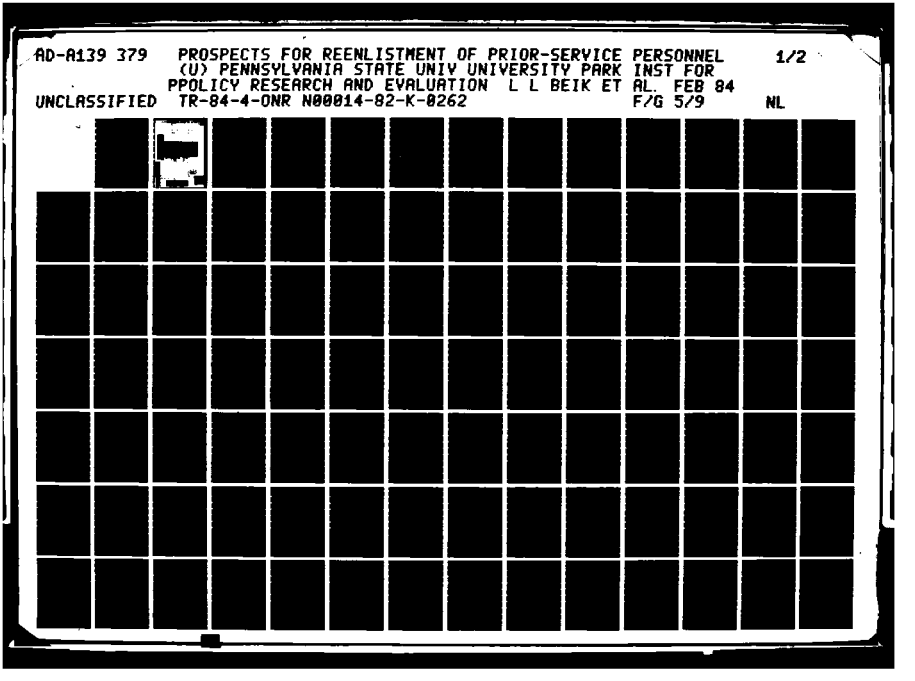
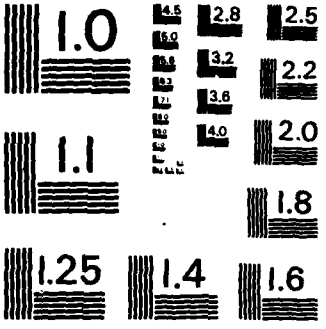
AD-A139 379 PROSPECTS FOR REENLISTMENT OF PRIOR-SERVICE PERSONNEL (U) PENNSYLVANIA STATE UNIV UNIVERSITY PARK INST FOR PPOLICY RESEARCH AND EVALUATION L L BEIK ET AL. FEB 84 1/2

UNCLASSIFIED TR-84-4-ONR N00014-82-K-0262 F/G 5/9 NL





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

INSTITUTE FOR POLICY RESEARCH AND EVALUATION

PROSPECTS FOR REENLISTMENT OF PRIOR-SERVICE PERSONNEL[a]

Technical Report ONE-4, February 1984

Leland L. Beik

and

Stanley D. Fitch

N-253 BURROWES BUILDING
THE PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY PARK, PA 16802

(12)

PROSPECTS FOR REENLISTMENT OF PRIOR-SERVICE PERSONNEL[a]

Technical Report ONR-4, February 1984

Leland L. Beik

and

Stanley D. Fitch

Institute for Policy Research and Evaluation
The Pennsylvania State University
University Park, PA 16802

Research Sponsored by the Organizational Effectiveness Group (Code 4420E), U.S. Office of Naval Research under Contract No. N00014-82-K-0262; NR 475-003. Reproduction in whole or in part is permitted for any purpose of the United States Government. Approved for public release; distribution unlimited. The content of this report reflects the views of the authors only.

[a]Comments and assistance from principal investigator Stanley P. Stephenson, Jr. and staff members David A. Macpherson and Margaret E. Mitchell are gratefully acknowledged. The assistance of Lt. Michael Reed of ONR and H. Wallace Sinaiko of the Smithsonian Institution are also gratefully acknowledged.

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: ~~ONR~~ 84-4	2. GOVT ACCESSION NO.: AD.A139 379
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): Prospects for reenlistment of prior-service personnel	5. TYPE OF REPORT & PERIOD COVERED: Technical Report
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): Leland L. Beik & Stanley D. Fitch	8. CONTRACT OR GRANT NUMBER(s): N00014-82-K-0262
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Institute for Policy Research and Evaluation N-253 Burrowes Building, PSU University Park, PA 16802	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: NR 475-003
11. CONTROLLING OFFICE NAME AND ADDRESS: Organizational Effectiveness Group Office of Naval Research (Code 4420E) Arlington, VA 22217	12. REPORT DATE: February 1984 13. NUMBER OF PAGES: 126
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office):	15. SECURITY CLASS. (of this report): Unclassified 15a. DECLASSIFICATION/ DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

prior service
reentrants
marketing analysis
occupational differences
geographic differences
reenlistments
market segment analysis

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

DMDC data were analyzed for prior-service and non prior-service enlisted personnel who entered or reentered the Navy during fiscal years 1974-1981. The characteristics of men in specific critical ratings were investigated to determine the numbers and qualities of personnel in each of the segments which developed. A final portion of the study investigated relationships among the segments and geographical recruiting locations.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S N 0102-LF-014-6601

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Preface

The shortage of mid-grade petty officers has been a source of great concern to the U. S. Navy, especially the Recruiting Command. The main motivation for this study is to identify a possible way to reduce this shortage--namely, recruiting prior-service personnel.

In this report Leland Beik and Stanley Fitch summarize the results of a study which they conducted. This study considers the "Prospects for the Reenlistment of Prior-Service Personnel." It is part of a larger study for the Office of Naval Research which is ongoing at The Pennsylvania State University. Others working on this project and contributing to this report include Margaret E. Mitchell, David R. Ellison and David A. Macpherson.

The Beik/Fitch study is mainly descriptive and examines actual military personnel data from the Defense Manpower Data Center (DMDC). The methodology extends market segmentation analysis to the study of the prior-service community. Four critical occupational groups (operations technicians, weapons technicians, main propulsion personnel, and engineering support staff) are examined. Special attention is paid to distinguishing factors associated with individual choices to (1) remain in the Navy, (2) leave permanently, or (3) leave and then reenter.

