authorized billet level. The Working Group voted to replace the current approach for ships with more reliable and defensible techniques. Alternative #1 for ships was rejected.

MEASUREMENT OF OUS/CS AND WATCHSTANDING

Prior to deciding on Ships Alternative #2, the Working Group requested additional information on the elements of work normally measured in the SMD process. The following summary was provided:

Maintenance manpower is the manpower needed to perform planned, corrective, and facility maintenance. The 3-M system provides the minimum skill levels of personnel and the time requirements for completing required planned maintenance actions. The manpower requirements come from the summing of these actions for all equipments aboard ship. The corrective maintenance requirements are determined through the application

of ratios of PM to CM. Facility maintenance requirements are developed by the application of standards to actions (sweeping, washing, painting, etc.) on surfaces (tile, painted bulkhead, carpet, etc.), accounting for size of surface, environment, interference, etc. Because officers do not perform maintenance as described, this workload component is not included in the methodology. The next components are own-unit support and customer support.

Own-Unit Support indicates the manpower needed to perform administrative, military, resupply, food service, hygienic and utility tasks, and special evolutions. They are determined through standard industrial engineering approaches, including operational audit and interview, job task analysis, work sampling, and statistical analysis.

Customer Support is the quantitative and qualitative sum of naval manpower needed to accomplish the necessary workload associated with providing repair and support services to units of the fleet. The workload element is unique to tenders and repair ships.

This alternative proposes to measure OUS/CS as it applies to officers. Finally, Operational manning is the manpower needed to man essential operating stations during Conditions I, III, IV, V, and special evolutions such as flight quarters, underway replenishment, and LA (amphibious operations). The determination of Operational Manning needs is based on Required Operational Capabilities (ROCs) assigned to the specific ship class by the appropriate OPNAV warfare sponsor. Detailed ROCs ensure objective determination of minimum watchstation requirements.

Alternative 2 will measure OUS and CS as well as watchstanding and develop officer requirements from those results. The estimates from the proposal were 4-5 years and 10-12 man-years (with 4-5 months of training for the participating analysts) to complete the measurement.

The amount of time and resources required to complete this approach coupled with basic uncertainties about the validity of the products led the Working Group to reject this alternative.

OFFICER WORKLOAD MEASUREMENT

Ships alternative #3 is similar to #2 in that it is the other methodology which bases officer requirements on measured workload. The principal differences are in the workload breakdown. Rather than attempting to fit the officer workload into categories which were developed to measure enlisted workload, it examines categories more tailored to the things an officer spends his/her time doing.

First the directed requirements are identified. Next the watchstanding requirements are identified as well as the demands of special evolutions. The workload of the primary, collateral and training duties are measured by analysts aboard ship. To this workload, Service Diversion and Training Allowance and Productive Allowance are applied.

The discussions of this approach led initially to a conclusion that it should be attempted. Subsequently, however, because of the lack of previous success in measuring officer workload in this type of environment, the Working Group decided that the probability of success was not high enough to warrant the investment. Although the alternative was rejected, it was recommended that this workload measurement approach be used as necessary to supplement the other techniques which were accepted.

MISSION-ORIENTED REQUIREMENTS

Ships Alternative #4 is a relatively unsophisticated and inexpensive approach to document officer requirements based upon historical precedent, organizational needs, good management practices, size and complexity of the ship, training and experience requirements, and the ship's mission and required capabilities. Because the Working Group opted for this technique, it is presented in greater detail here.

This methodology examines officer requirements from three directions. The first includes those required by law or by the Standard Organization and Regulations Manual (OPNAVINST 3120.32A). The second direction requires an examination of the ship's mission as expressed in the Required Operational Capabilities (ROC) and Projected Operational Environment (POE). Officer requirements emerging from an analysis of the ROC and POE will be specified and, when possible, grade requirements or ranges will be assigned. For example, if the POE for a destroyer requires "continuous readiness condition III at sea", that would translate into (among other things) a requirement for three qualified officers of the deck, underway, qualified for task force operations - minimum grade 0-2.

The third consideration requires an examination of historical data to account for other officer requirements, regardless of designator, which support prudent organizational management and control (such as certain division officer assignments).

The requirements from the three categories would then be integrated to meet all requirements with the minimum of officer billets. Qualitative aspects would be assigned as a result of this integration process.

To implement this approach, a class at a time would be addressed beginning with smaller ships such as destroyers. Using the Standard Organization and Regulations Manual, a "straw-man" officer organization would be developed by experienced personnel with the rationale for each officer manpower space documented. This organization would then be presented to the appropriate fleet and type commanders for comment and revisions as appropriate. Similarly, the ROC and POE would be reviewed to ascertain the most demanding operational condition --and the operational manpower requirements will be identified and documented using historical

precedent and best judgment for determining quality. Again, the fleet CINC and type commander's review would be solicited. The resulting matrix could resemble Figure 3-1.

The left hand column is a listing of the organizational requirements gleaned from the SORM and class documents for a DD-963 destroyer. The minimum grade requirements for each billet is identified where relevant. The billets marked with the asterisks are clearly officer requirements for which adequate justification exists. An examination of the POE, the SMD, and relevant guidance from Type Commanders and fleet CINCS reveals the most demanding operational condition for this class to be Condition III, and the stations to be manned are identified across the top of the matrix. Minimum grade requirements are noted alongside the stations. The placement of an "N" beside a billet title indicates that, for planning purposes, the position is non-watchstanding at Condition III. The matrix is then completed in such a way as to ensure that operational manpower requirements are met within the scope of the organization. Billets which are not clearly required to be primary duties for officers are then assigned as appropriate.

For example, the Electronics Warfare Officer and the Intelligence Officer jobs can be assigned as collateral billets. In some cases billets may be designated as being best assigned to senior enlisted personnel. Finally, designators are added in the right hand column. When the data is completed and the fleet CINCS' and the type commanders' inputs have been worked into it, the results would be developed into a staffing guide. It would contain the officer requirements identified by grade and designator, along with the justification for each billet, and would be subjected to a process similar to the SMD fleet review. After approval, the staffing guide would serve as the supporting documentation for introducing the officer billets into the NMRS process as directed billets.

DESIGNATOR	GRADE	SMC 0-1	SMC 0-1	SMC 0-1	TAO 0-3	TAO 0-3	TAO 0-3	TAO 0-3	JOD 0-1	JOD 0-1	JOD 0-1	JOD 0-1	OOD 0-2	OOD 0-2	OOD 0-2	OOD 0-2
* Commanding Officer 0-5 (N)	1110	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
* Executive Officer 0-4 (N)	1110	0-4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
* Operations Officer 0-3	1110	0-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Communication Officer 0-1	1160	0-1	-	-	-	-	-	-	✓	-	-	-	-	-	-	-
CIC/NTDS Officer 0-2	1110	0-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
First Lieutenant 0-1	1160	0-1	-	-	-	-	-	-	✓	-	-	-	-	-	-	-
Electronics Warfare Officer (C)	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Intelligence Officer (C)	1110	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
* Navigator 0-2	1110	0-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
* Weapons Officer 0-3	1110	0-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electronics Material Officer 0-1	6180	0-1	✓	-	-	-	-	-	-	-	-	-	-	-	-	-
Gunnery Officer 0-1	1160	0-1	-	-	-	-	-	-	-	-	-	-	✓	-	-	-
Fire-Control Officer 0-2	1110	0-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ASW Officer 0-2	1110	0-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
* Engineer Officer 0-3	1110	0-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Main Propulsion Assistant 0-2	1110	0-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Damage Control Assistant 0-1	1160	0-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electrical Officer 0-1	1160	0-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aux Mach Officer 0-1	1160	0-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
* Supply Officer 0-3 (N)	3100	0-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disbursing Officer 0-1 (N)	3100	0-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(N) - Non Watch Stander
(C) - Collateral Assignment

Figure 3-1. Sample Integrating Matrix

The Working Group recommended that this approach be adopted for use by the Navy. It is estimated that 80% of the Navy ships could be documented at the class level within one year with two or three manyears of effort. The process will be more difficult and the matrix will be more complex on larger ships. The reliability of this technique in documenting the officer requirements for a ship as large as a carrier is questionable. It should be perfected on smaller ships, then applied to large ships.

SPAN OF CONTROL - SHIPS

Ships alternative #5 addressed an approach wherein existing manpower data would be used to develop officer/enlisted ratios by department and by class of ship. The Working Group considered that span of control was only one factor to consider in determining officer requirements, and therefore the product of this approach would not be effective in defending or justifying officer requirements. Accordingly, ships alternative #5 was rejected.

POINT SYSTEM

Ships alternative #6 is a methodology which contains a technique for establishing grade level requirements for officer billets. The Working Group rejected the methodology, but adopted the approach for determining grade levels.

The technique involves a point system, where characteristics of a billet would be scored. The factors which could play a role in the scoring would be requirements for educational background, leadership, management expertise, technical experience, span of control, size of ship, level of responsibility, organizational position of the billet, etc. The relative importance of the factors relevant to a billet would be assigned weights, or scores such that when totalled the points would fall within a range which would define a grade level. Considerable analysis would be required to develop such a system, but similar approaches have been used in

other environments (e.g., for grade determination in the Air Force and for level of salaried jobs in the National Electrical Manufacturers Association). Currently, the Army is testing a scoring system for evaluating billets to determine if they should be filled by civilians, officers, warrant officers, or senior enlisted.

Figure 3-2 provides an example of how such a system might be developed and applied. A number of factors might be relevant to a billet grade level, but these factors must be reduced to scorable or measurable elements. The minimum number of scoring elements which incorporate the maximum number of relevant factors is desired. This example proposes to look at each billet from 5 directions: the echelon of the billet in the command; the number of officer billets which report to the billet in question; the size of the department or division; the size of the ship; and the experience level required to competently man the billet. All scoring elements have been broken into 5 discrete score categories, and the points allocated are an attempt to quantify the relative importance of each. Extensive analysis and testing would be required to produce a reliable, justifiable, and consistently accurate system, but this example provides some ideas for consideration. Carrying the example a step farther, Figure 3-3 shows the results of applying the point system from Figure 3-2 to four billets on a destroyer and the same four billets on a carrier.

In this example, the CO, XO, Engineer Officer and Communications Officer are scored following the point system from the Figure 3-2. The scores are totalled on the bottom line, and, applying the key from the lower left corner, the system produces a commander for CO, lieutenant commander for XO, lieutenant for Engineer, and ensign for Communicator of the destroyer. The carrier would require a captain for CO, commander for XO, commander for Engineer, and lieutenant commander for Communicator. This is a relatively simple example, but it demonstrates how a point system could be applied.

LEVEL OF BILLET	CO	XO	DEPT. HD	DIV OFF	OTHER	SCORE
	90	40	20	10	0	—
NO. OF OFFICERS REPORTING	0	1	2-3	4-6	7 OR MORE	—
	0	20	40	80	110	—
NO. OF ENLISTED REPORTING	0-10	11-25	26-50	50-100	101 OR MORE	—
	10	20	30	50	70	—
CREW SIZE OF SHIP	1-100	101-400	401-800	801-1200	1201 OR MORE	—
	10	50	80	100	150	—
SHIPBOARD EXPERIENCE (YR)	0-1	1-2	2-3	4-5	6 OR MORE	—
	0	20	40	70	100	—
TOTAL						—

Figure 3-2. Point System

	DD			CV				
	C.O.	X.O.	ENG.	COMM.	C.O.	X.O.	ENG.	COMM.
LEVEL OF BILLET	90	40	20	10	90	40	20	20
NO. OFF. REPORTING	110	110	40	0	110	110	110	80
NO. ENL. REPORTING	70	70	40	10	70	70	70	30
CREW SIZE OF SHIP	50	50	50	50	150	150	150	150
SHIPBOARD EXPER. (YR)	100	70	70	0	100	100	100	70
TOTAL	420	340	220	70	520	470	450	350

SCORE GRADE

- 0-100 0-1
- 101-200 0-2
- 201-300 0-3
- 301-400 0-4
- 401-500 0-5
- 501-600 0-6

Figure 3-3. Comparative Sample

PIPELINE CONSIDERATIONS

The Working Group considered that the major aspect of ships alternative #7, the identification of officer training and career development billets, was being addressed by the Navy. The approach was rejected.

SIMULATION - SHIPS

The final methodology considered for ships involves simulation, a technique used successfully in a similar environment by the Air Force.

One of the problems associated with other methodologies for determining officer requirements is the difficulty in specifying requirements in an "at-sea, in wartime" environment. Any techniques which rely on data collection from operational units will tend to receive data which reflect conditions as they exist or are perceived, rather than how they would be in a wartime scenario.

This methodology involves the development of an interactive computer simulation model which will quantify the demand for officers in a family of wartime scenarios which encompass the more taxing aspects of the ROC and POE. Thirty or sixty day scenario periods would be used depending on the type of operation or taskings selected. Routine administrative workload of officers would be incorporated into the model with "ability to defer" factors assigned to each element of the taskings. Also important is an estimate of which workload must be superimposed over the operational demands during the scenario period. Enlisted workload would not be a factor in this simulation, but the areas where senior enlisted personnel could be called upon to relieve excessive demand on officers would be considered.

The principal inputs to the model would be ship class (which would call up a sample organization to test), ROC (which would identify the relevant scenarios), and POE (which

would define the conditions to be tested). The output would be a report examining the utilization of officers during the simulated period which would permit an effectiveness evaluation of the organization assigned.

For example, consider again a destroyer. Because of its diverse missions, several scenarios would be needed to provide adequate wartime data. Examples of relevant scenarios are: participation in a large amphibious operation; screening a group of resupply ships on a transit across the Pacific; assignment to a carrier task force on a strike mission; and so forth. For each scenario a series of discrete events would be developed with probabilities of occurrence for each. For each event, the officer manpower demand would be evaluated based upon the Condition required to meet the threat. An air attack for example, might necessitate manning Condition I stations for an hour, and this operational workload requirement would be superimposed over the Condition III watch requirements which had prevailed before and after the General Quarters incident.

If an amphibious operation is examined to develop related discrete events which might occur, we might consider attempted submarine interdiction of the amphibious task force en route to the Amphibious Operating Area (AOA); plane guard for the carrier providing air support; search and rescue mission; high speed surface attack at the AOA; provide gunfire support for troops ashore; and others.

Having included a family of events in the model, an amphibious operation scenario is run, and the computer generates probabilities of incidents occurring and creates a 30 day sequence similar perhaps to the example shown in Figure 3-4. The officer manpower demand is computed in the model based upon the operations in which the ship is engaged. The first four days are fairly routine with administrative work being accomplished and the Condition III

AMPHIBIOUS OPERATION

<u>DAY</u>	
1-4	IN TRANSIT, IN COMPANY (CONDITION III)
5	RENDEZVOUS, REFUEL
6-9	SCREEN ATF, NO INCIDENTS: REFUEL ON 9 TH
10	ASW ACTION, CONDITION I AS 6 HOURS
11	REGENERATE ASW CONTACT COND. I AS 3 HOURS
12	REFUEL, REPLENISH
13	SCREEN ATF, NO INCIDENTS
14	ENTER AOA: AOA DEFENSE SCREEN
15	PROVIDE GUNFIRE SUPPORT 8 HOURS
16	REFUEL: PLANE GUARD
17-20	OPERATE WITH CARRIER
21	REFUEL, RETURN TO AOA
22-24	DEFENSE OF AOA: NO INCIDENTS
25	ASMD THREAT: CONDITION I (3) HOURS
26	REFUEL, REPLENISH
27-30	DEFENSE OF AOA: NO INCIDENTS

Figure 3-4. Sample Amphibious Scenario

watches being stood. On the fifth day the destroyer rendezvous with the amphibious task force and refuels. On the tenth day the first non-routine action occurs when a submarine contact is generated, and then regenerated the following day. Other actions and assignments continue as shown for the remainder of the 30 day scenario period. Each day's events are evaluated by the computer to determine the workload hours of each officer billet in question. Therefore, the purpose of the simulation is to test the adequacy of an officer organization in the at-sea, in wartime environment. As an input to the computer run, a characteristic officer organization for the class of ships in question is used. A good source for this information would be a staffing guide developed as described in an earlier alternative. When the scenario and its associated events have run their course, the computer will report on the officer utilization by billet.

Figure 3-5 is an example of the type of information which could be provided for analysis. The model would probably not examine directed billets because there would be no reason to do so in the use of the model being considered here. As may be seen, the four billets analyzed were rather fully utilized during the 30 day period, but not unreasonably so for a wartime environment. The demands of the scenario were felt most by the Operations Officer billet which averaged 11.6 hours of work per day, a peak day of 16.2 hours, a peak seven day period of 87 hours, and 19 hours of routine work had to be deferred. This, of course, is the result of just one run using one scenario and the computer-generated events associated with the scenario. A series of runs should be made to enable a thorough testing of the organization under a variety of wartime circumstances. As long as the scenarios are realistic, the events are plausible, and the watchstation demands are in accordance with recognized policy, the output of this type of simulation would have credibility in Congress.

UTILIZATION REPORT

	<u>AVERAGE HOURS</u>	<u>PEAK WEEKLY HOURS</u>	<u>DAILY HOURS</u>	<u>DEFERRED HOURS</u>
COMMANDING OFFICER - DIRECTED BILLET				
EXECUTIVE OFFICER - DIRECTED BILLET				
OPERATIONS OFFICER -	11.6	87.0	16.2	19
COMMUNICATIONS OFFICER -	10.8	80.1	12.5	11
NTDS-CIC OFFICER -	11.0	83.5	15.1	8
FIRST LIEUTENANT -	10.5	78.0	12.0	0
ETC.				
ETC.				

Figure 3-5. Sample Simulation Output

Ships alternative #8 was accepted by the Working Group as a valid methodology for requirements determination for officers.

CURRENT APPROACH - SQUADRONS

The first squadron alternative addresses the current approach. The Navy has developed crew seat ratios for all of its aircraft and these serve as the basis for determining the flight crew requirements, quantitatively. These requirements are applied to staffing tables which encompass certain policy items, such as the ranks of the CO and XO, and then spread a rational rank structure for the remainder of the officers. The flight crew billets are supplemented by a contingent of ground officers, the content of which is identified by the application of the Ground Officer algorithm. More details on the application of the Ground Officer algorithm are contained in Appendix I.

Based primarily upon the faults of the current approach cited in the Aviation Officer Requirements Analysis and summarized in Chapter II of this report, squadrons alternative #1 was rejected.

TACFLIER - NAVY VERSION

TACFLIER is a computer simulation model developed by the Tactical Air Command of the Air Force. It uses a variety of hostile action scenarios to create the most demanding condition for manpower. It simulates discrete events and generates probabilities of those events occurring. The inputs to the model are operational parameters and a flight schedule. The model generates a crew seat ratio as its output. Some of the relevant considerations are aircrew availability and the flight schedule parameters. For example, a particular aircrew may not be available for a specific crew activity for the following reasons: (1) may be preparing for a period of alert, waiting for an alert mission, and thus ineligible for any other crew activity; (2) may already be flying a

mission and will not be available until after landing and (normally) completion of post mission activity; (3) a mission without embedded crew rest requiring a crew does not land until after the end of the flight duty period; (4) a mission without embedded crew rest requiring a crew does not land until after the end of the flight duty period plus some period of flight duty extension; (5) may not be qualified for the mission; (6) may be in crew rest or in extended crew rest; (7) may have been shot down previously and either lost or recovered and recuperating; (8) may be on emergency leave; (9) may be medically disqualified; (10) may be duty not involving flying (DNIF) and available only for additional scheduled ground duties. Elements of the Flight Schedule are displayed in Figure 3-6.

A Navy version of the TACFLIER has been developed with changes initiated as necessary to ensure that the model would accurately reflect Navy requirements and that there would be no dependence upon the Logistics Composite (LCOM) model for inputs. The Working Group recommended implementation of the stand-alone Navy version of TACFLIER for developing crew seat ratios for the Navy.

SPAN OF CONTROL - SQUADRONS

Although the objectives of squadrons alternative #3 were accepted by the Working Group, the methodology was considered to be overly complex. Accordingly, a simplified version was developed.

The Working Group recommended that ground officer Staffing Guides be prepared by OPNAV and reviewed by the functional wing, the type commander and the CINC for each type of squadron in the fleet. Furthermore, it recommended that each Staffing Guide contain a set of fixed ground officer requirements which are considered vital to that squadron, regardless of the aviator population. After the fixed ground officer requirements are established, the variable administrative support augment would be determined by aircraft type and it would be keyed, of course, to flight crew requirements.

FLIGHT SCHEDULE PARAMETERS

- (1) NUMBER OF DAYS OF THE SIMULATION.
- (2) START TIME FOR THE FIRST MISSION BRIEF OF EACH DAY.
- (3) LENGTH OF BRIEFING/PREFLIGHT.
- (4) FLIGHT LENGTH.
- (5) CYCLE TIME (PLUS ANTICIPATED VARIATIONS).
- (6) NUMBER OF A/C AND STANDBYS REQUIRED FOR EACH LAUNCH.
- (7) ATTRITION RATE.
- (8) AIR ABORT RATE.
- (9) DECK ABORT RATE.
- (10) FLUCTUATIONS IN LANDING TIME.
- (11) NUMBER OF DAYS TO REPLACE A LOST A/C.
- (12) NUMBER OF FUNCTIONAL TEST FLIGHTS.
- (13) AIRCRAFT REQUIREMENTS PROFILE.
- (14) AIRCRAFT AVAILABILITY PROFILE.
- (15) FLIGHT LEAD REQUIREMENTS, INCLUDING ALERTS, STANDBYS,
AND FUNCTIONAL TESTS.
- (16) ALERT REQUIREMENTS.
- (17) AD HOC FLIGHT REQUIREMENTS.

Figure 3-6. TACFLIER Flight Schedule Parameters

After the quantitative requirements have been established, a prioritized staffing table would be entered to provide the grade level and designator information.

Once these ground officer relationships are developed, the requirements could be calculated and entered into the NMRS as directed billets. Alternatively, they could be computed in the NMRS based upon the type of squadron, crew seat ratio and number of aircraft.

SUMMARY

The actions of the Working Group are summarized as follows:

- Accept the Mission-Oriented Requirements alternative for ships.
- Accept the Simulation Alternative for ships.
- Accept the grade level determination technique presented in the alternative entitled Point System.
- Accept the TACFLIER alternative for squadrons.
- Accept the modified approach to determining Ground Officer requirements.
- Accept Officer Workload Measurement as a standby technique to be used as needed to supplement the other methodologies.
- Reject all other alternatives.

CHAPTER FOUR
RECOMMENDATIONS

CHAPTER IV
RECOMMENDATIONS

GENERAL

As a result of this study, several recommendations have been developed to address the problem of determining officer requirements at the unit level. They are presented below under the headings of Ships and Aviation Squadrons.

SHIPS

- Initiate the development of Staffing Guides for ships following the methodology outlined in the Mission Oriented Requirements alternative.
- Commence development of the computer simulation model described in the Simulation-Ships alternative.
- Commence development of the grade level evaluation technique outlined in the modification of the Point System alternative.

AVIATION SQUADRONS

- Implement the Navy version of TACFLIER as the Navy source of crew seat ratio information for use in determining flight crew requirements.
- Initiate the development of Staffing Guides for Ground Officers in Aviation Squadrons.
- Develop the Point System approach to grade determination for use in squadrons.

Cost estimates for the development of the aforementioned alternatives are displayed in Figure 4-1. These estimates are based upon the contractors understanding of the level of effort required and the expertise of the personnel available to do the work. The cost estimates for all of the alternatives are based upon a rate of \$60,000 per man-year of effort.

	FY82	FY83	FY84	FY85	FY86	FY87
SHIPS						
1. SHIP STAFFING GUIDES*	25K	100K	---	---	---	---
2. POINT SYSTEM	---	100K	30K	---	---	---
3. SIMULATION	---	---	180K	120K	120K	120K
SUBTOTAL	25	200	210	120	120	120
SQUADRONS						
1. TACFLIER (NAVY VERSION)	---	---	---	---	---	---
2. GROUND OFF. STAFFING GUIDES*	25K	100K	---	---	---	---
3. POINT SYSTEM	---	60K	---	---	---	---
SUBTOTAL	25	160	0	0	0	0
GRAND TOTAL	50K	360K	210K	120K	120K	120K
* MAY BE DONE INHOUSE						

Figure 4-1. Resource Requirements

CHAPTER FIVE
SUMMARY OF THE
ADVISORY COMMITTEE'S DECISIONS

CHAPTER V

ADVISORY COMMITTEE'S DECISIONS

GENERAL

The Advisory Committee stated that, "The Study, as supported by the OP-96 CSTAP, is completed and responsive to the tasking. The findings are useful, however, the narrow scope of the study argues against continuing implementation until the concept of determining total officer requirements is developed." "Additionally, before proceeding we should insure that the wartime scenario depicted is the most demanding in officer requirements (vis-a-vis a peacetime scenario with high administrative and collateral workloads)." The computer simulation for ships was rejected by the Advisory Committee. The following alternatives were approved for future development:

SHIPS

- Develop STAFFING GUIDES for each class of ship.
- Develop a POINT SYSTEM approach to grade level determination for ships.

AVIATION SQUADRONS

- Continue the use of TACFLIER for computation of crew seat ratios.
- Develop STAFFING GUIDES for aviation ground officers.
- Develop a POINT SYSTEM approach to grade level determination for aviation squadrons.

APPENDIX A
STUDY DIRECTIVE



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO

Ser 96/593700
MAY 30 1980

From: Chief of Naval Operations
To: Distribution List

Subj: Study Directive for the Development of Officer
Requirements

Ref: (a) CNO ltr Ser 96/S193073 of 25 Sep 79 (CSTAP-80)

Encl: (1) Guidance for CNO Studies and Analysis
(2) Manning Requirements

1. Title. Development of Officer Requirements.
2. Type. CNO Study with contract support.
3. Background. Requirements for U.S. Navy Officers at the unit level have evolved over the years from justification by individual commands to decisions by the Navy Department. OPNAV currently authorizes billets by issuing a unit Manpower Authorization (MPA) (OPNAV Form 1000/2) to fill these requirements. The evolution of manpower authorizations constitutes the current total authorized billets Navy-wide. Changes to manpower authorizations are made by requests from an individual command or sponsor.
4. Expected Impact. The findings of this study will be used to improve the identification and documentation of officer requirements at the unit level in the Navy.
5. Objective. Analyze methodologies used by the Navy, other Services, and DOD agencies to determine the requirements for officers. Processes used by industry to determine the number of executives also will be analyzed. Alternatives to improve the Navy's methodology and an analysis of their costs and expected benefits will be identified. An improved methodology for the Navy Manpower and Material Analysis Centers to use to determine the requirements for officers at the unit level during total peacetime and wartime will be recommended. Requirements for officers within individual communities (specialties) will be reviewed.
6. Specific Guidance. The specific tasks are:
 - a. Document the processes used to determine the requirements for officers by unit within the Navy, other Services, DOD agencies, and the private sector.

Subj: Study Directive for the Development of Officer Requirements

(1) Summarize the results of prior studies of requirements for officers by unit.

(2) Document methods used by the Navy, other Services, DOD agencies, and the private sector for determining the requirements for officers.

b. Using the results from 6.a., evaluate alternative methodologies for determining the requirements for officers.

(1) Identify methodologies applicable to the Navy.

(2) Identify the advantages and disadvantages of each methodology applicable to Navy requirements.

(3) Evaluate cost, manpower, training and time required to implement and operate each methodology.

c. Recommend changes to the Navy's methodology for determining officer requirements. Justify recommended changes in terms of Navy requirements, cost to implement, cost to operate after implementation and ease of implementation.

d. Observe the guidance of enclosure (1) for the treatment of assumptions, key parameters and qualitative measures and for the documentation of the methodology used.

e. Explicitly identify in the report the factors which are important to the analysis.

f. Enumerate in the Study Plan the specific units to be analyzed.

7. Coordination and Review.

a. The study sponsor is the Deputy Chief of Naval Operations (Manpower, Personnel and Training) (OP-01). The cognizant office is the Director, Total Force Planning Division (OP-11).

b. LCDR R. T. Martel, OP-111E1, is designated Project Officer (Room G830, Arlington Annex, X44931). Commander L.E. Curran, OP-964D1, is designated the OP-96 Study Monitor (Room 4A478 Pentagon, X76136).

Subj: Study Directive for the Development of Officer Requirements

c. The Advisory Committee will be comprised of OP-01 (Chairman), OP-090, OP-02, OP-03, OP-04, OP-05, OP-06, OP-96, and OPA. Chief of Naval Education and Training and the President of Center for Naval Analyses are invited to participate as members of the Advisory Committee. Commands and agencies are to forward to the Project Officer their nominations for the Advisory Committee and point of contact within two weeks of the date of this directive.

d. Composition of the Study Group will be in accordance with enclosure (2). Nominations for the Study Group are to be forwarded to the Project Officer within two weeks of the date of this directive.

e. The Director, Systems Analysis Division (OP-96), shall conduct a technical review to monitor progress and ensure quality of the study. The working papers and reports shall be reviewed for validity and completeness and an independent technical evaluation of the final report shall be conducted. Results from the review shall be promulgated to the Advisory Committee and the CNO Project Officer by OP-96.

8. Reporting.

a. The Study Plan will be presented to the Advisory Committee on 5 Jan 81.

b. The Project Officer shall submit quarterly progress reports to OP-96 in accordance with current instructions.

c. Meetings of the Advisory Committee shall be called by the Chairman when required and at least quarterly to provide guidance to the study group and review and evaluate study progress.

d. Preliminary results from the effort devoted to the documentation of alternative systems and attendant costs and benefits will be reported to the Advisory Committee by 4 Feb 1981. The integration, summarization and evaluation of alternatives will be briefed by 1 Apr 1981. The draft final report will be submitted to the Advisory Committee for review by 22 Apr 1981.

Subj: Study Directive for the Development of Officer Requirements

e. The study report will be promulgated by 30 May 81.



M. S. HOLCOMB
Vice Admiral, U.S. Navy
Director, Navy Program Planning

Distribution:

CNET

President, CNA

OPs-090, 96, 01, 02, 03, 04, 05, 06

COMNAVMILPERSCOM

Copy to:

SECNAV, OPA

OPs-964, 966, 10, 101, 11, 110, 111, 112, 12, 122, 13, 130,
132, 136, 14, 141, 29, 39, 49, 55, 59, 09B, 09R

GUIDANCE FOR CNO STUDIES AND ANALYSES

1. The assumptions which are of great importance to the outcome of the analysis shall be clearly stated in the introduction of the report. Also, at the beginning of each chapter, annex or appendix the complete set of assumptions which are applicable shall be listed. The analysis shall determine the effects of alternative assumptions when these are critical to the study results.

2. A clear and concise description of each model or simulation shall be included in an appendix to the report unless such description is available in an already published document and is referenced in the report. This description shall explain in qualitative terms (including a logic diagram) the general methodology which provides the basis for the model. Detailed design specifications for each model, or reference to a permanent OPNAV file in which these design specifications are held, shall be included in the permanent files of this study.

MANNING REQUIREMENTS FOR THE OFFICER MANPOWER
REQUIREMENTS STUDY

1. General. Personnel assigned to the Study Group should have a general or specific knowledge of officer requirements and programs and should also be familiar with the procedures for establishing officer billets and requirements. Each representative will be responsible for keeping his parent command informed of the progress of the study and making the view of his parent command known to the study project officer.

<u>COMMAND</u>	<u>RANK</u>	<u>NO</u>	<u>DURATION</u>	<u>SPECIALTY</u>
OP-01				
(OP-101)	CDR/LCDR	1	Part Time	Officer Manpower - Policy and Objectives
(OP-110)	GS-14	1	Part Time	Industrial Engineer OPS Research Analyst
(OP-111)	CDR/LCDR	2	Part Time	Project Officer, Asst. Proj. Officer - Manpower Requirements
(OP-112)	CDR/LCDR	1	Part Time	Officer Requirements Analysis
(OP-122)	CDR/LCDR	1	Part Time	Officer Billet Programming/Quality Control
(OP-130)	CDR/LCDR	1	Part Time	Officer Strength Plans
(OP-132)	CDR/LCDR	1	Part Time	Officer Personnel Program Requirements
(OP-136)	CDR/LCDR	1	Part Time	Officer Career Programs
(OP-141)	GS-11/12	1	Part Time	Navy Civilian Position Classification
OP-02				
(OP-29)	CDR/LCDR	1	Part Time	Submarine Officer Requirements

<u>COMMAND</u>	<u>RANK</u>	<u>NO</u>	<u>DURATION</u>	<u>SPECIALTY</u>
OP-03 (OP-39)	CDR/LCDR	1	Part Time	Surface Warfare Officer Requirements
OP-04 (OP-49)	CDR/LCDR	1	Part Time	Logistics Requirements
OP-05 (OP-55)	CDR/LCDR	1	Part Time	Carrier (CV) Officer Requirements
(OP-59)	CDR/LCDR	1	Part Time	Aviation Officer Requirements
OP-090	CDR/LCDR	1	Part Time	Officer Requirements Policy/Plans
OP-96	CDR/LCDR	1	Part Time	Consultant when called
NMPC-2	CDR/LCDR	1	Part Time	Officer Career Progression
NMPC-4	CDR/LCDR	1	Part Time	Officer Assignment Requirements
OP-09B	YN	1	Part Time	
OP-09B	Clerk-Typist (GS-4)	1	Part Time	

NOTE: Subsequent to the initial meeting of the Study Group, minor adjustments may be made to achieve an optimum balance of personnel assigned.

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RESOURCE CONSULTANTS INC MCLEAN VA
DEVELOPMENT OF OFFICER REQUIREMENTS STUDY. (U)
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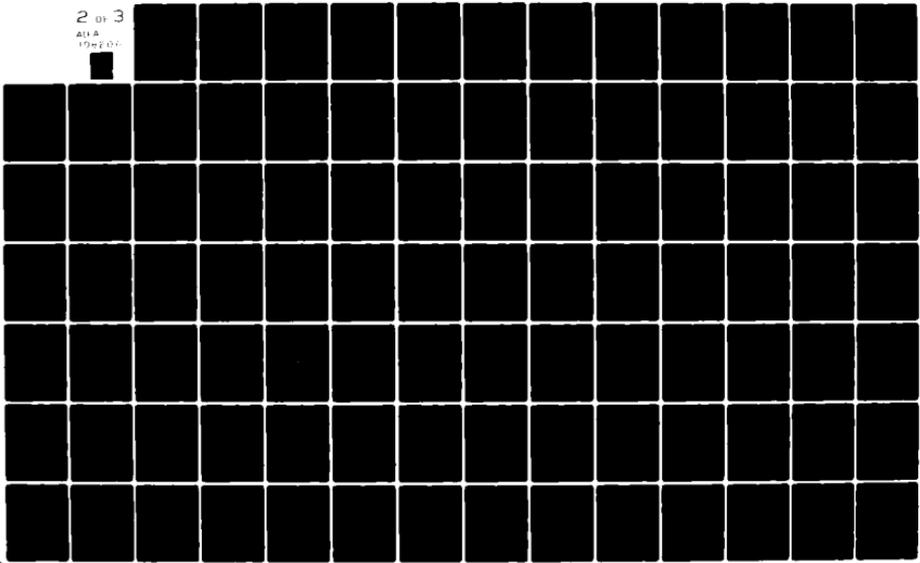
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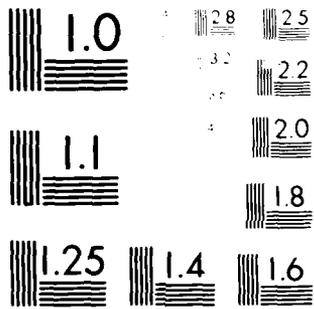
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2 of 3

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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

APPENDIX B

STUDY PLAN



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO

Memo 111E1/17-81
03 FEB 1981

MEMORANDUM FOR THE VICE CHIEF OF NAVAL OPERATIONS
DIRECTOR, NAVY PROGRAM PLANNING (OP-090)

Subj: Development of Officer Requirements Study Plan;
forwarding of

Ref: (a) OPNAVINST 5000.30C

Encl: (1) Study Plan for the Development of Officer Requirements
Study

1. Enclosure (1) has been approved by the Advisory Committee in accordance with reference (a) and is forwarded for information and retention.

Lando W. Zech, Jr.
LANDO W. ZECH, JR.
Vice Admiral, U. S. Navy
Deputy Chief of Naval Operations
(Manpower, Personnel and Training)

Copy to:
OP-96/96C/964D1/966/966C
OP-11/110P/111D/111E/112D22
OP-12/122C
OP-13/130C3/132D/132E/132E1/132E2/136C2
OP-14/141C2
OP-02/29/291
OP-03/39/391
OP-04/49/492
OP-05/55/551/59/597C
OP-06/60/602D
OPA
CNET
CNA
COMNAVMILPERSCOM (213, 461C)
CIC (MPC-20)
NAVMACLANV
NAVMACPC

STUDY PLAN FOR THE
DEVELOPMENT OF OFFICER REQUIREMENTS
STUDY

Ref: (a) CNO ltr Ser 96/593700 of 30 May 80

1. Background. Requirements for U.S. Navy officers at the unit level have evolved over the years, and requirements vary among warfare and specialty communities. These requirements have been initiated at all management levels from an individual unit to the Warfare Sponsor in the Office of the Chief of Naval Operations. OPNAV currently authorizes billets by issuing a unit Manpower Authorization (MPA) (OPNAV Form 1000/2) to fill these requirements. The evolution of manpower authorizations constitutes the current total authorized billets Navy-wide. Changes to manpower authorizations are made by requests from individual commands or sponsors.

2. Objectives

a. This study will analyze the methodologies used by the Navy, other Services, and DOD agencies to determine requirements for officers. The documented processes used by industry to determine the number of executives will also be analyzed. Alternatives will be identified which have potential for improvements to the Navy's methodologies for determining officer requirements for ships and aircraft squadrons. The anticipated costs of methodology implementation and benefits of each alternative methodology will also be identified. Improved methodologies for the development of officer requirements for ships and aviation squadrons will be recommended to the Study Sponsor for subsequent use by the Navy Manpower and Material Analysis Centers.

b. This study may produce one or more methodologies which could enhance or improve those currently in use. This could have a significant resource impact. Changes to the numbers or mix of officers in ships and squadrons may be one such outcome. An increase in training requirements could also result. Another potential resource-related outcome which could accompany the implementation of a new requirements determination technique could involve changes to the data collection techniques currently used for manpower requirements determination and could require increased workload at the Navy Manpower and Material Analysis Centers. If the enhanced methodologies were to rely upon workload data as an input to the process, data collection could be a significant factor.