While a number of conclusions and policy implications are reached, perhaps the most important conclusion concerns both the inadequacy of the number of people reentering and the qualifications of those who did reenlist in the 1974 to 1981 period. These reservations lead Beik and Fitch to recommend that this group not be targeted for recruiting unless more "screening" of applicants is undertaken.

Those readers interested in policy issues are directed to the Executive Summary and to Parts I and III. Practitioners and fellow researchers may also wish to read Part II.

Stanley P. Stephenson, Jr.
Associate Professor of Business Administration
and Principle Investigator
Navy Prior-Service Study
The Pennsylvania State University
February 15, 1984

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES
(continued)

LIST OF FIGURES

LIST OF EXHIBITS

EXECUTIVE SUMMARY: POLICY IMPLICATIONS

The basic question to be answered in this analysis is as follows: "Among prior-service personnel, which groups or segments, if any, provide favorable prospects for reenlistment in chronically short, mid-grade, petty officer ratings?" By (1) identifying numbers per segment, (2) identifying segment profiles, and (3) locating possible geographical concentrations, recruiting efforts could be targeted toward favorable and away from unfavorable segments.

The strategy inherent in this approach is to evaluate the size, characteristics, and location of segments, thereby laying a foundation for the design of marketing strategies. The size, quality, and accessibility of possible segments must be assessed in order to design or adjust a marketing campaign. Under the assumptions that (1) Critical Reenlistment Eligibility Opportunities ratings, (2) paygrades, and (3) Military Eligibility Processing (MEP) stations are all relatively fixed, the remaining controllable elements are (4) the persuasiveness of advertisements and of recruiters. By marketing analogy, these elements correspond with (1) product offering, (2) offering price, (3) channel of trade, and (4) advertising and personal selling, respectively. For advertising and personal recruiting to be successful, the further assumption is that viable segments exist.

The research procedure first identified four chronically undermanned occupational specialty segments (CREOS). These included operations technicians (OT), weapons technicians (WT), main propulsion (MP), and engineering support (ES) occupational categories.* Each of these occupational segments was further subdivided by two sequential decisions of the enlisted

men involved. Upon nearing completion of a term of service, each individual had first to decide whether to reenlist in the Navy or to separate. Base segments (called stayers or leavers) were thus formed. After separating, the second decision was to remain out of the Navy or to reenter that service. Additional base segments (termed reentries and nonreturners) resulted. The final stage of segmentation occurred when demographic, socioeconomic, and military variables were applied in discriminant analysis to identify the stayers from the leavers and then to distinguish the reentries from the nonreturners. Testing the resultant segments against the actual decisions of members in the data set served to evaluate correct and incorrect classifications.

One end product of the research is a test of the ability to analyze data from the Defense Manpower Data Center as a guide for developing recruiting strategies and policies. The research findings suggest that the same type of analysis could be applied to more complete and current active-duty data.

The more specific end product is a set of segments evaluated as to size, common characteristics, and locational clusters. In a statistical sense, the segments are distinguishable with what might be termed low-to-moderate success. For purposes of shaping recruiting strategy and policy, however, the important implications seem much the same for all four occupational segments with perhaps one exception. The four CREO segments are consequently combined in the following summary.

---

*Further description of these categories and of the methodology applied is available in Part I of this report.

Summary Concerning Segments

The stayer segment, men whose service obligations exceed 72 months, constitute the most accessible target segment among the several which developed in the analysis. Stayers, of course, only become a target upon separation. The evidence to support this conclusion may be summarized as follows:

(1) Actual retention after the initial 72 months is limited. Approximately 87.7 percent separated within an additional two years. The six- to eight-year turnover creates a substantial annual flow of prospects, although yearly variations are to be expected.

(2) The segment is sizeable. During the eight-year period, 19,873 or 28.8 percent of the combined CREO personnel were actually stayers, and an added 5.4 percent could be targeted as having characteristics similar to the stayers (Table 6, p. 86).

(3) The characteristics which classified men as stayers were not generally unfavorable. From the common profile characteristics, some inferences can be made concerning the nature of recruiting efforts (Exhibits 2, 4, 6, and 8, pp. 41, 54, 65, and 75, respectively).

(4) The stayers, especially the OT stayers, might also be targeted as a segment for retention as will be explained below.

Perhaps the second best target segment is made up of the nonreturners. A short list will suffice to explain this conclusion:

(1) Nonreturners constitute the largest single segment. Over the eight-year period, 41,521 or 88.4 percent of those who separated did not return to the Navy (Table 5, p. 83).

(2) Segment characteristics were similar to the stayers, and did not exhibit the adverse characteristics present among the reentries (Exhibits 3, 5, 7, and 9, pp. 48, 60, 70, and 79, respectively).

(3) For nonreturners, the exhibits provide profile information. However, the data base does not supply substantial guidance for directing recruiting efforts. Since past efforts have failed to attract this segment, little is known concerning how to encourage reenlistment of its members. Changes in recruiting incentives beyond advertising and face-to-face persuasion would doubtless be needed to tap substantial numbers from among this segment.

One expectation of the initial research pattern was that profile characteristics of reentry personnel could be determined in order to identify similar prior-service individuals who have not reentered. The underlying assumptions included the presence of sufficient numbers of reentries, data to classify them well, and a substantial added segment of similar men. Unfortunately, these assumptions proved to be incorrect. The potential for reentry of this target segment turns out to be the least attractive for the following reasons:

(1) Correctly classified reentries were so few--10.2 percent--in proportion to actual reentries that classification power is limited. Reentries were misclassified as nonreturners in a ratio of almost nine to one.

(2) Provided recruiting conditions are reasonably constant, expected reentries should approximate the proportions of past reentries. Any added potential would have to be obtained from the nonreturner segment.

(3) The added target population of nonreturners with characteristics similar to the reentries proved to be exceedingly small. Only 1.6

percent of the leavers were classified into this segment (Table 5, p. 83).

(4) The profile characteristics of this added target segment suggest that some members of this segment--and of the correctly classified actual reentries--are among the least desirable for reenlistment. Many had separated involuntarily and/or were classified not immediately eligible to reenlist.