Any changes to the methodology for the determination of officer requirements may require processing changes to the Navy

Manpower Requirements System (NMRS). Because of the design of the NMRS, however, this should not be a major expense or consideration.

3. Scope and Depth. A significant amount of data collection and analysis could be dedicated to this effort to ensure the thorough consideration of nearly all relevant officer manpower determination techniques. The level of effort specified for the work is approximately one contractor man-year. As specified in the Study Directive, the data collection phase will "Summarize the results of prior studies of requirements for officers by unit." The methodologies will be documented using a standardized technique to facilitate the analysis. To locate relevant non-military executive requirements determination methodologies, professional industrial engineers will be consulted.

The initial task of the analysis phase will involve the use of a scorecard which will enable an evaluation of all methodologies located during the literature search on the same basis. A statistical analysis of the scorecard gradings will be used to identify the most relevant methodologies. An analysis of these results will lead to recommendations for changes to the Navy's current approaches.

4. Specific Guidance

a. The study will be limited to officer requirements determination methodologies applicable to ships and aircraft squadrons.

b. The methodologies sought must be compatible with the environment; identification of a single multi-purpose methodology to apply to ships and aircraft squadrons is not an objective of this study.

c. Particular attention should be paid to the methodologies employed by the U.S. Air Force.

d. Where time or financial resources limit the scope of the study, priorities of methodologies are established as follows:

- (1) Services
- (2) Other government agencies
- (3) Private sector.

All three must be examined to some degree in the course of the study, but if time or funds limit the depth of the study, the above priorities apply.

5. Effectiveness Criteria. Not applicable.

6. Tasks and Methodology

a. Task 1

(1) Task:

Document the processes used to determine the requirements for officers by unit (e.g., Navy ship and aircraft squadrons) within the Navy, other Services, DOD agencies, and the private sector:

(a) Summarize the results of prior studies of requirements for officers by unit.

(b) Document methods used by the Navy, other Services, DOD agencies, and the private sector for determining the requirements for officers.

(2) Methodology:

This task will require the identification of, location of, and documentation of an inventory of military and non-military officer and executive manpower requirements determination methodologies and processes. A detailed description of each methodology, process, or prior study reviewed will be developed using a standard description format which will highlight a set of evaluation factors. By describing each manpower requirements determination methodology or prior study in the same fashion, comparison among methodologies will be facilitated.

In examining the existing methodologies in ships and aviation squadrons, data will be collected from a variety of ship types (e.g., CV, SSBN, CG, LKA, FFG, etc.) and squadrons (e.g., VA, VS, VP, VT, etc.) to identify variations in methodologies between classes. This data collection can serve as a baseline for validating the types of data to be collected from non-Navy services.

b. Task 2

(1) Task:

Using the results from Task 1 above, evaluate alternative methodologies for determining the requirements for officers by:

(a) Identifying methodologies applicable to the Navy.

(b) Identifying the advantages and disadvantages of each methodology applicable to Navy requirements.

(c) Evaluating cost, manpower, training, and time required to implement and operate each methodology.

(2) Methodology:

To facilitate the evaluation of methodologies the contractor will develop a scoring system or "scorecard". It will serve to ensure that each manpower requirements determination methodology is evaluated on the same basis with a minimum of evaluator biases. The key elements of the scorecard are the factors selected and the relative weighting of each factor. After the scorecard is developed, it will be reviewed by an expert panel selected from within the Navy. The panel members will assign weightings to each factor based upon an understanding of the Navy manpower requirements determination environment. The final version of the scorecard will be developed based upon an analysis of the inputs from the panel.

After the scorecard has been approved, a team of contractor personnel will score each manpower requirements determination methodology which emerges from Task 1. The validity of the methodologies and the scorecard factors will be evaluated based upon the scoring. If revisions to the scorecard appear appropriate, they will be recommended to the Project Officer. The methodologies will then be scored by the Working Group. Appropriate statistical analysis of the results will be conducted to ensure valid and supportable output.

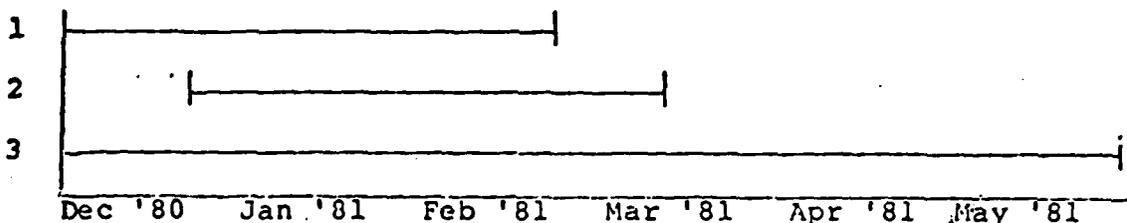
Criteria for determining feasible methodology alternatives will be established, and the various methodologies evaluated as feasible alternatives will then be presented to the Working Group for consideration and selection.

c. Task 3

Prepare briefings and working papers, as required by the Project Officer, based on the results from Tasks 1 and 2 above. Develop the final study report in accordance with the guidance provided in the CNO Project Officer's Handbook for Studies Management. The study report will include a discussion of the techniques and methodologies used in the study, a review of each manpower requirements determination method considered, and the study findings.

7. Task Schedule

Tasks



The task schedule above portrays the phasing and overlaps of the various tasks. Task 1 will phase down somewhat in February and will necessarily end by 1 March in order to permit the completion of Task 2 as shown. Task 3 is extended until May 30 to coincide with the date established for the publication of the Final Report.

8. Manpower Allocation

Approximate man-month allocation for each task is estimated as follows:

- Task 1 - 5 Man-months
- Task 2 - 4 Man-months
- Task 3 - 3 Man-months

9. Funding Allocation

Approximate funding requirements for each task are estimated as follows:

- Task 1 - \$16,600
- Task 2 - \$14,500
- Task 3 - \$10,000

10. Other Resources. The extent and complexity of the statistical analysis required by Task 2 will depend upon the volume of data accumulated. Computing requirements will be reported to the Project Officer by 1 February 1981.

11. Reports

<u>Report/Briefing</u>	<u>Draft Due</u>	<u>Publish/Deliver</u>
Brief Working Group	--	12/10/80
Brief OP-11	--	12/18/80
Brief OP-01	--	12/29/80

<u>Report/Briefing</u>	<u>Draft Due</u>	<u>Publish/Deliver</u>
Monthly Progress Report	--	1/10/81
Brief Working Group	--	1/22/81
*Brief Advisory Committee	--	2/04/81
Monthly Progress Report	--	2/10/81
Monthly Progress Report	--	3/10/81
Brief Working Group	--	3/18/81
*Brief Advisory Committee	--	4/01/81
Monthly Progress Report	--	4/10/81
Brief Working Group	--	4/15/81
Brief Advisory Committee	--	4/22/81
Monthly Progress Report	--	5/10/81
Final Report	4/18/81	5/30/81

*If required

12. Coordination. Incident to the collection of data for Task 1 of this study, the Study Group will interact with:

ASD(M, RA&L)
 ASSTSECNAV MRAL
 NAVHMACLANT/NAVMMACPAC
 U.S. Army, DCS Personnel
 U.S. Air Force, DCS Manpower and Personnel
 U.S. Marine Corps, DCS for Manpower
 U.S. Coast Guard
 Other government agencies - (such as HHS, HUD, VA, NOAA,
 etc.)
 Selected elements of private industry.

APPENDIX C

OFFICER MANPOWER REQUIREMENTS PLAN

NAVMACLANT, 20 APRIL 1978

OFFICER MANPOWER REQUIREMENTS PLAN

1. Background. U.S. Navy officer manpower requirements have evolved over the years through individual command justification and/or Navy Department decisions. Existing billets are authorized by OPNAV through issuance of a unit manpower authorization. The aggregation of manpower authorizations constitutes total authorized billets Navy wide. Changes to these manpower authorizations may be requested by an individual command. Since there is no historical record of all of the manpower decisions, the Navy Department is unable to provide adequate justification for overall officer strength.

2. Objective. The objective of this plan is to initially determine total officer requirements through utilization of existing manpower programs, and the identification of requirements in areas not presently covered. This approach is based on the use of existing resources without impinging upon current tasking. Areas of endeavor through which long term improvement in all officer programs can be obtained are identified and discussed.

3. Initial Coverage. For the purposes of this plan, the officer community will be divided into four general classes and discussed individually.

a. Class 1 Shipboard and Afloat Staff Billèts

(1) The SMD program presently incorporates the existing manpower authorization (OPNAV 1000/2) into the Ship Manpower Document (SMD). No program exists for the determination of afloat staff requirements. NAVMACLANT is in the process of developing officer requirements determination procedures for utilization by SMD teams aboard ships. Upon successful testing of these procedures, NAVMACLANT will adapt that methodology to provide afloat staff coverage within the SMD program.

(2) The SMD officer requirement procedures being developed are based on the identification and documentation of two types of billets:

(a) Directed billets - those billets that are directed by higher authority or by law. For example, OPNAVINST 3120.32 directs that there will be a CO, XO and certain department heads on ships and in aircraft squadrons; U.S. Code Title 10 directs that the CO of an aircraft carrier shall be an aviator.

(b) Mission related billets - those billets based on functions necessary to carry out the required operational capabilities or unit mission; e.g., officer watch stations or functional duties such as Combat Information Center Officer. Also included are those billets required in support of prudent organizational management or control, such as a departmental assistant or division officer. OPNAVINST 3120.32 will provide the basic shipboard organization.

(3) Officer requirements aboard ships and afloat staffs will be developed on the unit level. A zero base will be initially assumed. Directed and mission related requirements will be identified and documented. The requirements would be evaluated to determine the necessary grade, designator, naval officer billet code (NOBC) and subspecialty, as appropriate. Initially ship class or type documents will be developed to utilize economy of scale. After initial coverage by class, documents could be developed for individual commands by a process similar to the existing SMD fleet review. It is anticipated that the proposed methodology will result in Category III point standards (Appendix A).

b. Class 2 Aircraft Squadron Billets. Documentation of squadron officer billets is being conducted by the Squadron Manpower Document (SQMD) program. SQMD officer requirements fall into two distinct categories: Flying and non-flying billets. Flying billets are developed either in response

to specific mission tasking (seat factor) from the warfare sponsor or as a result of both documented and survey data in the area of instructor utilization. Non-flying billets are determined on the basis of an algorithm developed by a joint OPNAV/BUPERS/NAVAIR Committee. In developing this algorithm, the committee reviewed workload and billets determined by prior manpower surveys. Officer determination in the SQMD program is essentially of standards Category II/III reliability.

c. Class 3 Shore Support Activities. Manpower requirements for shore support activities are determined and documented through the Shore Requirements, Standards, and Manpower Planning System (SHORSTAMPS). Requirements, including officer requirements, are predicated upon physical configuration, workload, specified operating parameters, required operating capabilities, and doctrinal constraints, such as standard workweeks, leave policy, etc. Shore Required Operational Capability (SHOROC) is a structured functional tasking vocabulary which will eventually cover all mission areas and tasks ashore. SHOROC tasking is linked with work center staffing standards to determine manpower requirements. The predetermined and premeasured staffing standards are derived from the application of accepted industrial and statistical techniques. They reflect, at varying workload volumes, the manpower cost of performing a number of reasonably homogeneous activities grouped into a work center and provide a means of programming present and future manpower requirements. Shore Manpower Documents (SHMDs) are developed for activities that are part of the shore establishment. The documents delineate the manpower required at a given activity based on SHOROC tasking and the application of approved work center staffing standards. Officer requirements will be documented in the shore establishment as staffing standards are developed for the various mission areas. SHORSTAMPS produces Category II/III/IV standards.

d. Class 4 Headquarters Assets and Shore-based Staffs

(1) Staff Manpower Documents (STMDs) are planned to document manpower requirements for ashore staffs and headquarters organizations. When staffing standards and tasking language have been developed, these components will be included in SHORSTAMPS. Due to the nature of the functions performed by officers and the lack of clearly defined tasking statements, the development of objective requirements is most difficult. The essence of objective determination is the ability to identify and quantify actions required to efficiently perform mission driven functions. Functions performed within headquarters and shore staffs are frequently unspecified; workload is primarily non-repetitive, often response oriented, and frequently unique in nature. Currently used management engineering techniques are based on the measurement of repetitive functions. However, the size of the shore establishment and grade composition of the existing structure make it imperative that procedures be developed for effective officer coverage until such time as SHORSTAMPS can effectively expand into this area.

(2) In order to achieve initial coverage in this class, it is proposed that computer analysis be conducted to compare the individual unit manpower authorization with actual unit manning during the previous 18-month period. The underlying assumption to this approach is that if a billet has been vacant for the previous 18-month period, the functions associated with that billet have been absorbed within the unit. Therefore, the billet is no longer a valid requirement. Informal liaison with Pers-4D has indicated that they, in conjunction with Pers-3C, can produce such a computer analysis. Billets that have been filled will remain on the manpower authorization. A listing of those billets which have been vacant will be forwarded via the manpower claimant to OP-100 for action, with the recommendation that they be deleted.

NAVMMACLANT will provide program guidance and evaluation of the analysis through utilization of temporarily available assets from other programs on a not to interfere basis. It is acknowledged that documentation in this manner is less than ideal, however, it will provide interim coverage and permit the formulation of an officer zero base case. This procedure will result in Category IV point standards.

4. Personnel Planning and Requirements Integration

a. Up to this point the plan has been based solely on requirements derived at the unit level and then aggregated to establish the base case--the minimum officer manning to accomplish the Navy mission. To be realistic, however, personnel planning and authorization management considerations such as accession planning, training pipeline, and career progression must be introduced to obtain true requirements. Personnel planning billets are those which are required in support of inventory management, and which have no direct relationship to any given unit or activity mission. They need to be determined and managed on a Navy-wide basis after determination of the base case. The specific requirements for personnel planning billets will be identified at the BUPERS level, based on the central billet file. These billets will be distributed to those activities which can best utilize and train incumbents. For example, accession planning, based on requirements developed by various manpower programs, may identify the need for accession of a certain number of ensigns in order to provide adequate inventory in the out years. Thus, if the aggregate of requirements is insufficient to meet the accession figure, it will be necessary to authorize billets primarily for that purpose. These billets would be authorized at units which can support personnel development. Typically, 1160 designator personnel planning billets, if required, would be distributed among fleet units where surface warfare qualifications could be attained. These billets,

integrated into the unit organization, would be designated as personnel planning billets on the manpower authorization. It should be emphasized that the intent is to ensure that inventory will be compatible with, and in support of, justifiable requirements, not the primary factor driving those requirements.

b. The officer manpower requirements determined in each case will be added together to form a zero base case upon which personnel planners would apply personnel flow considerations. Individual unit manpower authorizations would be marked as having been validated. Where SHORSTAMPS addresses functional areas across numerous commands, only those billets affected would be validated. Purification of the billet file in this manner would not interrupt essential planning programs, and as the percentage of validated billets increases, the results of such planning will more closely match actual requirements and thereby enhance justification of total officer strength. This methodology will ensure that billets are not inadvertently deleted in the process since each existing billet will remain on file until such time as it is validated or intentionally removed.

5. Program Improvement. Once the need for a particular billet is identified, the manpower analyst must evaluate that billet in comparison with established criteria to ascertain the proper billet descriptors; i.e., grade, designator, subspecialty, and NOBC. At the present, criteria in the first three of these areas, as well as that relating to junior officer/senior enlisted interface, are subjective and the guidance provided is often inadequate. Criteria improvement in each of these areas is required in order to enhance the accuracy and credibility of the officer requirements determination process in the future. The following actions are either in progress or recommended:

a. Officer Grade Determination. This is imperative in view of legislation controlling the number of personnel assigned in the grade of 04 and above. Grade determination in operational units can frequently be based upon the time required to reach a specified level of professional warfare expertise. However, in shore based units such as headquarters and staffs, direct relationship to various degrees of warfare specialization is less prominent. OPNAVINST 1000.16D enumerates factors to be considered in determining grades, but provides no guidance in evaluation within those factors. No mechanism is provided to relate factors to specific grades. Grade determination, therefore, is primarily a subjective evaluation by the analyst. It is recommended that OP-104 expand section 603 of OPNAVINST 1000.16D to provide definitive guidance in the determination of officer grade levels. One possible expansion of the existing criteria would be the definition of levels within a factor. A composite of all relevant factors would identify the most appropriate grade. It is acknowledged that such a comparison should not be taken literally but would act as a point of departure from which the analyst could more objectively determine grade requirements.

b. Subspecialty and Designator Determination. These areas are interrelated in that the manpower analyst must frequently make the determination as to whether the billet requires a restricted line (or staff corps) specialist, or an unrestricted line (URL) subspecialist. If the requirement is that of the URL subspecialist, further difficulty arises as to the determination of what level or degree of subspecialization is needed. The Navy Occupational Development and Analysis Center (NODAC) currently has tasking in progress to improve subspecialty definition. Although not expressly intended to do so, it is anticipated that improved subspecialty identification would enhance designator identification. To further improve designator identification, it is recommended that the Chief of Naval Personnel task all designator advisors

to submit comprehensive role and responsibility descriptions for inclusion in the Manual of Navy Officer Manpower and Personnel Classification (Volume I, Part B, Section 3).

c. Senior Enlisted-Junior Officer Interface. Present definition of junior officers, warrant, limited duty officers and senior enlisted personnel frequently results in a layering and/or under utilization of personnel. Pers-23 is currently redefining the role and functions of senior enlisted personnel and is in the process of expanding role and function redefinition to include warrants and LDO's. When completed, this effort will provide the manpower analyst with an increased capability to make the distinction between junior officer and senior enlisted responsibility and assign the correct designation to the billet.

6. Conclusion. Initial officer coverage can be obtained by consolidating existing programs with those proposed for ships, afloat staffs and headquarters/shore staffs as outlined in Appendix B. Partial implementation of this plan can be conducted with currently authorized assets. However, as noted in Appendix C, there is a noticeable disparity between authorized and actual onboard strength. Implementation at current manning levels will have significant impact on the POA&M presented in Appendix B. The extent to which short term assets will be available for the Headquarters/Shore staff project is indeterminate at this time. Assets available for this project will be directly related to actual NAVMACLANT manning and level of current tasking. It is anticipated that the project can be completed during FY81.

APPENDIX A

STANDARDS CATEGORIES

In order to provide a yardstick for comparison of the reliability of the determination process in each program, the following is excerpted from OPNAV 12P-8: Manpower Requirements Program; Guide to the Preparation of Staffing Standards.

Category I - Engineered. Manpower standards developed by industrial engineering techniques within DOD component prescribed accuracy and confidence limits.

Category II - Statistical. Manpower standards established with limited confidence levels by industrial engineering techniques, judgment standards, and/or statistical standards. Do not include effort already reported in Category I.

Category III - Manhour Allowances. Manhours worked in positions established by management decision, law, or other means, not dependent on the volume of production and manhours allowed by ratio or related to some other measureable unit.

Category IV - Other. Manhours worked for which no type of measurement exists. Standards developed within the Navy SHORSTAMPS Program will normally be Category II or III standards.