(5) In addition, many members of this added target segment--and of the correctly classified actual reentries--obtained their CREO ratings after reenlistment. The potential for saving costs is thus minimized or possibly eliminated.

Whatever policies are considered with regard to recruiting or other decision areas, improvement in the base records would be helpful. From initial contacts at MEP stations throughout an enlistee's career, numerous opportunities for omissions and errors exist. Additional errors occur during data transfer and management. Consider a few of the difficulties met in this study:

(1) Missing data obviously caused some deterioration in the number of cases at each stage of the research. The possibility of bias exists as a result. Fortunately, such bias is seemingly minimal for purposes of the present study.

(2) Numerical codes not recognized in the basic codebook (mispunched) were present in the data. This was one cause of missing data. In addition, a roughly equivalent number of valid codes were probably mispunched thereby causing some confusion in the data and possible limitations on interpretation.

(3) Reentries frequently had codes which indicated that they were ineligible to reenlist or had separated from the service for adverse reasons. If such codes are assigned meaningfully, they should be followed when screening personnel.

(4) Many variables, e.g., AFQT scores based on divergent tests, are ambiguous and require careful judgment for appropriate use.

Policy With Regard to Segments

To the extent manpower requirements demand attention to mid-grade, CREO ratings, the size, quality, and accessibility of the stayer segment doubtless makes it the preferred target among the segments analyzed. As shown below, current analysis would be preferable to the period of analysis represented by this study. The productivity of the potential pool of qualified, prior-service men should nevertheless be considered relative to other possible sources.

If demand is such that nonreturners need to be added to stayers as a target segment, more needs to be known concerning their characteristics, objectives, alternative opportunities, etc. Since recruiting procedures during the period analyzed did not manage to reenlist this portion of the prior-service pool, incentives beyond advertising and personal recruiting messages might be needed. Consideration might extend to further adjustments of pay scales or bonuses or possibly even to revision of job specifications, decisions which involve numerous Navy Commands.

Ability to tap the prior-service pool has not been extensive: 5,429 or 7.9 percent of the total analyzed were reentries. Defining a target segment similar to the actual reentries fails to supply feasible

numbers of qualified personnel over and above actual reentries. Although classification power was limited, the characteristics of the actual as well as the potential reentries showed considerable proportions of less desirable or borderline people. Unless the stayers prove to be a viable target, the advisability of seeking reentry personnel might well be questioned. A more stringent screening based on improved data provides a minimum recommendation.

The data base, while not ideal for the objectives of the present study, proved sufficient for developing insights concerning the service population. Direct control of the data base is outside the Recruiting Command, and that command controls only one portion of data generation. However dispersed authority over data management may be, improvements seem possible and advisable.

Summary Concerning Applications

There are several options available for applying the type of analysis used in this study to the problem of locating CREO personnel. In increasing order of utility, these are: (1) search for personnel by following the geographic patterns which became apparent in the project analysis; (2) beyond the current findings, one could analyze active-duty records and follow-up with recruiting efforts while addresses are still fresh after separations; (3) apply analysis to active-duty records and place increased emphasis on retention rather than recruiting after separation; and (4) combine increased efforts on retention with early follow-up recruiting.

The first option is limited by the fact that place of entry rather than current location is recorded in the DMDC files, and that numerical

concentrations do not often look large enough to be actionable. Option two would be more accurate given discriminant functions based on current data rather than data from the period studied. If current data and functions were used, options two and three would combine in the fourth. The problem of location would be overcome since present units of assignment or recent addresses are available.

(1) Especially with newly developed functions based on current data, scores can be calculated to indicate the likelihood of CREO personnel reenlisting in the Navy. The array of scores can be divided into, say, three or four accessibility segments depending upon manpower requirements and alternative sources. The divisions would indicate segments from the most likely prospects down to the least likely and possibly undesirable individuals. Use of addresses would provide for automatic geographic tracking.

(2) The approach suggested would apply primarily to the objective of retaining personnel as they near the end of their terms of service. Indeed, the approach is illustrated with reference to the operations technicians (p. 92 ff). For individuals who then separate, the segment classification would be known and their records flagged for early follow-up for those in preferred segments while their addresses remain current.

(3) Segment classification plus relevant information not found in unit personnel records could be routed to the career counselors as aids in the encouragement of retention. Failing retention, appropriate information could be quickly routed to the recruiting station nearest the addresses provided at separation. A system integrating proper

information in successive contacts should have better success than separate efforts.

Recommendation With Regard to Application

The same function or functions (option four) would serve the combined purposes of targeting the most likely service individuals for retention before, or reentry after, separation. The research findings suggest that the methodology would work reasonably well with operations technicians, but less well for engineering support occupations. If current functions and data improve results substantially, the method could be extended to other CREOs whether or not they are included in the present study.

Possible recommendations with respect to applying the method include (1) further research to verify the potential (using current data and newly developed functions), or (2) developmental research to apply the method on a trial basis. The present analysis does not consider other possibilities, ranging from no change in recruiting practices to full-scale application of this or alternative methods. Further development of the methodology would appear to be potentially productive and might provide a preliminary foundation for information system development.

Synopsis

To condense results to a minimum, the direct answers to the opening question are:

1) Stayers and nonreturners provide numerically feasible targets.
2) Stayers and especially nonreturners may be difficult to cultivate since inferences from characteristics in the data base do not suggest strong reasons for reentry.

3) Also, the relative size of geographical concentrations of stayers and nonreturners is not numerically large enough to guide recruiting efforts to especially favorable concentrations.

4) Contrary to initial expectations, nonreturners with characteristics equivalent to reentries are very limited in number. In addition, many of the actual reentries as well as the similar nonreturners exhibit adverse characteristics in the segment profile. This expected target did not materialize.

5) Without improved targeting and screening, a policy of seeking or readily accepting reentries may be counterproductive.

Less directly, the methodology applied to a current and more adequate data base would improve both the delineation of target segments and geographical tracing. This possibility was described in the preceding paragraphs and in Part III of this report. The turnover-shortage problem is countercyclical to the civilian economy. When it again reaches serious proportions, system-wide strategies may be required. Such strategies could include revision of job specifications, assignment rotations, and differential payscales as hinted in the final section of Part III.