APPENDIX B

PLAN OF ACTION AND MILESTONES

CLASS I

Ships

- Adapt SMD Methodology FY78
- Develop/Test Measurement Plan FY78
- Documentation FY79-81

Afloat Staffs

- Adapt SMD Methodology FY78
- Develop/Test Measurement Plan FY79
- Documentation FY79-81

CLASS II

Aircraft Squadrons

- Formalize Documentation Process FY78
- SQMD Documentation in accordance with existing POA&M FY81

CLASS III

Functional Shore Areas

- SHORSTAMPS Program Documentation in accordance with existing POA&M FY81

CLASS IV

Headquarters & Shore Staffs

- NAVMACLANT conduct on a not to interfere basis with the intent of completion in FY81.

REQUIREMENTS INTEGRATION AND PERSONNEL PLANNING

- BUPERS continue existing personnel planning process; identify personnel planning requirements on a continuing basis.

APPENDIX C

MANPOWER PROGRAM ASSETS NAVMACLANT/NAVMACPAC

	<u>AUTHORIZED OFF/ENL/CIV</u>	<u>CURRENT ONBOARD OFF/ENL/CIV</u>	<u>% COB OFF/ENL/CIV</u>
<u>SMD</u>			
LANT	5/42/2*	4/23/2	80/55/100
PAC	1/27/-	1/16/-	100/59/-
<u>SQMD</u>			
LANT	3/14/0	2/6/-	67/43/-
PAC	1/6/-	1/4/-	00/67/-
<u>SHORSTAMPS</u>			
LANT	6/42/62***	5/30/61	83/71/98
PAC	6/30/70**	5/31/64**	83/103/91**

*includes 1/4/0 authorized for afloat staff project
 **civilians in all programs
 ***does not include six billets for SHOROC team

APPENDIX D

DOCUMENTATION OF SHIPBOARD OFFICER
MANPOWER REQUIREMENTS

This is a joint NAVMACLANT/NAVMACPAC proposed approach drafted to respond to the 18 June 1980 tasking by the Deputy Chief of Naval Operations (Manpower, Personnel and Training) (OP-01). It was not officially submitted to the addressee.

DEPARTMENT OF THE NAVY
NAVY MANPOWER AND
MATERIAL ANALYSIS CENTER, PACIFIC
San Diego, California 92132
NAVY MANPOWER AND
MATERIAL ANALYSIS CENTER, ATLANTIC
Norfolk, Virginia 23517

LANT:00:7-214/ps
5310
Ser:

PAC:00:7-214/ps
5310
Ser: 870

JOINT LETTER

From: Commanding Officer, Navy Manpower and Material Analysis Center,
Pacific
Commanding Officer, Navy Manpower and Material Analysis Center,
Atlantic
To: Chief of Naval Operations (OP-11)

Subj: Documentation of Shipboard Officer Manpower Requirements

Ref: (a) CNO ltr ser 111C1/678731 of 18 June 1980
(b) Joint ltr NAVMACPAC ser 649 of 11 July 1980, NAVMACLANT ser
1062 of 15 July 1980
(c) CNO ltr ser 111D/679036 of 20 August 1980
(d) Manual of Navy Officer Manpower and Personnel Classification,
NAVPERS 15839C, Vol I
(e) Manual of Navy Enlisted Manpower and Personnel Classification
and Occupational Standards, NAVPERS 18068D
(f) OPNAVINST 5310.14
(g) NAVMACLANT ltr 5310 ser 71617 of 20 April 1978

Encl: (1) Officer Watch Station Requirements Proposed POA&M
(2) Officer Own Unit Support (OUS) and Customer Support (CS)
Requirements Proposed POA&M

1. Reference (a) tasked originators to develop and document shipboard officer manpower requirements for selected ship classes and submit a plan of action and milestones for this tasking no later than 1 August 1980.
2. Reference (b) was an interim response to reference (a), proposing a basic approach to the tasking and indicating POA&M's would be submitted during the fourth quarter FY80.
3. Reference (c) approved the approach recommended in reference (b) and established a revised due date of 30 September 1980 for the POA&M's.
4. Enclosures (1) and (2) are forwarded in accordance with reference (c).

Subj: Documentation of Shipboard Officer Manpower Requirements

5. Although reference (a) identifies reference (d) as applicable to the determination of appropriate officer skill and skill level, unlike its counterpart, reference (e), reference (d) does not provide qualitative officer grade levels for work performed, in particular, that of the managerial category. Preliminary development of occupational standards for officers for application to watch stations, as a minimum, is viewed as the key to initiation of this project and ultimate task achievement. The scope of reference (e) suggests that this task best be accomplished by the office of the Chief of Naval Personnel. The recommendations in reference (g) are also germane. Additionally, reference (a) calls for the NAVMMAC's to determine unit (ship) officer requirements for designated ship classes using reference (f) in regard to principle policies and procedures. However, reference (f), using a three phase (preliminary, measurement, compilation) approach, is a guide for determining requirements in terms of a mission area. Ship Manpower Documents are, on the other hand, produced in particular consideration of readiness condition manning. The application of reference (f) to shipboard officer requirements, therefore, requires further clarification.

6. The high visibility of this project, wide variety of factors affecting officer requirements, and subtle interrelationships of such functions as training for career development and management responsibilities make assignment of highly qualified individuals imperative to the success of the project.

7. The minimum qualifications for the OUS/CS project coordinator is a senior LT Surface Warfare Officer with recent afloat experience. This level of experience is mandated by needed familiarity with shipboard work and work environment, as well as necessary close liaison between project coordinator and various warfare sponsors that must take place.

8. It is important to the success of the OUS/CS project to develop a comprehensive measurement plan and develop and maintain supportable standards. To accomplish this, continuity is required during the course of standards development, which can only be satisfied by establishing an experienced civilian manpower position.

9. Alternatives for providing personnel requirements to support the OUS/CS portion of the Officer Manpower Requirements determinations are as follows:

a. Use existing NAVMMACPAC assets. NAVMMACPAC SMD resources (one officer, one GS-11, and 19 enlisted personnel) are fully employed with SMD measurement requirements and FM/OUS data collection and standards development. Officer OUS/CS standards development, therefore, cannot be accomplished with present SMD resources without a day-for-day impact upon either SMD production or FM/OUS standards development for enlisted billets.

LANT:00:7-214/ps
5310

PAC:00:7-214/ps
5310

Subj: Documentation of Shipboard Officer Manpower Requirements

b. Divert one 1110 officer and one civilian position from NAVMMACPAC SHORSTAMPS Department. The existing assistant SMD Division Officer billet is filled by a 1100 woman officer (LTJG), who is actually working in SHORSTAMPS. Training of new individuals for this project will require four or five months if inexperienced analysts are assigned. Training must include the Management Engineering Course (8 weeks) and thorough familiarization with officer organization, measurement plan development, and standards development (8 to 12 weeks).

c. The final alternative is to contract the OUS/CS portion of the project. However, if funds could be made available for this currently unfunded project, it would require about one year to place the contract for approximately four man-years of effort. This alternative will also require assignment of a 1110 LT to act as COTR for the project.

10. The above outlined circumstances lead to the following recommendations concerning the officer OUS/CS standards development project:

a. Divert the 1110 LT currently enrolled in the Management Engineering course from SHORSTAMPS to the Officer OUS/CS project.

b. Divert and fill one civilian position from SHORSTAMPS program to the Officer OUS/CS standards development and maintenance project.

These two positions must be filled in order for the POA&M, outlined in enclosure (2), to be accomplished.

11. Similar personnel requirements for accomplishing the shipboard officer watch stations portion of this tasking can be anticipated over the long term. However, initial use of in-house assets relative to methodology development can be achieved in recognition of the need to move the project along and that there may be a trade-off required later in other ship manpower document scheduled work.

W. T. GREENHALGH JR.

S. J. WATLINGTON

POA&M FOR OFFICER WATCH STATION REQUIREMENTS

<u>Item</u>	<u>Action</u>	<u>Cog</u>	<u>Assist</u>	<u>Remarks</u>	<u>Anticipated Completion</u>
1.	Develop POA&M completion dates	LANT	PAC		+ 1 mo
2.	Develop measurement plan for Officer Watch Station	LANT			+ 3 mos
3.	OPNAV QC approve Measurement Plan	OPNAV QC	LANT		+ 1 mo
4.	OPNAV approve Measurement Plan	OP-111			+ 1 mo
5.	Test Measurement Plan on sample ship (one class)	LANT		Dependent upon resources and ship availability	+ 1 mo
6.	Evaluate data collected	LANT			+ 1 mo
7.	(Revise Measurement Plan, if required)	LANT			+ 1 mo
8.	Collect data	LANT/PAC		Date to coincide with Item 18 of Encl (2)	+ 24 mos
9.	Analyze data	LANT	PAC		+ 2 mos
10.	Develop Watch Station Standards	LANT			+ 2 1/2 mos
11.	Review Standards	OPNAV QC	LANT		+ 2 1/2 mos
12.	Approve Watch Station Standards	OP-111			+ 2 1/2 mos
13.	Develop Staffing Guides	LANT	PAC	Inputs from W/S Standards and OUS/CS Standards	+ 2 1/2 mos
14.	Review Staffing Guides	OPNAV QC			+ 1 mo
15.	Approve Staffing Guides	OP-111			+ 1 mo

OFFICER OUS/CS PROPOSED POA&M

<u>Item</u>	<u>Action</u>	<u>Coq</u>	<u>Assist</u>	<u>Remarks</u>	<u>Anticipated Completion*</u>
1.	Develop POA&M completion dates	LANT/ PAC	OP-111	PAC responsible for OUS and CS requirements; LANT lead and WSS	
2.	Fill existing LT billet in Code 42	PAC		Requires LT SWO/1110	
3.	Fill new Officer OUS Analyst position	PAC		Requires GS-9/11 experienced management analyst	
4.	Train Officer OUS/CS project personnel	PAC		8-week Management Engineering Course/8-12 week OJT	+ 5 mos
5.	Establish liaison with warfare sponsors	PAC	OP-111/ LANT	Required to determine philosophy of Officer Manpower Distribution	+ 1 mo
6.	Identify workload categories	PAC	LANT/ OP-111	Determination of applicable designators, NOBCs, etc. to SMD production	+ 1 mo
7.	Select appropriate work measurement methods	PAC	LANT OP-111	Includes determination of which billets need not be measured. Which will be directed (CO,XO,etc.)	+ 1/2 mo
8.	Develop measurement plan	PAC	LANT/ OP-111	Recommend field test of FF-1052 class to include ten hulls.	+ 3 mos
9.	OPNAV QC approve measurement plan	OPNAV QC	PAC		+ 1 mo

* Completion date estimates are added to previous action item.

10.	OPNAV approve measurement plan	OP-11	PAC		+ 1 mo
11.	Collect field test data	LANT/ PAC	OP-111		+ 1 scheduling qtr (+ 3 mo) dependent upon resources & ship availability
12.	Analyze data	PAC	LANT/ OP-111		+ 1 mo
13.	Develop OUS/CS Officer Standards for FF-1052 class	PAC	LANT OP-111/ Warefare Sponsors		+ 2 1/2mos
14.	Review standard	CNO QC	PAC		+ 1 mo
15.	Approve/implement	OP-111	PAC		+ 1 mo
16.	Identify class priority & schedule	OP-111	PAC/ LANT	About 38 ship visits required for development of standards for 5 classes. Each class is considered a universe:	+ 1/2 mo

CLASS # IN CLASS SURVEYS

AOE-1	1	4
CGN-38	4	4
DD-963	30	10
FFG-7	27	10
LST-1179	20	10
	<u>85</u>	<u>38</u>

17.	Collect data	PAC/ LANT	OP-111		Continuing Start about
18.	Analyze data	PAC	OP-111		Continuing
19.	Develop standards	PAC	OP-111/ LANT		Continuing
20.	Review standards	CNO QC	PAC		Continuing
21.	Approve/implement standards	OP-111	PAC		Continuing

22. Maintain standards PAC OP-111/
LANT Continuing

NOTE: Items 3, 4, and 5 are critical to this POA&M.

APPENDIX E

OFFICER REQUIREMENTS DETERMINATION METHODOLOGY

NAVMACLANT CODE 731, 5/18/78

This letter and enclosures present ideas which were developed and submitted within NAVMACLANT.

18 May 1978

From: Code 731
To: Code 7
Via: Code 73/73A
Subj: Officer Requirements Determination; methodology for
Encl: (1) Outline of proposed methodology to determine officer
manpower requirements
(2) Proposed POA&M for testing methodology
(3) Draft outline of CO/XO/Wardroom brief
(4) Op Audit Sheet and Interview material
(5) Draft message

1. Enclosures (1) through (5) are submitted for your concurrence. Enclosure (1) provides an outline of the basic methodology required to determine officer requirements. Enclosure (2) is the proposed POA&M for testing the methodology. Enclosure (3) is the proposed outline for the brief which will be given to the CO, XO and wardroom when initial contact is made with the ships. Enclosure (4) consists of specific outlines of directed tasking for each billet in a given unit as well as an interview work sheet to be used in conjunction therewith during the Op Audit. Enclosure (5) is a proposed draft message to COMNAVSURFLANT regarding the nomination of ships for participation in the test phase.

Very respectfully,

C. A. Youngblood

METHODOLOGY

The methodology to determine officer manpower requirements aboard ships requires the collection of the average weekly workload.

This workload is then divided by productive work hours available per week to determine the number of billets required. Due to the differences in officer and enlisted responsibilities and type of work performed by each, the method of officer workload determination will differ from present SMD practices in enlisted workload determination. Officer workload will be categorized as primary duties, collateral duties watch standing and training responsibilities.

In outline form, the steps necessary to construct the SMD for officers are as follows:

1. Determine directed billets (Title 10 US Code/OPNAVINST 3120.32)
2. Determine quantity and quality of watch standers (OPNAVINST 3120.32)
3. Determine billets required for organizational and combat effectiveness (ROC/POE/OPNAVINST 3120.32)
4. Determine and document officer workload: (Leadership/management responsibilities and admin. requirements, etc. will be documented across each of the factors listed below)
 - a. Primary duties
 - b. Collateral duties
 - c. Training responsibilities
5. Evaluation of billet quality:
 - a. Designator
 - b. Grade
 - c. NOBC
 - d. Subspeciality (if applicable)

e. AQD Code (if applicable)

The technique employed to obtain the above information will be operational audit. The two methods of Op Audit proposed are as follows:

- a. Interview. The analysts will use OPNAVINST 3120.32 as a starting point to obtain each officer's workload. Additional workload will be recorded at time of interview.
- b. Historical Data. The following historical data will be obtained by the analysts to aid in developing the average weekly workload:
 - (1) Days underway
 - Pertinent ships logs
 - Days in port
 - (2) Collateral duty assignments
 - (3) Watch Bills
 - (4) ODCR
 - (5) OPNAV 1000/2
 - (6) SORM
 - (7) Battle Bill
 - (8) Training records
 - (9) Number of times special evolutions/drills were conducted during past year.

On determining the above, the following allowances will be developed:

- a. SD&T allowance will be applied to officers. Documentation of actual SD&T time spent per officer will be conducted during the on-site interviews.
- b. Productive allowance figure of 20% will be utilized for officer primary duties as it is with enlisted productive work.

It is proposed that the methodology test be conducted aboard two small combatants (First choice----FF-1052 class with LST-1179 as alternate) homeported in Norfolk. The test will require two analysts who will be on board each ship a maximum period of two weeks.

It is recommended that during the week before each on-site, the analysts meet with the CO/XO to explain the purpose of the upcoming study. This should not take longer than one hour. The team will also brief all other officers in either one meeting or in groups depending upon the XO's desires (one hour).

The following timetable is submitted:

<u>EVENT</u>	<u>TIME TO CONDUCT/ACCOMPLISH</u>
Contact SURFLANT	2-3 days (from "Go Ahead")
Submit MSG request for ship visits	
Nominate ships and time frames	2 weeks (Dependent on SURFLANT)
Visit CO/XO of ship #1	1 day (max. - 2 hrs.)
Give wardroom brief	1 day (max. - 2 hrs.) same day
On-site ship #1	2 weeks
Evaluate data/write test draft SMD for ship #1	2 weeks
Visit CO/XO of #2	1 day (max. - 2 hrs.) same day
Give wardroom brief	1 day (max. - 2 hrs.)
On-site ship #2	2 weeks
Evaluate data/write test draft SMD for ship #2	2 weeks
Compare ships #1 & #2	2 weeks
Write class test draft SMD	
Evaluate methods/make changes/write report	4-6 weeks
Submit to CNO for approval	

BRIEF

1. Who/what NAVMACLANT and the analysts are.
2. Discuss the CNO tasking for this study.
3. Explain how the ships fit into tasking, and what their time spent will accomplish. Explain what we will do with the data collected aboard the ship.
4. Explain the testing procedures and what the test objective is (not an inspection).
5. Discuss the schedule, interviews, etc. for the two-week on-site.
 - a. Explain the interview procedures.
 - b. Schedule those who will be on leave, at schools, etc. part of the 2 week period as early as possible. It will be necessary to schedule those who will be absent the whole period at another time (outside the two-week on-site period).
 - c. Indicate what historical data is required.

NAME: BILLET as per 1000/2
 DEPARTMENT: GRADE: TITLE:
 TASK PERFORMED: DIVISION: SUPERVISION: DATE:
FREQUENCY OF HOW LONG HOW LONG HOW LONG COMMENTS
OCCURRENCE COND. III COND. IV COND. V

b. non-directive; unit generated:

FM: NAVMACLANT, NORFOLK VA
TO: COMNAVSURFLANT, NORFOLK VA
INFO: CNO, WASHINGTON D.C.
CINCLANTFLT, NORFOLK VA

BT

UNCLAS//N05310//

CNO FOR OP-01C

DEVELOPMENT AND DOCUMENTATION OF SHIPBOARD OFFICER MANPOWER
REQUIREMENTS

- A. CNO LTR SER 124E/195451 of 14 MAR 77 (NOTAL)
- B. NAVMACLANT LTR 5310 SER 716/7 of 20 APR 78 (NOTAL)
 1. REF A TASKED NAVMACLANT TO DEVELOP A PLAN FOR DOCUMENTATION OF OFFICER MANPOWER REQUIREMENTS FOR SHIPS AND AFLOAT STAFFS. REF B OUTLINES PROCEDURES FOR DOCUMENTATION OF SUBJ REQUIREMENTS ABOARD SHIPS. REF B PROVIDES THAT PROCEDURES BE TESTED IN SHIPBOARD ENVIRONMENT PRIOR TO IMPLEMENTATION BY THE SHIP MANNING DOCUMENT (SMD) PROGRAM.
 2. PROCEDURES TO BE TESTED WILL CONSIST OF IN-DEPTH INTERVIEWS OF ALL OFFICERS ABOARD SHIP TO DETERMINE MANHOUR EXPENDITURE IN SUPPORT OF UNIT MISSION AND A REVIEW OF SHIPBOARD HISTORICAL RECORDS. INTERVIEW SCHEDULING CAN BE ARRANGED WITH MINIMAL IMPACT ON SHIP'S INPORT ROUTINE.
 3. IT IS REQUESTED THAT ONE FF1052 CLASS SHIP HOMEPORTED IN NORFOLK BE SCHEDULED TO PARTICIPATE IN THE PROCEDURES TEST. LST 1179 CLASS WOULD BE ACCEPTABLE ALTERNATIVE. SHIP VISIT OF ONE WEEK'S DURATION WILL BE REQUIRED. MMACLANT SURVEY TEAM WILL BE AVAILABLE WEEK OF 30 OCT-3 NOV 1978 TO CONDUCT TEST.