PART 1: THE PATTERN OF INVESTIGATION

The basic question posed for the segmentation portion of the more comprehensive project is: "Among prior-service personnel, which groups or segments, if any, provide favorable prospects for reenlistment in chronically short, mid-grade, petty officer ratings?" The resulting objective is to target recruiting efforts by sorting favorable from unfavorable segments. Subobjectives include identifying (1) the number per segment, (2) the characteristics which provide a descriptive profile of segments, and (3) locating geographical concentrations of individuals who make up any favorable segments.

The above general statement, of course, constitutes an extensive problem. A much tighter definition or focus will develop along with the methodology discussion. The resulting focus will make the problem tractable for research.

The following section of this report will refine the problem definition by explaining the segments for analysis and outlining the methodology. Subsections will treat the nature and extent of the data as well as the types of analysis applied to the data. Some limitations of the data and techniques will be noted as part of the exposition. Later sections of the report will express the actual analysis as well as conclusions and recommendations.

Developing the Methodology

The initial concept embedded in the proposal was to assess the potential among prior-service personnel for reentry in occupations with chronically low manning levels. Segmentation was to be accomplished using demographic, socioeconomic, and other appropriate descriptors available in

the Department of Defense Manpower Data Center (DMDC) files. Improved targeting was to be developed through comparisons of three basic groups: (1) those remaining in service, (2) those leaving service, and (3) those who returned to active duty. Attention was to be focused on personnel eligible for selected "Critical Enlistment Eligibility Opportunities," the CREO groups. Comparative segments were thus anticipated, but CREO segments had yet to be selected.

The data base. Extensive preliminary analysis refined the scope of the research in light of Recruiting Command interests and data feasibility. A first research step explored a tape which contained all prior-service accessions for the period FY73 through FY81. This and subsequent tapes were of course obtained through channels from DMDC/Monterey. A second step explored a tape which contained information on attritions and separations. Other tapes were designed for portions of the comprehensive project other than segmentation, and one additional tape provided the foundation for the present report.

Exploratory analysis of the first two tapes plus consultation with personnel of the Office of Naval Research and the Recruiting Command enabled (1) selection of appropriate CREO groups for analysis, (2) an indication of the variables likely to be of use in the segmentation process, (3) a check on the proposed analytical methods, and (4) design of a tape suitable for the segmentation analysis. Portions of this exploratory work have been expressed in previous reports (Stephenson, Beik, Ellison, and Fitch, 1983; Ellison, Mitchell, Beik, Stephenson, and Fitch, 1983; and Beik, Mitchell, and Fitch, 1983.)

Nine CREO ratings were selected and checked to make sure that they were chronically undermanned during the period covered. The nine ratings

may be combined into the broader technical and craft ratings. They may also be identified by their primary occupational category codes as follows:

1. Technical
    a. Operations Technicians
        1) ET (POC 100, 101, 102, 103, 193)
        2) DS (POC 150)
    b. Weapons Technicians
        1) GM (POC 633, 644)
        2) FT (POC 104, 113, 121)

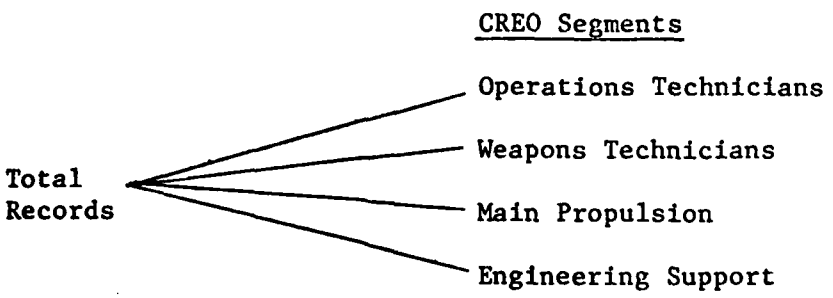
2. Craft
    a. Main Propulsion
        BT and MM (POC 651)
    b. Engineering Support
        1) EM (POC 662)
        2) HT (POC 701,790)
        3) IC (POC 623)

Several of the above incorporate three-letter designations, e.g., FTG, GMG, etc.

The computer tape obtained for the segmentation component of the research was constructed in the following manner. Data drawn from the individual cohort files at DMDC provided initial entry, most recent entry, and loss data. Additional information was obtained from the master and loss files for the same individuals. The period initially included FY73 through FY81. The tape incorporated those enlisted male personnel who were included in the ratings listed in the previous paragraph. Reentries were included throughout the period, but initial entries were ex[illegible]uded

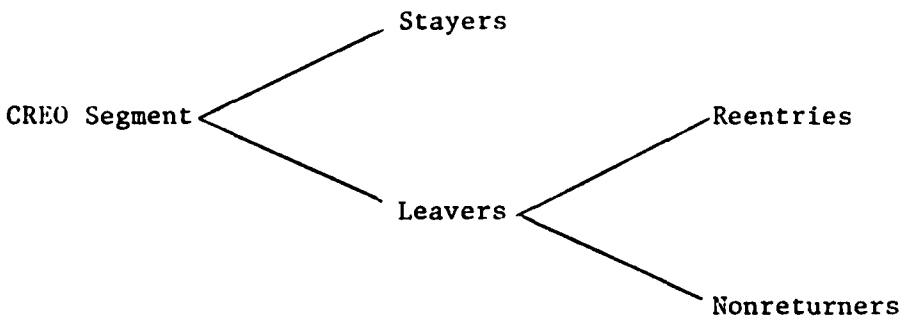
after FY78 on the basis that the remaining time was insufficient to permit analysis of exit-reentry decisions. The research objectives do not involve analyses at the individual level and therefore remain in accord with privacy requirements (PL93-579).