4. COMPOSITION OF SURVEY TEAM AND CLEARANCE ARE:

LCDR D SAMEK, USN

LCDR JR HOPKINS, USN

LT C. A. YOUNGBLOOD, USN, 451-84-6157, SECRET

STEM NATION, USN

PNCM BLACK, USN

BTCM LEE, USN

5. NAVMAACLANT POINT OF CONTACT - LCDR SAMEK, 44-3835/3713

APPENDIX F
TACFLIER - NAVY VERSION
General Description and Logic

This appendix contains sections 1 and 2 of
and Operations Manual for TACFLIER (Navy Version)
prepared by PRC Data Services Company.

SECTION I

General Description

1. Introduction. The TACFLIER is a computer simulation model designed and maintained by the Tactical Air Command at Langley Air Force Base, Virginia. The Navy operates a version of the model containing minor modifications primarily with the display area; the versions are software compatible. Presently, the model is operational at TAC and CINCLANT on the Honeywell 6060 (series) WWMCCS computers. The WWMCCS Intercomputer Network (WIN) is utilized for file transfer and job generation between sites with the principal processing destined to be accomplished at TAC.

2. Model Description. The TACFLIER computer simulation model is designed toward one objective: the determination of a crew ratio for a particular aircraft unit in a combatant environment. Crew ratio may be defined as the minimum aircrew per aircraft required to meet operational requirements in a period of hostilities in which continuous sustained flight operations are maintained (CONDITION III). TACFLIER is a discrete event model programmed in SIMSCRIPT II.5 and utilizes a stochastic process in that random numbers and probabilities determine the results.

Generally, a scenario is designed by the analysts that reflects the anticipated hostile environment and the model is exercised in this environment for a period of time selected by the analyst. Time frames for the model runs are extremely flexible with a thirty-day period of simulation being the most common. Analyst inputs are extensive and each operation of any Navy aircraft can be simulated in almost any real world environment.

The model has been utilized extensively by the Air Force over a period of four years for determining crew requirements for most of the aircraft in the Air Force inventory. The results of Air Force simulation are accepted by the

Department of Defense Audit Agency as an accurate reflection of Air Force crew requirements. Capabilities for projecting outyear flight student training requirements, flight instructor requirements, and training resources necessary are also feasible with regression of TACFLIER results.

3. Supporting Systems. TACFLIER is a stand-alone model; however, supporting files are required for operational parameters such as attrition, medical disqualification rate, probability of recovery of downed crewmen, scheduled crew rest, etc. These operational parameters are contained in File 05. Section II of this manual contains detailed instructions and procedures for the entry of operational parameters.

The second file required for the operation of TACFLIER is the "realized flying schedule" or "Flight Schedule" (File 07). In the Air Force utilization of the model, the Flight Schedule (File 07), is a by-product of a larger model - Logistic Composite Model (LCOM). The LCOM model is used by the Air Force for determining all aviation support personnel and logistics requirements for Air Force wings and squadrons in a wartime environment. One product of LCOM is the Flight Schedule. This Flight Schedule, with weather and maintenance aborts, lead requirements, and attrition, is used as input to TACFLIER. The running of the LCOM model is a sophisticated endeavor requiring a dedicated staff and literally months of analysis. The Navy version of TACFLIER by-passes the LCOM-produced Flight Schedule and, a separate set of programs have been developed to produce a Flight Schedule that allows the running of the Navy version with much greater flexibility. Included within this document is a list of flight schedule parameters for running the Navy model. With relative ease, any or all of these parameters may be changed to accommodate a scenario change, sortie rate increase or decrease, higher or lower attrition, etc.

4. Products. TACFLIER provides a capability to select a variety of output reports. The User may select any combination of six reports:

- a. A report to include squadron briefings.
- b. A report to include detailed mission assignments, including emergency leave and medical disqualification.
- c. A report to include all entries into crew rest to be printed.
- d. A report to include all alert assignments to be printed.
- e. A report to include a summary for the simulated time period.
- f. A report consisting of just the resultant crew ratio.

Each of the reports may be obtained independently of the other; however, for detailed analysis of a TACFLIER run, all are required. Normally, preliminary runs are made with the selection of a summary report and, once the parameters and crew ratio are satisfactory, detailed reports are selected. The print of detailed reports generates a significant amount of paper and should be selected with discretion.

SECTION II
TACFLIER Logic

1. TACFLIER Logic. TACFLIER is designed to simulate the operations and aircrew functions of an operational unit during a period of sustained flying activity. A very general description of the model logic follows:

The model maintains a pool of aircrews that are available for crew activity. Crew activity is preparing for a period of alert, on alert waiting for an alert mission, mission ready standby (waiting for non-alert missions), and additional scheduled ground duties. A particular aircrew may not be available for a specific crew activity for the following reasons: (1) he may be preparing for a period of alert or on alert waiting for an alert mission and thus ineligible for any other crew activity; (2) he may already be flying a mission and will not be available until after landing and (normally) completion of post mission activity; (3) a mission without embedded crew rest requiring a crew does not land until after the end of his flight duty period; (4) a mission without embedded crew rest requiring a crew does not land until after the end of his flight duty period plus some period of flight duty extension; (5) he may not be qualified for the mission; (6) he may be in crew rest or in extended crew rest; (7) he may have been shot down previously and either lost or recovered and recuperating; (8) he may be on emergency leave; (9) he may be medically disqualified; (10) he may be DNIF and available only for additional scheduled ground duties. Aircrews may be removed from the pool of available crews for some period of time and then placed back into the pool. For normal missions without embedded crew rest, the model selects a crew whose duty day has already started and who is closest to the end of his flight duty period but still has enough time remaining to fly the mission. For normal missions with embedded crew rest, the model selects a crew

whose duty day has already started and who is closest to the end of his flight duty period. If no crews are available that meet this criteria, the model selects a crew whose duty day has not yet started. For alert missions, the model selects a crew who is on alert waiting for an alert mission. To prepare a crew for a period of alert, the model selects a crew whose duty day has not yet started. To select a crew to attend a squadron briefing, the model selects a crew whose duty day has not yet started. After completing the squadron briefing, the crew's duty day has been started and the crew is in mission ready standby status. To select a crew for additional ground duties (an additional pseudo-mission), the model selects a DNIF crew. If no DNIF crews are available, the model selects a crew whose duty day has not yet started.

The number of crews available may be specified; however, this value is normally set artificially high so as not to constrain the model and to generate the required crews. The number of crews may be constrained to a value below the required number and an analysis performed of missed sorties under various operational parameters.

2. TACFLIER Operation. The first step in the operation of TACFLIER is to build the two essential files, the Flight Schedule (File 07) and the Operational Parameters (File 05).

a. Building a Flight Schedule. The POE for the particular type of aircraft is the principal source for initiating a flight schedule. Monthly flight time per aircraft, sortie length, and the number of aircraft assigned provide sufficient information to build the basic schedule. Consideration also has to be given to the operational aspects of the scenario, e.g., the scheduled on-line period of the carrier, etc. Weather conditions and the number of flights that will be lost are to be analyzed based on the Summary of Synoptic Meteorological Observations for the particular area of the world. Figure II-1 contains a check list of data elements required for operation of the basic flight schedule.

Flight Schedule Parameters

The following information is required for building a Flight Schedule (File 07) for a TACFLIER run:

- (1) Number of days of the simulation.
- (2) Start time for the first mission brief of each day.
- (3) Length of briefing/preflight.
- (4) Flight length.
- (5) Cycle time (plus anticipated variations).
- (6) Number of A/C and standbys required for each launch.
- (7) Attrition rate.
- (8) Air Abort rate.
- (9) Deck Abort rate.
- (10) Fluctuations in landing time.
- (11) Number of days to replace a lost A/C.
- (12) Number of functional test flights.
- (13) Aircraft Requirements Profile.
- (14) Aircraft Availability Profile.
- (15) Flight Lead requirements, including alerts, standbys, and functional tests.
- (16) Alert requirements.
- (17) Ad hoc flight requirements.

Figure II-1

The items included in Figure II-1 will have values assigned and be entered into a series of programs that build the flight schedule. Section III contains the details for placing this data into the correct programs.

b. Building the Operational Parameters. The principal source of data for building the operational parameters is the operational staffs, OP-96 and operational squadrons. The collection and analysis of this data is a complex task. Included are parameters such as lead qualifications, medical disqualification, average delay in recovery of downed crews, i.e., numerous probability entries. This data must be realistic and validated by a majority of the operational community. It must be defensible in all respects. Certain data requires considerable analysis before it can be synthesized into specific values acceptable to the model.

Once this data is collected, it is applied directly to File 05. Appendix E-1 contains a checklist for collecting and formatting these values. Once formatted, it is placed in a computer file and accessed during a TACFLIER run.

A list and description of the operational entries (File 05) are included below:

RUN, NUMBER	ID for this run of the simulation. Input as A6 starting in card column 21 of the first record.
RSEED	Random Number Seed. 0 = do not reset the SIMSCRIPT random number seed. N = reset the SIMSCRIPT random number seed for stream #1 to the value of n. RSEED is an integer number starting in card column 48 of the first record. All input values from here on are unformatted, or in free form. This means that input values may be located anywhere on the input record, but must be

separated from the preceding value by at least one blank. You may input as many values per record as you desire, the only restriction being the blanks as a delimiter. Since the input parameters below are free form, the program expects a value to be input for each parameter. If a particular input parameter is not needed, some value must still be read. A value of zero may be used for all unneeded input parameters.

INC. EARLYCRTIME

Incremental value (decimal hours) for early crew release (EARLYCRTIME).

FDP

Duration of flight duty period for a crew. Input hours as a real number.

STOP. EARLYCRTIME

Early crew time is the time before the end of a flight duty period that a crew is normally removed from the set of available crews and placed in crew rest. If the crew is busy, they are removed from the set of available crews and placed in crew rest as soon as they complete the activity they are in. Input in hours as a real number. The program now has the capability of computing the crew ratio for several early crew times. This is done by furnishing the START.EARLYCRTIME (appears further down in input list) and the STOP.EARLYCRTIME. The program will increment the START.EARLYCRTIME by "INC.EARLYCRTIME" increments until the STOP.EARLYCRTIME has been reached. If only one early crew time is wanted, then input the same input value for both START and STOP early crew time. Input as decimal hours.

FDPEXTEND The time that a crew may fly beyond the end of his flight duty period. Input in hours as a real number.

CR The normal crew rest time. Input in hours as a real number.

ECR The amount of time for extended crew rest. Input in hours as a real number. Normally, this value is 24 hours.

MAXMISSIONFDP The maximum number of missions a crew can fly in one flight duty period (does not include alert crews). Input as an integer number.

MAXDAYS The maximum number of days a crew can fly before entering a period of extended crew rest. Input as an integer number.

HOLDTIME The period of time that a crew is held past EARLYCRTIME. If the value of HOLDTIME is not zero, he is removed from the set of available crews at EARLYCRTIME, accumulates mission ready standby time, and is scheduled for crew rest at the end of the holdtime. Input in hours as a real number.

*****NOTE: "HOLDTIME" must be less than or equal to "EARLYCRTIME". You cannot use "HOLDTIME" and "EMBCR" simultaneously.*****

DNIF.FRAC The fraction of medically disqualified crews that are available as DNIF crews. Input as a real number.

EMLVOUR The duration of a period of emergency leave. Input in days as an integer number.

PEM.LV The probability that a crew will go on emergency leave on any given day. Input as a real number.

PR1.FLAG Flag to cause the squadron briefing assignments to be printed. 1 = write squadron briefing assignments. 0 = do not write squadron briefing assignments.

PR2.FLAG Flag to cause mission assignments and entries to emergency leave, medical disqualification, and DNIF to be printed. 1 = write mission assignments and entries to emergency leave, medical disqualification and DNIF. 0 = do not write mission assignments, etc.

PR3.FLAG Flag to cause the crew entries into crew rest to be printed. 1 = write crew rest entries. 0 = do not write crew rest entries.

PR4.FLAG Flag to cause the alert assignments to be printed. 1 = write alert assignments. 0 = do not write alert assignments.

PR5.FLAG Flag to cause daily summaries to be printed. 1 = write daily summaries. 0 = do not write daily summaries.

PR6.FLAG Flag to cause the crew summary at the end of the replication to be printed. 1 = write crew summary. 0 = do not write crew summary.

MAXAD Restricts a healthy crew from being scheduled for more than n consecutive additional duty pseudo-missions.

NOPRINT A flag to suppress printing results. Prints only the summary of replications. 0 = normal print, do not suppress. 1 = suppress printing results, print only summary of replications.

PMEDDIS The probability that a crew will become medically disqualified on any given day. Input as a real number.

PRCVR The probability that a crew will be recovered after having been shot down. Input as a real number.

PNOHOSP The probability that a crew will not require hospitalization after recovery from being shot down. Input as a real number.

DELLOST The delay before replacement of a crew shot down and not recovered. Input in days as an integer number.

RCVR.DNIF The delay before becoming available for additional duties (i.e., DNIF) for a crew shot down, recovered, and not hospitalized. Input in days as an integer number.
****NOTE: "RCVR.DNIF" must be less than or equal to "DELRCVR".****

DELRCVR The delay before returning to available for flying status for a crew shot down, recovered, and not hospitalized. Input in days as in integer number.

HOSP.DNIF The delay before becoming available for additional duties (i.e., DNIF) for a crew shot down, recovered, and hospitalized. Input in days as in integer number.
****NOTE: "HOSP.DNIF" must be less than or equal to "DELHOSP".****

DELHOSP The delay before returning to available for flying status for a crew shot down, recovered, and hospitalized. Input in days as an integer number.

WARMUP.TIME The number of days to be simulated prior to starting to gather statistics. Input as a real number.

START The day of simulation for which the model starts gathering statistics. Input as a real number.
****NOTE: START = WARMUP. TIME.****

QUIT The last day of simulation for which the model will gather statistics. Input as a real number.

NREP The number of replications of the simulation to run. All data remains the same with the exception of the Random Number Seed. Input as an integer number.

UEFLAG Flag to determine whether the crew ratio is to be computed separately for each squadron or as one number for the entire wing. 0 = compute the crew ratio for the entire wing. 1 = compute the crew ratio separately for each squadron.

AT.AVAIL.FLAG Flag for determining the requirements for an available alert crew. 0 = any mission qualified crew may fly an alert mission. 1 = only mission qualified crews who are also flight lead qualified may fly an alert mission.

AT.GO.HOME.FLAG Flag to cause an alert crew to enter crew rest immediately after flying an alert mission and completing post mission activity. 1 = enter crew rest. 0 = stay on alert.

N.SQUADRON The number of squadrons in the simulation. Input as an integer number.

NO.OF.SEL.CR.SQ The number (input as an integer) of crews and squadrons that are to be printed on this run. If you want to see all crews and squadrons, then input a "0". If it is not = "0", the pairs of crews and squadrons are

read just below the wing/squadron overhead combinations data.

ATTRIT.PROB.CODE Input as an integer number which will be used in comparison to the attrition problem code on the flight schedule. Normally a "1".

START.EARLYCRIME The starting value for early crew time. Early crew time is defined above in STOP.EARLYCRIME. Input as decimal hours.

UE.IN.SQ The number of aircraft to be utilized by this squadron. Input as an integer number.

CRS.IN.SQ The number of crews in the squadron that are qualified for flight lead. Input as a real number.

FL.IN.SQ The fraction of crews in the squadron that are qualified to fly functional check flights. Input as a real number.

ST.GO.HOME The starting time of the interval during the day that crews of the squadron are placed in crew rest rather than mission ready standby when becoming available after having been scheduled. Input in hours as a real number. If there is to be no interval, this value should be set to equal ED.GO.HOME.

****NOTE: "ST.GO.HOME" should occur earlier than "ED.GO.HOME." (Does not have to be same day).****

ED.GO.HOME The ending time of the interval during the day that crews of the squadron are placed in crew rest rather than mission ready standby when becoming available after having been scheduled. Input in hours as a real number. This value may be less than the ST.GO.HOME time

indicating that the interval extends over midnight.
If there is to be no interval, this value should be
set equal to ST.GO.HOME.

SQ.BRIEF The time of the first squadron briefing. Input in
hours as a real number.

SQ.PREP The duration of the period of preparation. Input in
hours as a real number.

SQ.DUR The duration of the squadron briefing. Input in hours
as a real number.

SQ.FREQ The frequency of squadron briefings. Input in hours
as a real number.

SQ.QTY The number of crews whose duty day will be started by
the squadron briefing. Input as an integer number.

The above listed values from UE.IN.SQ through SQ.QTY
are repeated until n SQUADRON sets of values have been
input.

N.MISSION.TYPE The total number of different mission types including
both alert missions and additional duty pseudo-missions.
Input as an integer number.

N.ALERT.MISSION.TYPE The number of different mission types including both
alert missions and additional pseudo-missions. Input
as an integer number.

N.ADD.DUTY.TYPE The number of different additional duty pseudo-missions.
Input as an integer number.

MTP.NAME The name of the particular mission. Input as an
alpha variable.

MTPFLAG Flag to identify particular mission types. 0 = normal mission; 1 = alert mission; 2 = additional duty pseudo-mission.

PS.TIME Time required to accomplish post-mission activity. Input in hours as a real number.

CONSEC.REDUCE Amount of time that post-mission activity may be reduced when a second mission of this type is flown. Input in hours as a real number.
 ****NOTE: "CONSEC.REDUCE" must be less than or equal to "PS.TIME".****

EMBCR The sum of flight planning time prior to crew rest and embedded crew rest time. If there is to be no embedded crew rest, this value is to be set to zero. Input in hours as a real number.
 ****NOTE: (1) EMBCR = 0 for alert MSN types
 (2) *FLT *EMBEDDED *BRIEF *FLY
 *DEBRIEF *PLAN *CREW RST
 *TIME *MSN *
 EMBCR = FLT PLAN + EMBEDDED CREW REST
 (3) If you use "EMBCR", the out-of-phase statistic is meaningless.
 (4) If you use "EMBCR", then HOLDTIME = 0.
 (5) MTPFLAG = 1 overrides normal MSN input parameters.****

AFIRST (MTPFLAG=1) The time of the start of the first alert period. Input in hours as a real number.

APREP (MTPFLAG=1)	The duration of the period of preparation. Input in hours as a real number.
ADUR (MTPFLAG=1)	The duration of the period of alert. Input in hours as a real number.
AFREQ (MTPFLAG=1)	The time interval between the start of alert periods. Input as an integer number.
ACREST (MTPFLAG=1)	The time interval between the actual landing time of an alert mission and the end of the alert period when crews landing from missions are placed in crews rest at the end of the post-mission activity period rather than being held until the end of the alert period. Crews cancelling missions in this interval are placed in crew rest immediately. Input in hours as a real number.
ANUM (MTPFLAG=1)	The number of crews committed to each of the alert periods. Input as an integer number.
AREPL (MTPFLAG=1)	The time interval between the actual landing time of an alert mission that gets shot down and the time that a replacement crew must be on alert. Input in hours as a real number. ****NOTE: "AREPL" must be greater than or equal to "APREP".****
ANOREPL (MTPFLAG=1)	The time before the end of an alert period when a replacement crew is not required for an alert mission that gets shot down. Input in hours as a real number.

ADFIRST (MTPFLAG=2) The time of the start of the first additional duty pseudo-mission. Input in hours as a real number.