Establishing the base segments. A first a priori stage of segmentation was thus created on the basis of occupation. Each segment contains a related set of occupational specialties. In essence, each set of CREO positions is the "product" offered to the recruiting "market." Also each product is assumed to attract a reasonably distinct market segment, a group of potential recruits who have certain abilities and characteristics in common (Kotler 1980, Chapter 10). The several segments, in turn, should be distinguishable from one another. Although a priori by definition, the concept contains elements of product-benefit segmentation as a result of the positions offered (Haley, 1968). Using the CREO labels to indicate the potential segments, the concept may be illustrated as follows:



While the CREO groups supply one segmentation variable, a second segmentation variable is based on a comparison of those who separate and do not return with those who separate and later reenter the Navy. Actual decision behavior supplies the criterion for this stage in the process. However, one must first sort those who separate from those who

remain in the Navy. The decision sequence is stay or leave, and reenter or not. The same order is needed for sorting each CREO segment. The following diagram illustrates this sequence:



While the above diagram reflects the decision sequences and establishes a handy terminology, the terms required further definition during preliminary analysis. Perhaps the easiest definition is that of a nonreturner, an individual who has separated without long-term service and does not reenter during the period. A reentrant must separate for at least 24 hours. In the records, the reentry can be identified by return through a MEP station and existence of a second cohort file. Distinguishing the stayers from the leavers is more difficult because it involves determining a specific time limit to divide longer- from shorter-term service.

Most initial entries are four-year terms of enlistment, but numerous cases in the data indicate two, three, five, or six-year terms. A six-year obligation often results from specialized training, but many individuals fail to complete the training and drop out, usually at the four-year mark. Conversely, many four-year entries add a two-year obligation during their initial term of enlistment. At the four-year

mark, there is no way to distinguish voluntary extensions from obligatory extensions. There is also the problem of quite a few non-standard terms of service, and the numbers of separations after completing six years is large. In other words, the voluntary decision or intent to stay in the Navy is better measured after six rather than four years, especially for the CREO segments which require specialized training.

A stayer, consequently, is defined as one who (1) reenlists upon completing six years or 72 months of service, or, (2) whose obligated or expected termination of service (ETS) extends well beyond the 72-month limit. Although other combinations are possible, this would typically mean a third enlistment after a four-year term and a two-year extension, all with no break in service. A leaver, as a consequence, is one who fails to complete as much as 72 months of service or who separates upon completing a term of service which ends at 72 months.

The base segments for analysis are thus formed through classification of the CREO groups by their exit-reentry decisions. After a description of the number of cases available for analysis, the base segments and their respective sizes are displayed in Table 1.

The numerical base. In spite of the diligent efforts of LCDR William H. King at DMDC, records on the final tape required further evaluation. First, FY73 was deleted from the data because the draft still applied during a major portion of the year. The period analyzed became FY74 through FY81. Several additional difficulties, most inherent in the source tapes, prevented use of all the cases. These difficulties included:

Two sets of records assigned to one individual		8,520
Insufficient (missing or miscoded) data		642
Other: deaths, officer training, etc.		334
Unable to classify as CREO		74
		9,570
and, Total cases in period	81,248	100.0%
Less cases deleted	9,570	11.8%
Cases for analysis	71,678	88.2%

Note that the total cases constitute a census rather than a sample for the eight-year period. Even after subtracting the unusable cases, the remaining number certainly contains a preponderance of cases, essentially a census. The base for analysis is thus over seventy thousand, although numbers later differ as additional missing data occurs for the items in the analysis. Where the analysis concerns individual segments, the totals are of course much smaller.

The data represent what happened during the eight-year period; the data are also assumed to represent what *is* expected to occur currently and in the near future. In this sense the data provide a sample to guide recruiting efforts. The underlying assumption is that conditions which affected recruiting efforts in FY's 1974 through 1981 remain constant for several current years. The eight-year period, however, contained some less favorable recruiting years (FY 1974 and FYs 1978-79) and some relatively favorable years (FYs 1975-77 and FYs 1980-81) (Stephenson, 1983; Beik, 1983). The eight-year period thus represents a rough average of favorable and unfavorable conditions.

After breaking out each of the occupational specialties and subdividing these by reenlistment decisions, the base segment numbers and proportions are displayed in Table 1. The nonreturners plus the reentries of course add up to the leavers. In the final column, for instance,

TABLE 1

Distribution of the Base Segments Before Further Analysis

Classification	Operations Technicians	Weapons Technicians	Main Propulsion	Engineering Support	Totals
Stayers	5,359 (26.58) [51.24]	2,915 (14.46) [25.22]	7,472 (37.06) [28.26]	4,415 (21.90) [19.00]	20,161 (100.00) [28.13]
Nonreturners	4,463 (10.16) [42.67]	7,260 (16.52) [62.80]	15,881 (36.14) [60.11]	16,344 (37.19) [70.33]	43,948 (100.00) [61.31]
Reentries	637 (8.42) [6.09]	1,385 (18.30) [11.98]	3,066 (40.51) [11.61]	2,481 (32.78) [10.68]	7,569 (100.00) [10.56]
Totals	10,459 (14.59) [100.00]	11,560 (16.13) [100.00]	26,419 (36.86) [100.00]	23,240 (32.42) [100.00]	71,678 (100.00) [100.00]

( ) Percent in each of the CREO segments.

[ ] Percent in each of the decision classification segments.

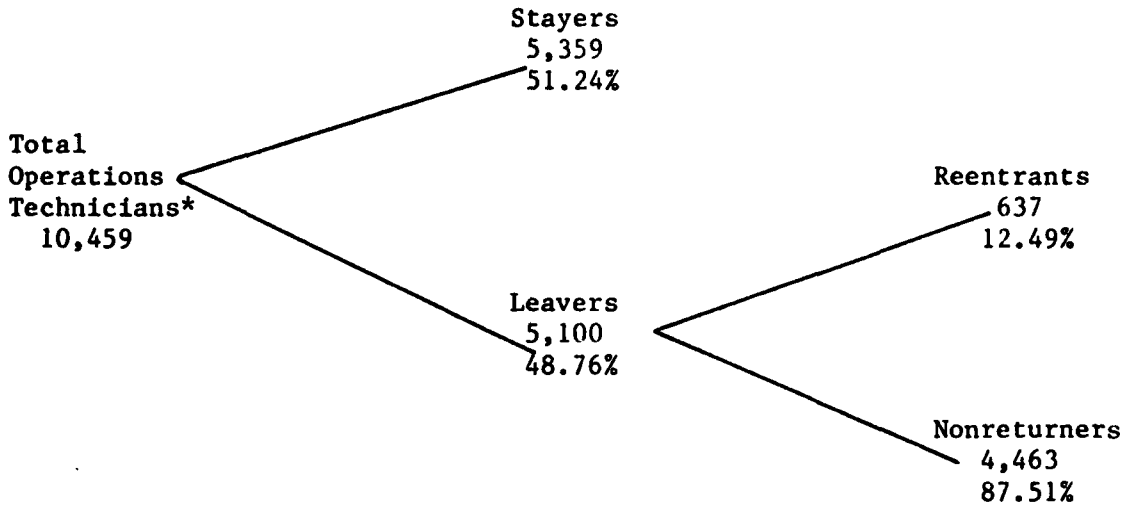
the leavers would be about 71.9 (61.3 + 10.6) percent of the 71,678 total cases which survived the two-way classification. Except for the operations technicians, nonreturners are largest in numbers and percentages. Reentrants supply the smallest numbers and percentages, especially for the operations technicians. The operations technicians, on the other hand, have by far the largest proportion of stayers.

Analytical refinement of the segments. After development of the base segments, preliminary analysis continued to shape the study. Demographic, socioeconomic, and military-record variables were used in cross tabulations to develop comparisons of segment characteristics. Cross tabulations, together with Chi-square statistics, enabled associations or relationships between pairs of variables to be recognized. Numerous tables identified useful relationships and aided the evaluation of variables for further analysis. The Chi-square statistic and its associated probability verifies that any relationship which develops is not due to chance variation in the selection of data elements. The contingency coefficient provides a rough measure of the degree of association and permits a first estimate of the importance of the variables incorporated in the analysis. Actually, the near census in the present data shows what happened; there was little if any variation due to data selection. The statistics evaluate potential variation when current decisions are based on past data.

An example of preliminary Chi-square analysis (Bruning and Kintz 1968, pp. 209-215) is provided by the number of dependents of operations technicians. The number of dependents is measured for stayers in their most recent records and for leavers at separation. Figure 1 shows how the total numbers break out at the successive decision stages. Table 2

FIGURE 1

Reenlistment Decisions of Operations Technicians



*The figure accounts for the total operations technicians classified as in Table 1. Additional missing data will cause the numbers to vary in later sections of this report.

TABLE 2

Operations Technicians

A		Number of Dependents: One	Two or More	Total
Stayers	Observed number	1,192	3,447	5,359
	Expected value	2,735	2,625	
	Contribution to χ^2	247.4	257.8	51.4
	Raw percent	35.7	64.3	
Leavers	Observed number	3,409	1,660	5,069
	Expected value	2,587	2,483	
	Contribution to χ^2	261.5	272.5	48.61
	Raw percent	67.3	32.7	
	Observed number	5,321	5,107	10,428
	Raw percent	51.0	49.0	100.00

Chi-square = 1039.2, d.f. = 1, Pr. < .0001, C = .301

And Among Leavers

B		Number of Dependents: One	Two or More	Total
Reentries	Observed number	416	190	606
	Expected value	408	199	
	Contribution to χ^2	0.2	0.4	11.9
	Raw percent	68.6	31.4	
Nonreturners	Observed number	2,993	1,470	4,463
	Expected value	3,002	1,462	
	Contribution to χ^2	0.0	0.0	88.1
	Raw percent	67.1	32.9	
	Observed number	3,409	1,660	5,069
	Raw percent	67.3	32.7	100.0

Chi-square = 0.608, d.f. = 1, Pr. < .4355, C = .011

provides the Chi-square analysis. Note that 31 additional cases are missing between Figure 1 and Table 2 where number of dependents information was missing or miscoded in the data. A close inspection of the A portion of the table indicates that individuals with two or more dependents tend to be stayers. The interpretation develops from the fact that only 32.7 percent of the leavers had two or more dependents while 64.3 percent of the stayers had two or more. The percentages are nearly reversed for one (self) dependent. A similar conclusion may be obtained by observing the differences between the observed and expected values in the various cells of the table.

When reentrants and nonreturners are compared in the B portion of Table 2, no interpretation is possible because Chi square is not significant. In A, the probability (< .0001) indicates that the chances are exceedingly small that chance variation in the data could falsely indicate an association. In the B portion, the probability (< .4355) indicates that chance variation in the data might account for any association over four times in ten. A large number of cases, however, might verify even very weak associations. The contingency coefficient overcomes this problem. A definite, although moderate, degree of association is evident in the A portion (C = .301) and an almost nil association is indicated in the B portion (C = .011). The cell Chi-square values are retained in the tables since larger values tell which cells contribute most to Chi-square and consequently to low probabilities and high contingency coefficients.

The variable "number of dependents" was retained for further analysis because it distinguished stayers from leavers for operations technicians, and because it distinguished stayers from leavers and/or

reentries from nonreturners for the other CREO segments. Variables which failed to attain significance were eliminated along with some redundant variables. Missing data also proved excessive for some variables, and others were devoid of responsible interpretation. Excessive reporting would occur if all the Chi-square tables were included, even for the variables retained. For economy of exposition, the preliminary tables are excluded other than the sample just supplied.

To define the base segments, reentries were first identified by their return after a break in service. Stayers were next located through a record of service or expected term of service greater than six years. Nonreturners exhibited neither the extended service of the stayers nor the return to service of the reentries. After identification, analysis followed the stayer-leaver and reentry-nonreturner sequence. Two base segments became available at each decision point, and the Chi-square variables which distinguished one from the other were entered in discriminant analysis. For each pair of known segments, a two-group discriminant analysis was applied to each of the four CREO segments. Instead of evaluating each variable separately, discriminant analysis evaluates their combined effect (Klecka, 1980). The result is more powerful and parsimonious sets of variables or profiles which distinguish appropriate pairs among the base segments.

Very briefly, discriminant analysis operates in the following manner. In the stepwise program used, all of the potential predictor variables are tested to estimate which one best distinguishes one of the test segments from the other (Dixon, Brown, Engelman, Frane, Hill, Jennrich, and Toparek, 1981). The criterion is the extent to which the between-group variance exceeds the within-group variance. The best predictor is chosen

and retained, and the remaining variables are retested for selection of the next best discriminator. It is possible for a subsequent selection to replace an earlier selection so that the final combination has the ability to distinguish the test segments most clearly. The process of selection ends when no remaining variables add significantly to the ability to discriminate or when all the predictor variables have been entered in the analysis. The selected variables are consolidated into one or more canonical functions or equations. In the two-group analyses used in the present study, each analysis produces a single function.