ADDUR (MTPFLAG=2) The duration of the additional duty. Input the time in hours as a real number.

ADFREQ (MTPFLAG=2) The time interval between the start of additional duty periods. Input in hours as a real number.

ADNUM (MTPFLAG=2) The number of crews committed to each of the additional duties. Input as an integer number.

MQUAL.LIST A two-dimensional array containing the squadron qualifications for the various mission types. The rows contain the qualifications for a particular mission type. The columns contain the qualifications for a particular squadron. 1 = the particular squadron may fly the particular mission type. 0 = the particular squadron may not fly the particular mission type. The binary mask linked above from the MTP.NAME through MQUAL.LIST are repeated until N.MISSION.TYPE set of values have been input.

DIST.MEDDIS Discrete distribution of the duration of medical disqualification. Paired by cumulative probability for medical disqualification (input as a real number) and the number of days medically disqualified (input as a real number). An asterisk indicates the end of the data pairs.

N.OHSTRUCTURE The number of different wing/squadron overhead combinations to be considered in the simulation. Input as an integer number.

WGCHPCT The percentage of days that a wing crew may be scheduled for flying activity. Input as a real number. (Note #1).

WING.WEENIES The number of wing crews that are attached to the particular squadron for flying duty. Listed by squadron. Input as an integer number. (Note #1).

SQN.PUKES The number of squadron crews that are to be excluded from the calculations for crew ratio. Listed by squadron. Input as an integer number.

The above listed values from SGCHPCT through SQN.PUKES are repeated until NO.CHSTRUCTURE sets of values have been input.

An asterisk indicates the end of the data.

- SEL.CR.NBR Paired with a squadron number, this is a crew number (input as an integer number). These pairs are input only when NO.OF.SEL.CR.SQ. is not = 0.

SEL.SQ.NBR. Paired with the above crew number, this integer number is input when NO.OF.SEL.CR.SQ. is not = 0.

Note #1: The wing participation is not normally used with Navy squadrons. The medical disqualification rate is adjusted down to allow replacement of grounded crews by air wing staff.

APPENDIX G
BILLET/POSITION IDENTIFICATION
U.S. Army

This presentation is excerpted from Appendix D of the report Quantitative Procedure for Position Identity Definition, Final Report, December, 1979, prepared for the Department of the Army by General Research Corporation.

DEVELOPMENT OF FACTORS, SUBFACTORS AND THEIR HIERARCHICAL WEIGHTS

CHART 1

ALL OF THE FACTORS IMPORTANT TO DETERMINATION OF WHETHER A POSITION IS MILITARY OR CIVILIAN WERE DISCUSSED AT THE LAST SAG MEETING. THE FIRST FIGURE SHOWS THE FACTORS AND WHETHER THEY WERE INDICATORS OF A POSITIONS BEING MILITARY, CIVILIAN, OR WHETHER THEY WERE AMBIGUOUS. THIS DISCUSSION CARRIES FORWARD FROM THAT POINT AND ADDRESSES THE USE OF THOSE FACTORS IN AN ORDERED SEQUENCE.

EIGHT OF THE FACTORS CAN IMMEDIATELY BE ADDRESSED IN THE FORM OF A LOGIC CHAIN.

CHART 2

THE SECOND FIGURE INDICATES HOW THESE EIGHT CAN FORM A LOGIC NETWORK. EACH FACTOR HAS A SINGULAR DEFINITION. POSITIONS WHICH ARE COMBAT POSITIONS ARE EASILY CATEGORIZED. THAT SAME CATEGORIZATION CAN BE APPLIED AS WELL TO EACH OF THE FACTORS. THE ORDER OF FACTOR APPLICATION GOES FROM THE STRONGEST POINTER TO MILITARY POSITIONS TO THE LESS COMPELLING. IN THE CHART, ONE BEGINS WITH ASKING THE QUESTION: "IS THE POSITION A COMBAT POSITION?" IF THE ANSWER IS YES, THEN BY DEFINITION IT IS IMMEDIATELY CLASSIFIED A MILITARY POSITION AND NO OTHER QUESTION NEEDS TO BE ASKED. IF THE ANSWER IS NO, THE NEXT QUESTION IS: "IS THE POSITION A COMBAT SUPPORT POSITION?". A NO ANSWER RESULTS IN ASKING THE NEXT QUESTION; "IS THE POSITION COMBAT SERVICE SUPPORT?". THE NO ANSWER CONTINUES THE CHAIN WITH; "IS THE POSITION WARTIME AUGMENTATION?" AND A NO ANSWER TO THAT ONE RESULTS IN ASKING WHETHER THE POSITION IS "MILITARY BY LAW OR TREATY?" OR IF NOT, WHETHER THE POSITION IS "AN EXTERNAL MILITARY REQUIREMENT?". IF THE RESPONSE CONTINUES TO BE A NO,

POSITION IDENTIFICATION FACTORS

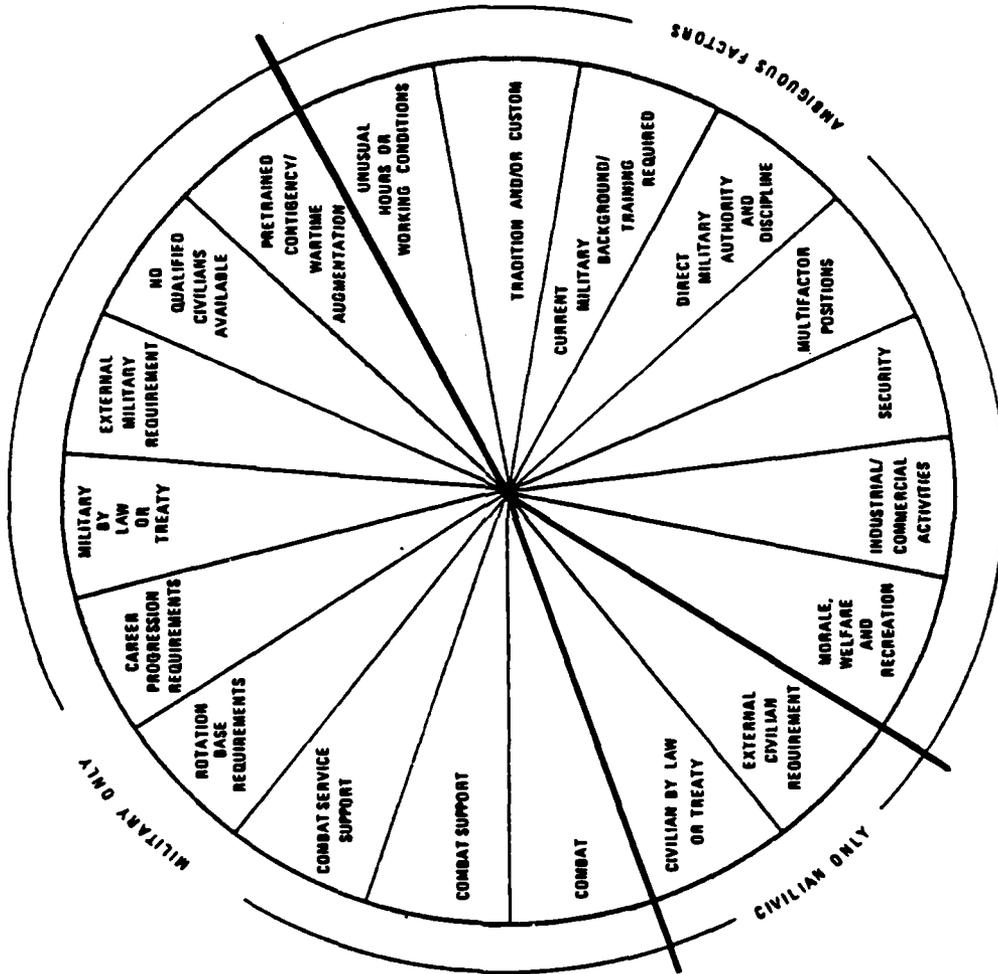
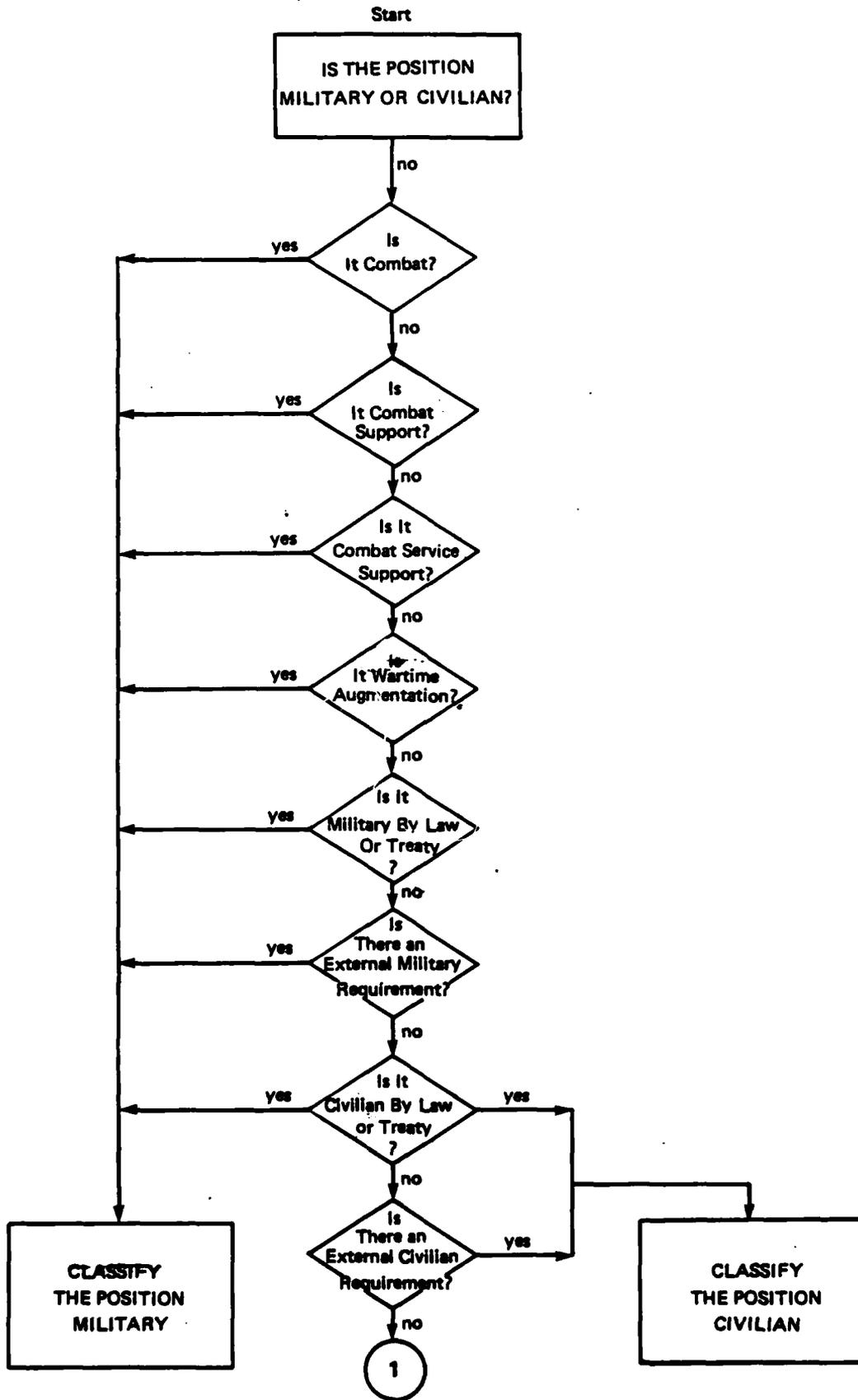


CHART 1



THEN THE QUESTION IS ASKED; "IS THE POSITION CIVILIAN BY LAW OR TREATY?" AND IF IT IS NOT, THEN FINALLY, THE QUESTION IS ASKED; "IS THE POSITION CIVILIAN BECAUSE OF AN EXTERNAL CIVILIAN REQUIREMENT?" NO ANSWERS TO ALL OF THESE QUESTIONS ASKED IN THE SEQUENCE SHOWN INDICATES THAT A QUANTITATIVE EVALUATION WILL BE REQUIRED.

CHART 3

THERE ARE 6 AMBIGUOUS FACTORS INVOLVED IN QUANTITATIVE ANALYSIS. THEY ARE SHOWN IN THIS FIGURE. THEY ARE

SECURITY
MILITARY AUTHORITY AND DISCIPLINE
CURRENT MILITARY BACKGROUND AND TRAINING REQUIRED
TRADITION AND OR CUSTOM
UNUSUAL HOURS OR WORKING CONDITIONS
MORALE, WELFARE, AND RECREATION

EACH OF THE FACTORS MAY HAVE CHARACTERISTICS OR SUBFACTORS INTERNAL TO ITSELF. FOR EXAMPLE, "SECURITY" INVOLVED CONSIDERATIONS OF WHETHER THERE IS A REQUIREMENT TO EXERCISE TROOP SECURITY, OR TO KEEP COMMAND POSTS SECURE. ADDITIONAL FUNCTIONS ARE SUPERVISION OF PRISONERS; PERIMETER PATROL; FIRE WATCH; DOCUMENTATION OF IDENTITY OR ACCESS; TRAFFIC CONTROL AND PERHAPS OTHERS. ALL OF THESE FUNCTIONS ARE PERFORMED UNDER THE GENERAL FACTOR OF "SECURITY".

CHART 4

THE NEXT CHART LISTS ALL OF THE EVALUATION SUBFACTORS WE HAVE IDENTIFIED TO DATE.

AMBIGUOUS EVALUATION FACTORS

SECURITY	MILITARY AUTHORITY & DISCIPLINE	CURRENT MILITARY BACKGROUND & TRAINING	TRADITION/ CUSTOM	UNUSUAL WORKING HOURS/ CONDITIONS	MORALE, WELFARE & RECREATION
----------	--	--	----------------------	--	---------------------------------------

EVALUATION SUBFACTORS

SECURITY	MILITARY AUTHORITY AND DISCIPLINE	CURRENT MILITARY BACKGROUND AND TRAINING REQUIRED	TRADITION AND/OR CUSTOM	UNUSUAL WORKING HOURS OR CONDITIONS	MORALE, WELFARE AND RECREATION ACTIVITIES
TROOPS	COMMAND	RESEARCH AND DEVELOPMENT	POSITIONS MILITARY BY PRECEDENT	POSITIONS MILITARY BY DEFINITION	
COMMAND POSTS	UNIFORM CODE OF MILITARY JUSTICE	TRAINING	QUANTITATIVE EVALUATION OF TRADITION AND CUSTOM	RISK OF LIFE	
PRISONER SUPERVISION	SUPERVISION OF WORK	COMBAT SUPPORT TYPE FUNCTIONS		COMPARABILITY TO FEDERAL CIVILIAN STANDARDS	
PERIMETER PATROL					
FIRE WATCH					
DOCUMENT IDENTIFICATION					
TRAFFIC CONTROL					

PERFORMANCE OF SOME FUNCTIONS IS SUFFICIENT BY ITSELF TO CLASSIFY A POSITION AS "MILITARY". FOR INSTANCE, IF SECURITY IS TO BE MAINTAINED OVER TROOPS OR COMMAND POSTS, THE POSITION IS BY DEFINITION A MILITARY ONE. THUS THERE APPEAR TO BE SOME FACTORS WHICH CONTAIN PARTICULAR FUNCTIONS WHICH PERMIT CONTINUATION OF A LOGIC SEQUENCE. THOSE FUNCTIONS NOT WITHIN THE LOGIC SEQUENCE REMAIN TO BE ADDRESSED BY QUANTITATIVE ANALYSIS.

CHART 5

THIS FIGURE INDICATES THE LOGIC SEQUENCE INVOLVING THE AMBIGUOUS FACTORS. FIRST, IT MUST BE DETERMINED WHETHER THE POSITION IS A COMMERCIAL OR INDUSTRIAL POSITION. IF IT IS, AND DOES NOT INCLUDE ANY OF THE SIX AMBIGUOUS FACTORS, IT IS CLASSIFIED CIVILIAN. IF IT IS NOT COMMERCIAL OR INDUSTRIAL, AND IT INVOLVES AMBIGUOUS FACTORS IT UNDERGOES FURTHER EVALUATION.

THE FIGURE INDICATES THAT THE LOGIC SEQUENCE CONTINUES THROUGH THE FUNCTIONS. CERTAIN ELEMENTS OF SECURITY, MILITARY AUTHORITY AND DISCIPLINE, TRADITION AND CUSTOM AND UNUSUAL HOURS OR CONDITIONS CAN AUTOMATICALLY CLASSIFY A POSITION AS "MILITARY"

OTHERWISE, A SERIES OF QUANTITATIVE EVALUATIONS MUST BE MADE USING THE REMAINING SUBFACTORS INDICATED IN THE NEXT CHART.

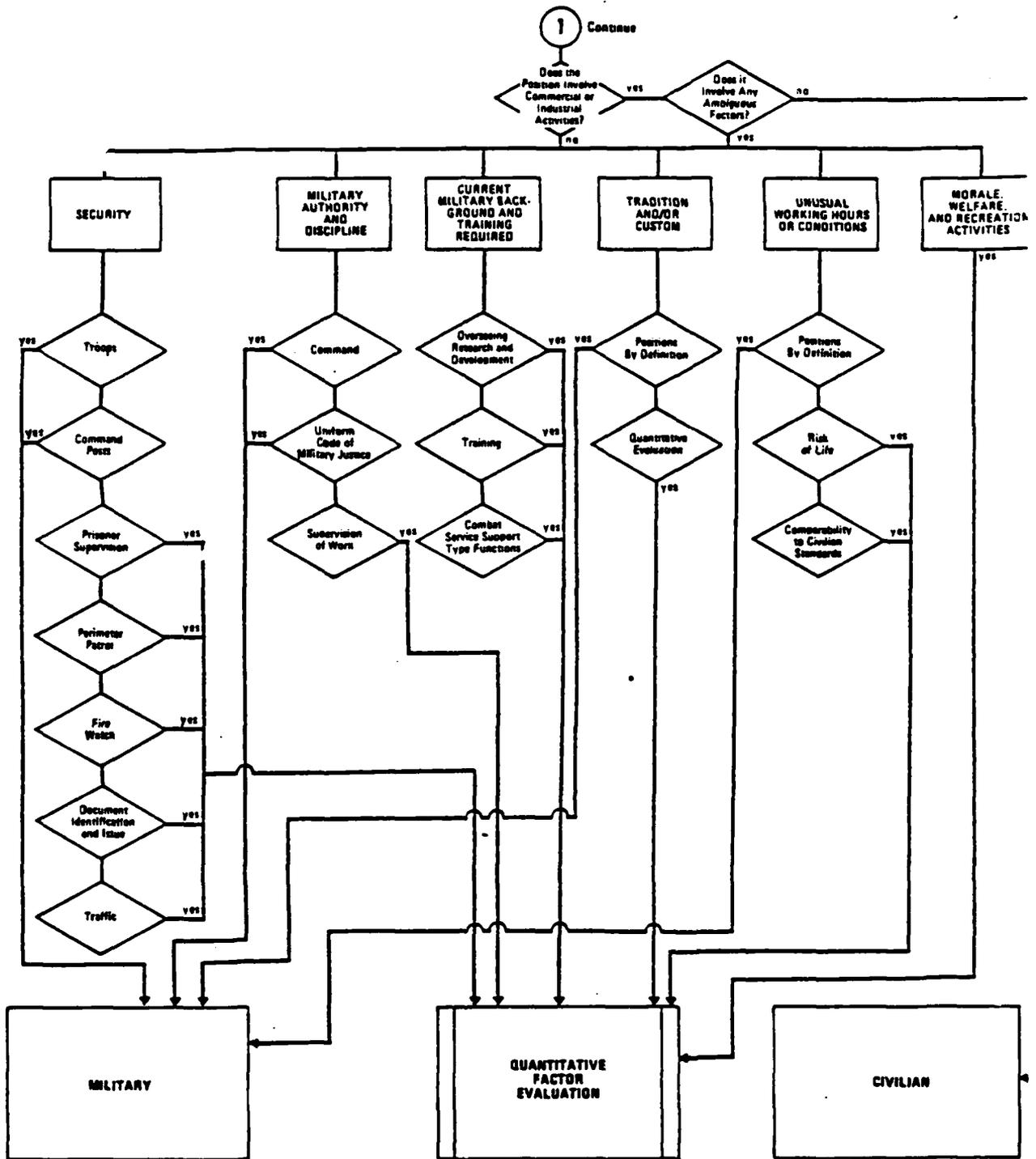


CHART 5

CHART 6

IN THIS CHART, EACH FACTOR IS LISTED TOGETHER WITH ANY FUNCTION TREATED QUANTITATIVELY. THE ORDER OF IMPORTANCE OF THE FACTORS IN TERMS OF WHETHER THEY IMPEL TOWARD CLASSIFICATION OF A POSITION AS MILITARY, IS FROM LEFT TO RIGHT. THE SECURITY FACTOR APPEARS TO BE MOST IMPORTANT AND THE MORALE, WELFARE AND RECREATION FACTOR IS LEAST IMPORTANT IN CLASSIFYING A POSITION AS MILITARY.