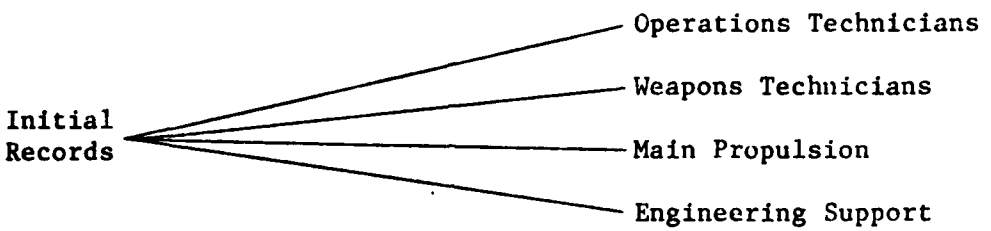
The two important end products of discriminant analysis are (1) the ability to analyze any measurable differences between the segments, and (2) the ability to classify any case into the segment it most resembles. The standardized coefficients of the linear canonical functions provide the ability to analyze segment differences; they provide a descriptive profile of the typical characteristics of individuals in each of the base segments. The function itself enables the test cases to be classified and checked against the actual segments from which they came. Figure 2 summarizes the stages of segmentation described thus far.

The final set of descriptor variables embedded in the function fails to classify all known members of each base segment correctly (Part C, Figure 2). Before using the analysis, however, the ability to describe or classify reenlistment behavior is even more limited. Classifications are typically improved by discriminant analysis and the improvement can be measured against the known cases. After checking results in this manner, the discriminant function may also be used to classify/predict segment membership of individuals in other independent and like sets of data. Additional details of discriminant analysis

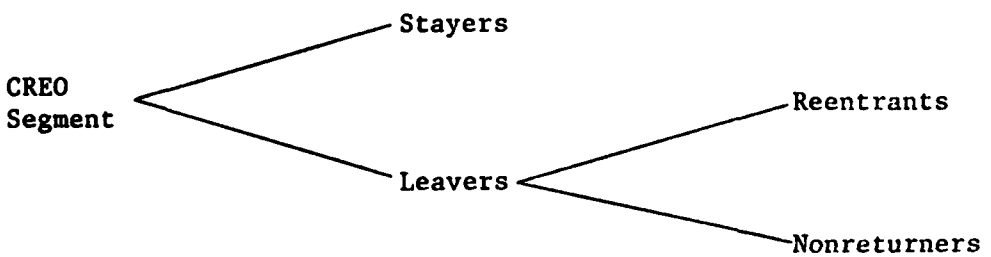
FIGURE 2

Stages of Segmentation

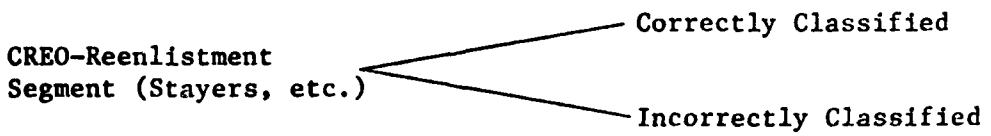
A Segmentation by CREO Groups:



B Further Segmentation by Exit-Reentry Behavior, Base Segments



C Further Segmentation by Demographic, Socioeconomic; and Military Variables; Terminal Segments



procedure will be treated, as necessary, in conjunction with the actual analysis.

Actually, many variations of discriminant analysis were run with different combinations of variables before settling upon a final "model." As a cross check on discriminant analysis, a logist program (SAS Supplemental Guide, 1980) was also used. The resulting classification power turned out to be slightly less than the discriminant. The models--variables entered and basic interpretations--proved to be quite similar, adding some confidence to the use of discriminant functions. Since logist analysis contributed little beyond some verification of methodology, it was not pursued further.

The base-segment classifications from discriminant analysis (stayer-leaver, and reentry-nonreturner) were reentered in Chi-square analysis. These segments are of course slightly different from the data sets initially analyzed with cross-classifications. Each of the base-segment pairs now has its own best set of profile variables which can be used to interpret the quality of the segment. Interpreting discriminant coefficients involves judging the relative impact of many variables at once. Returning to Chi-square analysis will aid interpretation, since the row frequencies illustrate the association of one descriptor variable in the profile with one segment. The row differences between segment pairs involve relatively simple interpretations.

The preliminary Chi-square analysis contributed to segment definition and to the efficient development of discriminant analysis. When applied, the latter provided end-product classifications and segment descriptions for evaluation of the quantity and quality of personnel in

the base segments. Subsequent Chi-square analysis facilitated interpretation and development of recommendations for targeting recruiting efforts. Following analysis of the segments, a final step of geographical segmentation traced clusters of segment personnel to recruiting districts.

Potential interpretations for the basic problem.

But how is all this analysis expected to respond to the basic question initially posed? Essentially, each of the initial CREO segments has been partitioned into four base and eight terminal segments. These segments are illustrated in Figure 3 for the Operations Technicians, and the terminal segments in the figure are identified by numbers.

The objective of analysis is to aid review and possible reformulation of recruiting strategies and policies from a market-oriented point of view. Recruiting implications of the market-segment analysis may be briefly indicated in the following list of potential interpretations:

1) Long-term retention or reentry is certainly to be encouraged if quality personnel are present in the segment.

2) Misclassifying stayers as leavers is not desirable, but retention is apparent despite the error. Note that stayers, whether classified correctly or not, become possible targets for reentry once they leave.

3) Very persuasive recruiting would likely be required for this segment.

4) Since these leavers are incorrectly classified as stayers, they have many of the characteristics of stayers. The segment consequently becomes a possible target for retention or reentry. The leavers designated by segments three and four, however, are further analyzed in the B portion of Figure 3.