THE POSITION OF EACH FUNCTION WITHIN EACH FACTOR IS ALSO LISTED IN ORDER OF IMPORTANCE. PRISONER SUPERVISION IS INDICATED AS BEING MORE IMPORTANT THAN PERIMETER PATROL, AND PERIMETER PATROL AS MORE IMPORTANT THAN FIRE WATCH. DOCUMENTATION IS MORE IMPORTANT THAN TRAFFIC CONTROL BUT LESS IMPORTANT THAN FIRE WATCH IN DETERMINING WHETHER A POSITION IS MILITARY.

THE HEIRARCHY WEIGHTS POSITION FACTORS AND FUNCTIONS IN TERMS OF MILITARY POSITION DETERMINATION SCORES. THE HIGHER THE POINT SCORE THE MORE LIKELY THE POSITION IS TO BE MILITARY.

THE VALUES SELECTED FOR SECURITY WERE ARBITRARY. IN PRACTICE TWO METHODS CAN BE USED TO ASSIGN WEIGHTS TO THE FUNCTIONS AND SUBFACTORS.

A GROUP OF EXPERTS COULD INDEPENDENTLY EVALUATE THE IMPORTANCE OF THE FACTORS. THE PROCESS IS REPEATED UNTIL CONSENSUS IS REACHED. THIS IS CALLED THE DELPHI TECHNIQUE AFTER THE ORACLE OF THE SAME NAME.

QUANTITATIVE EVALUATION FACTORS

SECURITY	MILITARY AUTHORITY AND DISCIPLINE	CURRENT MILITARY BACKGROUND AND TRAINING REQUIRED	TRADITION AND/OR CUSTOMS	UNUSUAL WORKING HOURS OR CONDITIONS	MORALE, WELFARE, AND RECREATION ACTIVITIES
PRISONER SUPERVISION 30	SUPERVISION OF TECHNICAL WORK	TRAINING TROOPS		RISK OF LIFE	
PERIMETER PATROL 25		OVERSEEING MILITARY SYSTEMS DEVELOPMENT		COMPARABILITY TO FEDERAL CIVILIAN LABOR STANDARDS	
FIRE WATCH 20		COMBAT SUPPORT-TYPE FUNCTIONS			
DOCUMENT IDENTIFICATION AND ISSUE 15					
TRAFFIC CONTROL 10					

AN EMPIRICAL ANALYSIS CAN BE PERFORMED ON EXISTING POSITIONS AND THE SIGNIFICANCE OF THE VARIOUS FACTORS AS POSITION CLASSIFIERS CAN BE DETERMINED USING MULTIPLE REGRESSION TECHNIQUES. SINCE THE FACTORS ARE AMBIGUOUS, SOME KIND OF SCALE IS NECESSARY TO INDICATE THE DEGREE TO WHICH THE FUNCTION APPLIES TO MILITARY AND CIVILIAN POSITIONS.

CHART 7

THE NEXT CHART INDICATES A METHODOLOGY USEFUL FOR DOING THIS. IT BEGINS WITH DEFINITION OF A SCALE WHICH RANGES FROM VERY IMPORTANT TO NOT AT ALL IMPORTANT. THE WORDS USED MAY BE "ALL", "MOST", "SOME", "RARELY", "NEVER". THE SCALE RANGES FROM ZERO TO 100 IN INCREMENTS OF 25. A SCALE WHICH IS DIVIDED INTO SEVEN INTERVALS COULD ALSO HAVE BEEN DEvised. AS THE JOB ANALYSIS PROGRESSES, AND THE ANSWERS TO INVOLVEMENT ARE PROVIDED, THE POINT SCORE IS DETERMINED BY MULTIPLYING THE POINT SCORE FOR EACH FUNCTION WITH THE POINT SCORE FOR THE DEGREE OF INVOLVEMENT. FOR EXAMPLE: IF PERIMETER PATROL IS VERY IMPORTANT IN TERMS OF THE SECURITY FACTOR, THEN THE 25 POINTS ASSIGNED TO PERIMETER PATROL AS A VALUE WOULD BE MULTIPLIED BY THE 100 POINTS ASSIGNED TO THE DEGREE OF INVOLVEMENT "VERY IMPORTANT" TO OBTAIN A TOTAL POINT SCORE FOR THAT FACTOR-FUNCTION COMBINATION OF 2,500 POINTS. MORE THAN ONE FUNCTION MAY BE SCORED FOR A FACTOR IF MORE THAN ONE FUNCTION IS PERFORMED. EACH FUNCTION PERFORMED MUST BE WEIGHTED IN TERMS OF THE FIVE DEGREES OF INTENSITY.

PERCENT OF TIME SPENT

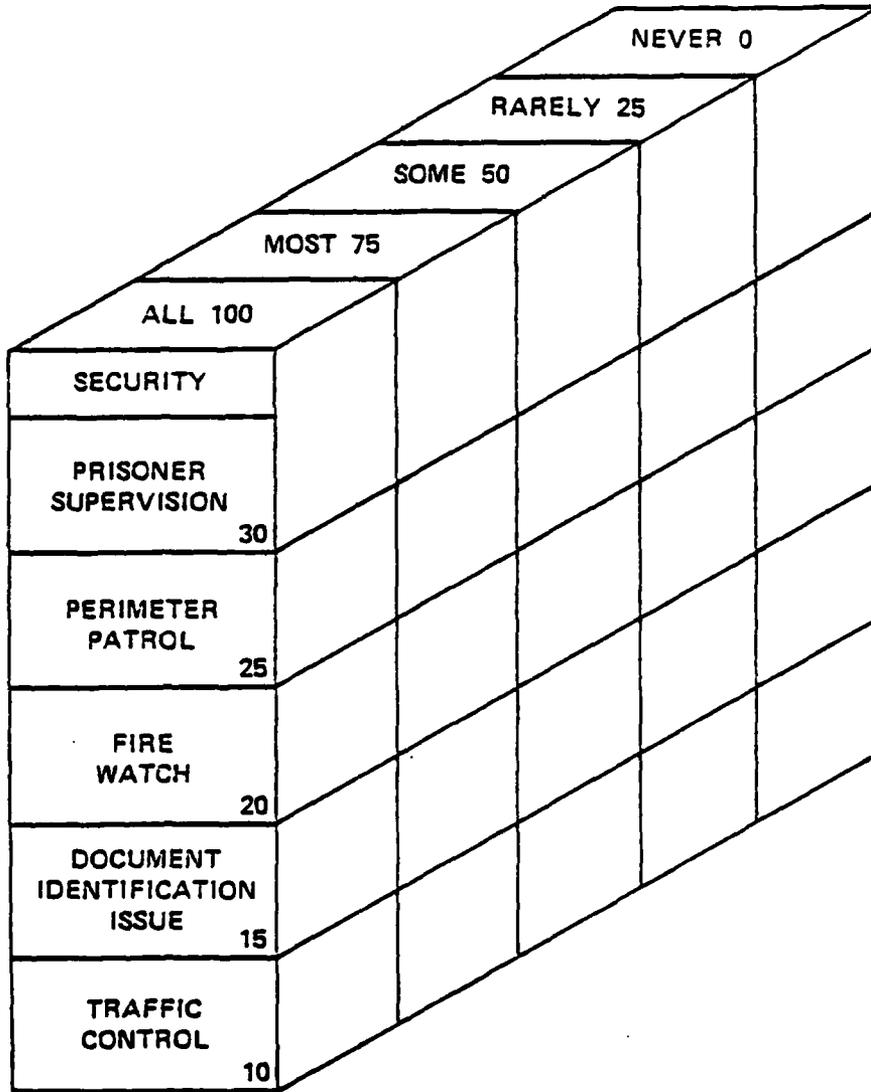


CHART 8

THE TOTALITY OF SUCH EVALUATIONS IS INDICATED IN THE NEXT CHART. EACH FACTOR-FUNCTION COMBINATION IS SCORED. THE THREE DIMENSIONAL ARRAY SHOWN IS A PICTORIAL REPRESENTATION OF THE METHOD PROPOSED. IT PROVIDES CONSIDERABLE FLEXIBILITY IN POSITION EVALUATION. NOT ALL OF THE FUNCTIONS AND FACTORS NEED TO BE PRESENT IN EACH POSITION ANALYZED. BUT IT IS NECESSARY TO DERIVE POINT SCORE FOR ALL THAT ARE.

THE RELATIVE IMPORTANCE OF THE FACTORS MAY CHANGE FROM POSITION TO POSITION. FOR ONE POSITION THE MILITARY AUTHORITY AND DISCIPLINE FACTOR MAY BE MOST IMPORTANT, FOLLOWED BY THE REQUIREMENT FOR CURRENT MILITARY BACKGROUND, AND TRADITION AND CUSTOM. THERE MAY BE NO SECURITY ASPECT AND NO SPECIAL HOURS OR CONDITIONS INVOLVED. IN ANY CASE, THE METHOD REQUIRES THAT THE TOTAL POINT SCORE FOR ALL OF THE FACTORS BE 100. THAT IS, IF FOUR FACTORS ARE INVOLVED EQUALLY EACH ONE IS WEIGHTED AT 25 POINTS. FUNCTIONS ARE WEIGHTED AT THEIR VALUES WITHIN THE FACTORS. WHEN THE TOTAL POINT SCORE FOR ALL FUNCTIONS WITHIN THE FACTOR ARE DETERMINED THEY ARE ADDED TOGETHER AND MULTIPLIED BY 25 POINTS FOR THIS EXAMPLE.

CHART 9

ONCE THE QUANTITATIVE EVALUATION IS PERFORMED ON THE AMBIGUOUS FACTORS ALL POSITIONS WILL BE DELINEATED MILITARY OR CIVILIAN. THE IDEAL IDENTITY OF EACH POSITION HAS BEEN ESTABLISHED IN THAT WAY. THERE ARE, HOWEVER, THREE OTHER CONDITIONS WHICH MUST BE MET BEFORE POSITIONS THAT IDEALLY SHOULD BE CIVILIAN CAN IN FACT BE CLASSIFIED THAT WAY.

Continued

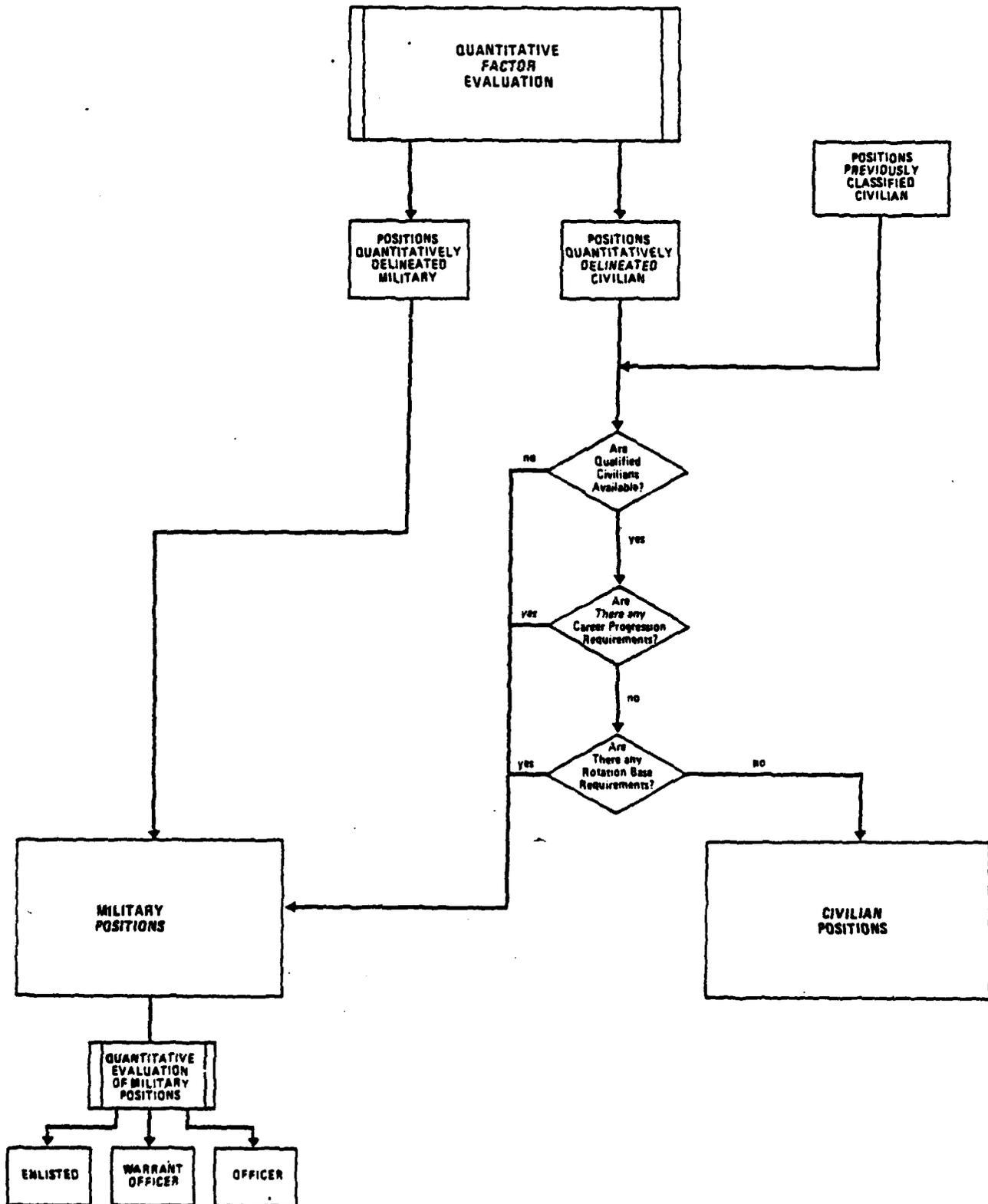


CHART 9

THIS LAST FIGURE ILLUSTRATES THIS LOGIC CHAIN. IT MUST BE DETERMINED
FIRST, WHETHER ANY QUALIFIED CIVILIANS ARE AVAILABLE
SECONDLY WHETHER THERE ARE ANY MILITARY PROGRESSION REQUIREMENTS
THIRD WHETHER THERE ARE ANY ROTATION BASE REQUIREMENTS.

WHEN THE TOTALITY OF THIS FINAL LOGICAL SEQUENCE HAS BEEN CONSID-
ERED, A POSITION CAN FINALLY BE CLASSIFIED AS CIVILIAN OR MILITARY.

FURTHER PROCEDURES THEN CAN BE APPLIED TO MILITARY POSITIONS TO DET-
ERMINATE WHETHER THEY SHOULD BE MILITARY OFFICERS, WARRANT OFFICERS, OR
ENLISTED POSITIONS.

APPENDIX H

INTERVIEWS WITH NATO NAVY OFFICERS

This appendix contains brief summaries of interviews conducted with selected Naval Officers from NATO countries.

Navy: Norway

Date: January 29, 1981

Contact: CDR Hans K. Svensholt
CDR Jens L. Rist
CDR Harald H. Mallaug

Substance: Many of the Norwegian ships were obtained from England after World War II, and the officer requirements for those ships had previously been determined. Most of the Norwegian ships are small and officer requirements are easy to define. The definition of jobs for officers is not done scientifically. They are well defined in submarines - and the space limitations also limit the number of officers. Although the requirements have generally evolved over the years, the officers interviewed considered inventory an important factor which tended to control requirements.

Norway does not have a Navy air branch.

Social changes in Norway have had an impact upon the organizations in the Navy. Originally, the Naval officers graduated from the academy and went on to sea assignments, and followed a logical career progression to greater responsibilities in the Navy. Recently, however, another officer corps was formed from the petty officers. It is anticipated that their career paths will

Navy: Norway
Contact: CDR Hans K. Svensholt
 CDR Jens L. Rist
 CDR Harald H. Mallaug

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tend to follow the specialty areas from which they emerged. The officer corps described first is now called Officers I. The recently formed officer corps is called Officers II.

Normal retirement in the Norwegian Navy occurs at age 60 at a pay of 66% of the basic pay. One may also retire at age 57 if the individual's age plus his years of service total 85. There is another retirement option at age 52 - and the reduced retirement pay is 55% of basic pay.

Navy: France

Date: January 29, 1981

Contact: RADM Maurice J. Soulet

Substance: The French Navy began a downward trend (relative to the Gross National Product) after the Algerian War. Four years ago there was a turnaround, and since that time, there have been gentle increases in the size and role of the Navy. The French Navy is assigned several duties normally associated with the Coast Guard.

Regarding the establishment of manpower requirements, operational staffs are responsible for establishing the operational requirements. The manpower people then compute the manpower requirements to meet the operational commitments. Admiral Soulet indicated that they base their analysis upon what the command is doing now and they generally do not "zero base". He also stated that the Navy has a relatively low officer/enlisted ratio.

After manpower requirements are determined, the billet totals and distribution are modified to meet budget constraints and account for promotional considerations. After requirements for current operations have been determined and budgeted for, the Navy resists changes caused by perturbations

Navy: France
Contact: RADM Maurice J. Soulet

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in conditions, environment, operations, etc. They prefer to fleet up for heavier operations by using reserves rather than increasing regular billets. Major changes in billets cause personnel fluctuations which cause problems for years in the future.

Regarding the Maritime Patrol Aircraft, the French Navy determines the officer requirements by applying seat factors. The currently used factor is approximately 1.5. The MPA carry a crew of 13 which includes 3 officers. Seat factors are developed by the manpower staff which was created about 10 years ago. Its main function has been to find manpower offsets to balance increased requirements.

Additional information provided in the interview includes:

- There are fewer officers now entering the Navy from the Academy.
- More officers are coming from the ranks of the petty officers. Some of the younger, promising petty officers

Navy: France

Contact: RADM Maurice J. Soulet

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are given an exam. Those that pass the exam go to the Academy for a one year course to become officers. Some petty officers are selected for officer status later in their careers. This program is similar to the USN LDO program.

- More officers are needed in the specialty fields.

Navy: Portugal

Date: January 29, 1981

Contact: CDR Narciso A. Carmo Duro

Substance: The Portuguese Navy has very little similarity to the U.S. Navy in size or mission. It is not concerned with projecting world-wide force or with developing a strike capability. It is concerned with being a competent defensive force - and the Navy has all coast guard responsibilities including harbor duties.

Portugal normally receives its ships from other countries, and they accept the officer requirements information which had been determined by the country from which the ship had been acquired. If the Commanding Officer considers that he has a requirement for more officers than have been provided, he proposes changes to his Flotilla Commander. If the requirement appears to be justified, the Flotilla will forward the request on to the Naval Staff.

In general, Commander Carmo Duro felt that officer requirements were primarily driven by inventory. The Navy has been short of officers, and there has been a move to draw officers from the ranks of the petty officers. There is a new process being used involving selection boards.

Navy: Federal Republic of Germany Date: January 29, 1981

Contact: CAPT Ulrich Weisser

Substance: The principal information available through Captain Weisser deals with the officer community rather than requirements at the unit level for officers. As was the case with several other countries, inventory, promotion, education, and other personnel considerations appear to drive requirements rather than workload factors. Some interesting aspects of the officer community include:

- Education of 5 years (Masters level) plus seven year obligated service afterwards amounts to a 12 year commitment.
- Many officers are phased out at the 12 year point.
- Increased complexity of systems have led to the implementation of specialty communities.
- Requirements for aircraft squadrons come from the Air Force.

Other subjects of interest which were discussed were summarized in a report provided by Captain Weisser. Relevant excerpts are quoted below:

Navy: Federal Republic of Germany
Contact: CAPT Ulrich Weisser

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For reasons of time and money, university courses cannot be granted to officer candidates who sign on for less than twelve years. But candidates may become regular officers even without going on to university when there is a demand and when they are qualified. This also applies to young officer candidates who leave a Bundeswehr university prematurely.

The training of future regular and non-permanent line officers whose term of service is 12 years or more takes about five years and is broken down into three slices:

An officer candidate receives his basic training in the field, followed by fundamental military training at the officer candidate and branch schools of his Service.

Following the officers' examination, candidates begin a course of study at one of the two Bundeswehr universities as a rule in the 16th month of their service. The 3-year courses of study impart to them the scientific and methodological know-how which they need for their future tasks. Professional courses of study are complemented with courses on teaching and social science. This widens students' horizons in respect of leadership and political education. The course closes with an academic degree or diploma. Thus far, counting all the subjects read, 1404 academic degrees and 448 diplomas have been awarded. Following their university course, officers are trained at schools run by the three Services for their further active assignments.

Extension training Grade C begins for regular line officers - as a rule in their 13th year of service - with a fourteen-week basic course. They must pass the examination at the end of this course if they are to be promoted to field grade officer. They then go on to an assignment course of advanced training for duties in one of the principal staff functions or on the general or admiral staff. Advanced training in the principal staff functions comprises

Navy: Federal Republic of Germany
Contact: CAPT Ulrich Weisser

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an S 1 course: Innere Führung/Personnel/
Press and Public Informa-
tion work,

an S 2 course: Military Intelligence/
Security,

an S 3 course: Operations/Organization/
Training,

an S 4 course: Logistics,

an S assignment course for officers of the
Air Force communications and electronics
services.

Furthermore, officers are given functional courses,
as and when required, to train them for special
duties - for instance as faculty members, attaches,
or in press and public information work.

Grade C extension training, initiated in 1974,
has proved worthwhile. The training given to
officers earmarked for promotion to field grade
on the basic course and on the assignment courses
for the principal staff functions lays a solid
and common foundation.

The results of the basic course are an aid to
deciding the duties to which officers are to be
assigned. The students' probation in the field
will be duly taken into account in assessing
these results.

The general staff/admiral staff course seeks to
prepare officers for the manifold duties of
general staff or admiral staff officers in the
armed forces or in integrated staffs. This
training contains sections dealing with service-
peculiar as well as interservice tasks.

Reassignment Backlog - Promotion Barrier

The targeted levels of regular officer man-
power have been reached. The number of annual
retirements dictates the number of officers
who may be transferred to higher positions

Navy: Federal Republic of Germany
Contact: CAPT Ulrich Weisser

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that call for higher-rated qualifications, the number of officers who may acquire regular status, and in consequence the number of officer candidates who can enlist every year.

This mechanism presupposes a well-balanced age structure of officers. In actual fact, however, the situation with regard to regular officers is marked by an unbalanced age structure, caused as it was by the rapid build-up of the Bundeswehr. Serious problems are bound to develop in the 1980s when only relatively few officers will reach retirement age, and even more so in the 1990s, when the number of officers due to retire will be exceptionally high. There will be a drastic drop in transfers among all levels of responsibility in the 1982 to 1991 time frame (reassignment backlog). In consequence, the number of possible promotions will recede, which in turn will have an adverse effect on career prospects (promotion barrier).

For members of other branches of the Public Service the impact of age on work performance is not as heavy as in the armed forces. The age of military leaders and instructors is a salient criterion of their qualification. Battalion commanders of the combat and combat support forces should preferably be not older than 45, company commanders not older than 35 years of age. Should the personnel situation in the Bundeswehr remain unchanged, however, it will not be feasible to observe that age limit.

Most of the line officers are affected by the reassignment backlog and promotion barrier. They will have to remain in positions of equal responsibility for a lengthy period without any prospects of promotion.

These trends have serious repercussions on the internal structure and morale of the armed

Navy: Federal Republic of Germany
Contact: CAPT Ulrich Weisser

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forces. Even slight differences in efficiency ratings may lead to differences in career advancement and promotion waiting times. To solve this problem is beyond the ambit of the efficiency rating system. It is becoming increasingly difficult in these circumstances to ensure a just and equitable distribution of career prospects.

The esprit de corps which is indispensable among officers can suffer gravely through an attitude governed by individual competitive career thinking. Given the large number of officers who are compelled to remain for long periods in positions of equal responsibility - although in different assignments - energy and imagination might slacken and the desire to accept responsibility might dwindle.

Navy: Great Britain
Contact: CAPT Richard G. Heaslip

Date: January 29, 1981

Substance:

Parliament does not get into the management or direction of the Navy the way the U.S. Congress does. Parliament does appropriate dollars for manpower and does establish an officer ceiling; but it does not get into requirements methodologies. It is the Navy's job to manage within the established ceilings.

Officer requirements for ships are developed somewhat like the U.S. Navy's approach. They are not based upon workload measurement. The Seaman/Engineer Corps of the Royal Navy tend to alter the problem somewhat in that many billets which would be identified as Unrestricted Line billets in the U.S. Navy are specified as requiring an Engineer (Marine or Weapons) in the Royal Navy. The interviewee expressed some pros and cons of the British system vis a vis the U.S. System - and he felt that the Navy's needs in the long run were better served by the Royal Navy approach. There is a school which provides an engineering course for prospective commanding officer which focuses upon two particularly important skills:

- The ability to communicate effectively with the Engineer; and
- The ability to "behave properly" in an emergency situation.

Captain Heaslip expressed his own opinions about the critical aspects of manpower requirements for officers. He considered that officer requirements are centered around the lieutenants-the middle grade officers who have the experience, education, and training to

function effectively aboard ship. They are also in an age group which is physically well adapted to the rigors of sea duty. He felt that if the Navy were to clearly establish the requirements for these officers, the requirements for the more junior officers and the senior officers could be managed. In 1979, the Royal Navy did not have sufficient numbers of these officers to man their ships properly - and they were not available in the shore establishment. The problem was sufficiently serious to cause a decision to be made to "lay up" five of the older ships. If one identifies the requirements for lieutenants in ships and the personnel system strives to maintain that level, the officer personnel problems will be manageable.

The problem of defining requirements and differentiating between junior officer and senior enlisted billets is as prevalent in the Royal Navy as in the U.S. Navy. Where the management of the two communities is separated, the problem is bound to remain. Captain Heaslip believes that their "mustang" program has not worked well at all. The transition from senior enlisted to junior officer has been difficult and, in many cases, a mistake.

Captain Heaslip recommended that the Study Group review certain articles of The Queens Regulations for the Royal Navy and the Appendix to the Navy List (which describes how officers enter the Navy).

Navy: Canada

Date: January 30, 1981

Contact: CAPT Cameron G. McIntyre

Substance: Captain McIntyre was able to address the officer manpower question for ships - but not aircraft squadrons. For ships, the requirements are derived by regulation, organizational considerations, and training pipeline.

Officers in ships involve three separate communities: executive, marine engineering, and combat systems engineering. Only those in the executive community (sometimes referred to as seamen officer or, colloquially, as "fish heads") can aspire to command of ships. Accordingly, the ships are generally organized into three major departments: Combat Control Operations (CCO), Marine Systems Engineering (MSE), and Combat Systems Engineering (CSE).

The senior seaman officer under the Executive Officer serves as the CCO, responsible for operations, tactics, watchkeeping, etc. Under the CCO, the organization goes in four directions: Navigator, Anti-Submarine Warfare Officer, Communication/Electronic Warfare Officer, and Anti-Air Warfare Officer. Under this echelon, there are three or four officers aboard for watchkeeping and shipboard operations training. These training

Navy: Canada

Contact: CAPT Cameron G. McIntyre

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billets are in the pipeline to advance in the unrestricted line community. They are established openly as requirements in peacetime operations. In the event of mobilization, the officers in those billets would presumably be available to move up to fill more critical requirements.

The Marine Systems Engineering department is responsible for propulsion, power, and ancillary equipment. Under the department head there are normally two officer billets: an Assistant MSE (normally a junior officer), and a Chief Engineer (normally a Limited Duty Officer, Warrant Officer, or senior enlisted rating). There is also normally a billet for an officer in a training status.

The Combat Systems Engineering department is responsible for the technical functioning of all combat systems. Under the Combat Systems Engineer there is an Assistant (senior officer) and a Combat System Technician (an experienced LDO, WO, or senior enlisted). There also may be an officer trainee billet.

Navy: Canada

Contact: CAPT Cameron G. McIntyre

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The model described above is a destroyer or other small combatant. Other types of ships would have similar organizations, modified as necessary to accommodate the mission. One of the principal points made by Captain McIntyre involves the identification of officer training billets which enable newly commissioned officers to get at-sea experience, concentrating on acquiring their watchkeeping tickets prior to being placed in shipboard management positions.

Captain McIntyre also advocated an active LDO program which is geared to recognize talented enlisted personnel with high potential early in their careers. He considered this an excellent source of valuable, professional officers.

The Canadian armed forces spend a great deal of money on officer training and education, and Captain McIntyre expressed the opinion that some of the school training may be a negative retention factor in that many junior officers were tired of being students.

Navy: Canada

Contact: CAPT Cameron G. McIntyre

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Regarding aviators, they must do an initial tour of duty in ships before moving on to flight training. At other occasions during their careers, aviators who remain in the Navy are rotated back to sea tours to retain their at-sea proficiency.

Navy: Netherlands Date: January 30, 1981

Contact: CAPT Hans C. Van der Meyden

Substance: As in the case with most navies, the Netherlands requires a Commanding Officer and an Executive Officer in their Navy regulations. Their combatants are generally divided into four departments: Operations, Engineering, Weapons/Electronics and Supply. Navigation duties are shared but the responsibility normally falls on the principal Combat Control Officer. The principal CCO is the head of Operations, and has Gunnery, ASW, and Communications/Electronics Warfare within the department. Each of these positions is normally filled by an officer. There is normally a junior officer in each of the remaining departments.

Captain Van der Meyden indicated that there have been consultants examining their organizational structure to attempt to streamline it. He feels that they have had no lasting impact - except in the shore establishment.

The Netherlands Navy has three categories of officers: A, B, and C. The A category officers flow from high school to the Naval College, to

Navy: Netherlands
Contact: CAPT Hans C. Van der Meyden

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a career officer pattern which can lead to top management in the Navy. The B category comes into the Navy from the merchant navy, engineering positions, etc. They are normally only able to progress to the rank of commander. The C category officer comes from the enlisted ranks. C officers are normally only able to achieve the rank of lieutenant.

Pilots do not begin flight training until completing two years as a seaman officer. Later in their career they also return to sea duty for retention of proficiency. This keeps them in the running for top management jobs along with their Seaman Officer counterparts.

A reorganization in the Ministry of Defense ten years ago resulted in an increased number of requirements for Navy Captains. This had an impact upon the entire officer structure which tended to drive officer requirements upward at the unit level.

In general, Captain Van der Meyden indicated that officer requirements at the unit level were

Navy: Netherlands

Contact: CAPT Hans C. Van der Meyden

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more driven by promotion, training, career growth, etc., than by methodologies involving measurement.

Navy: Denmark

Date: January 30, 1981

Contact: CDR Wilhelm L. Grentzmann

Substance: Commander Grentzmann had considerable experience in identifying ways to reduce costs of operating in the Army, Navy, Air Force, and the Home Guard. Although Denmark does not have a Navy with much similarity to the U.S. Navy, they have executed many cost cutting measures to improve the cost effectiveness of their operations. Manpower is an important consideration in these measures.

An examination of maintenance requirements played an important part in reductions. Regarding existing equipment, the general policy was implemented to do only corrective maintenance and essential preventive maintenance at sea; routine maintenance and large maintenance jobs are done in port. For new equipment, emphasis is placed on a reduced need for maintenance at sea. Better maintenance management is prevalent throughout the Navy.

Another approach that has been implemented in order to reduce manpower requirements involves a "key personnel" technique. If, as a result of a review of peacetime mission requirements, a ship which has been identified as being required only for mobilization, the ship is partially laid up. The

Navy: Denmark
Contact: CDR Wilhelm L. Grentzmann

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crew is reduced to the minimum necessary to operate and maintain equipment, and move the ship from one place to another in daytime. For a destroyer which required 13 officers, 25 senior enlisted, and 180 other enlisted, the skeleton crew would require 4 officers, 11 senior enlisted, and 40 other enlisted. The supplementary personnel required to fight the ship were identified through mobilization. This provides for a rapid capability to activate a ship in a reduced status.

Regarding new construction, Denmark is buying a new corvette which has a gas turbine, a mid-range sonar, 8 sea sparrow launchers, 8 harpoon launchers, depth charges, a 3-D radar, 12 close-in weapon stations, and other guns on the forecastle. The total manpower requirements are 73 personnel, including only 6 officers.

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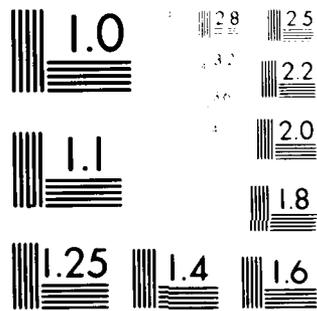
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APPENDIX I
GROUND OFFICER ALGORITHM DISCUSSION

GROUND OFFICER ALGORITHM

The Ground Officer Algorithm employs a subjective approach to requirements determination; using historical precedent, professional judgment and community needs. It is not a particularly quantitative process and it is difficult to justify to external authority.

Essentially, ground officers are assigned to aircraft squadrons to impart technical expertise to the maintenance department and to keep the squadron running smoothly during extended periods of heavy flight activity, such as might be experienced in wartime.

Figure I-1 is an example of the Ground Officer's Algorithm as applied to the A6E/KA6D squadrons. There are 12 squadrons, and ground officers are identified to fill the billets named. In 6 of the 12 squadrons an Aviation Maintenance Aeronautical Engineering Duty Officer (1520) lieutenant commander would be the Assistant Maintenance Officer; in three squadrons, Aviation Maintenance Limited Duty Officers (6330) would be designated for that billet; and in the remaining three squadrons, Avionics Limited Duty Officers (6380) would be assigned. For Maintenance Material Control Officer, the same designators are identified but with the distribution as shown. All 12 squadrons have the Avionics, Aviation Ordnance, Operational Intelligence, and Tactical Intelligence Officer billets as ground officer requirements for the designators and grades shown.

Although most of the Ground Officer billets are well-established requirements which are based upon aircraft type and complexity, some of them are a function of administrative workload. While squadrons differ from each other in many respects, the administrative workload for an aviation squadron is relatively constant throughout all communities. Therefore, an inverse mathematical relationship exists between aviators and those ground officer requirements which are administrative in nature. For example, if one were to compare the officer requirements for the A-7E

SAMPLE OF GROUND OFFICER ALGORITHM

AGE/KA6D (12)

ASST MAINT OFF: (6) 1520I
(3) 6330I
(3) 6380I

MAINT MAT CTL: (3) 6330J
(3) 6380J
(6) 1520J

AVIONICS: (12) 73800
AV/ORD: (12) 73600

OPS INTEL: (12) 1630K
TAC INTEL: (12) 1630L

Figure I-1. Sample of Ground Officer Algorithm

squadrons with F-14 squadrons, the results might demonstrate the variability of these requirements. Figure I-2 shows a comparison of the Ground Officer Algorithms of the 24 A-7 squadrons and the 17 F-14 squadrons. The differences are not very dramatic. The A-7 has a Warrant Officer in Avionics; and the F-14s have ground officers assigned as Assistant Maintenance Officer and Material Control Officer. However, the differences become quite significant when one looks at the total officer requirements generated in the SQMD, shown in Figure I-3.

Because the flight crew requirements of the F-14 are almost double those of the A-7, the officer requirements are 44 versus 24 as shown. If the administrative workload is relatively constant as mentioned earlier, it is easily seen that a ground officer augment for administrative support is a significantly greater requirement for the A-7 squadron than for the F-14.

GROUND OFFICER ALGORITHMS

<u>A-7E (24)</u>		
MAINTENANCE MATERIAL CONTROL	1520 J (12)	6330 J (6) 6380 J (6)
AVIONICS	7380 O (24)	
AV/ORD	7360 O (24)	
CORROSION CONTROL	1520 L (24)	
OPS INTEL	1630 L (24)	
<u>F-14 (17)</u>		
ASSISTANT MAINTENANCE OFF	6330 I (5)	6380 I (4) 1520 I (8)
MAINTENANCE MATERIAL CONTROL	6330 J (4)	6380 J (4) 1520 J (9)
MATERIAL CONTROL	3100 L (17)	
AV/ORD	7360 O (17)	
CORROSION CONTROL	1520 L (17)	
OPS INTEL	1630 L (17)	

Figure I-2. A-7E/F-14 Ground Officer Algorithms Comparison

SQMD

<u>A-7E (12 PLANES)</u>		<u>F-14 (12 PLANES)</u>	
<u>OFF</u>	<u>DESIGNATOR</u>	<u>OFF</u>	<u>DESIGNATOR</u>
19	1311	2	1301
2	1520	17	1311
1	1630	17	1321
1	7360	2	1520
<u>1</u>	7380	2	1630
24	TOTAL	1	3100
		1	6330
		1	7360
		<u>1</u>	7470
		44	TOTAL

Figure I-3. A-7E/F-14 Officer Requirements Comparison

APPENDIX J

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