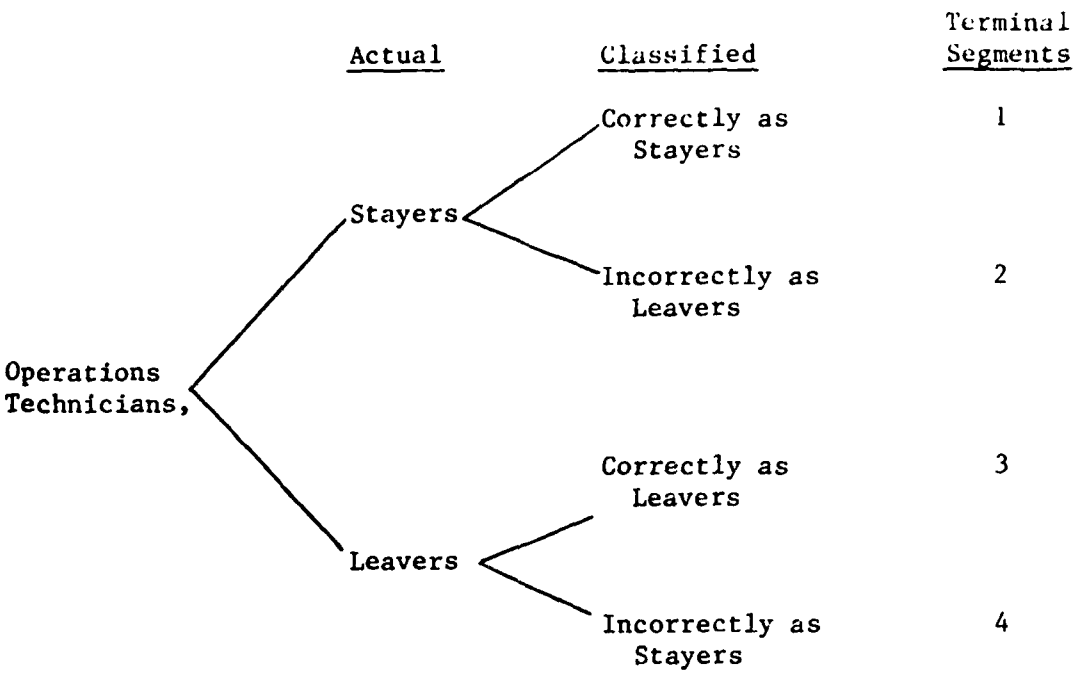
5) The characteristics of this segment delineate the type of prior-service people who reenter the Navy. Quality provided, they constitute a probable target for attention if they again separate.

6) Reentry is indicated in spite of the error, and does not seem to indicate specific recruiting effort other than to avoid missing the contacts.

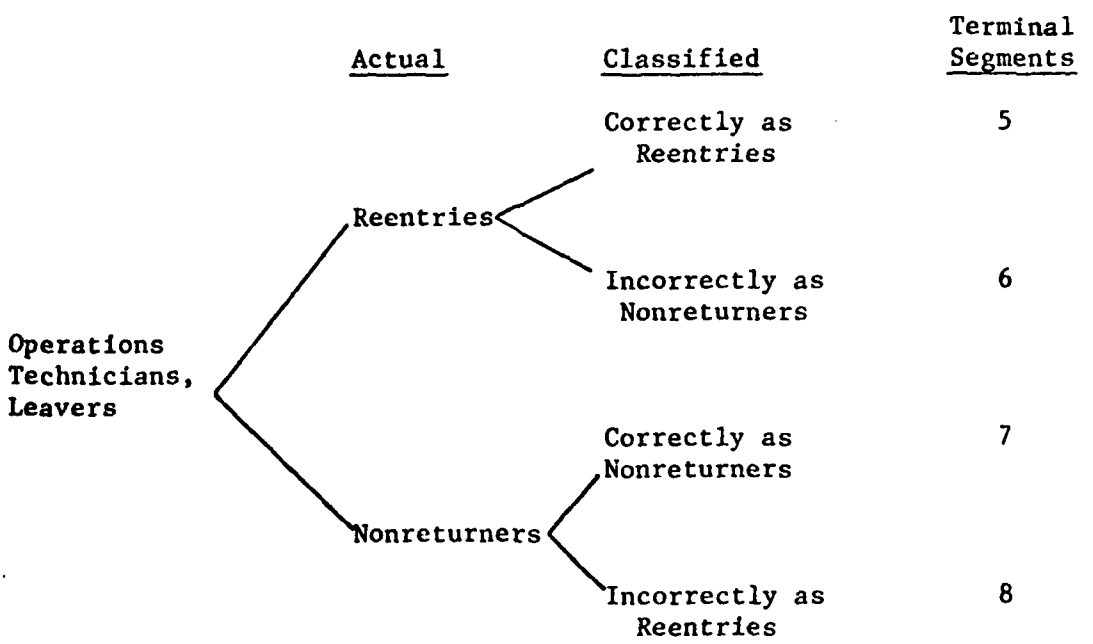
FIGURE 3

Reenlistment Decisions and Classifications of Operations Technicians

A. Stayers versus Leavers:



B. Reentries versus Nonreturners:



7) Very persuasive recruiting would again be required for this segment. The potential accessibility of recruits relative to costs would require attention before designating the segment as a favorable target.

8) Since the nonreturners are incorrectly classified as reentries, they have many of the characteristics of reentries. Quantity and quality provided, this segment might constitute a favorable target for recruiting soon after separation and for some period thereafter.

Note that the classification ability of discriminant analysis provides the number of personnel in these terminal segments for the eight-year period covered. Current and future estimates are expected to approximate this experience, although the analysis does not provide a direct forecast. Analysis of the variables or characteristics which permit classification provide a similar historic description or current estimate of the characteristics of personnel in the base segments. Both types of estimates depend upon the continuity of the forces which had an impact on recruiting over the period FY74-FY81. It is also important to recall that, although indicative, the variables available in DMDC records are not ideal for rating the quality of segment personnel.

The initial statement of the basic question to be investigated was: "Among prior-service personnel, which groups or segments, if any, provide favorable prospects for reenlistment in chronically short, mid-grade, petty officer ratings?" The base segments, as defined by preliminary analysis, now consist of selected CREO groups cross-referenced by their various reenlistment decisions. Pairs of these base segments form the dependent or criterion variables for analysis as illustrated in Figure 3. A workable set of independent, descriptor, or predictor variables is provided by the variables entered in the discriminant functions. The basic question as further defined has become a tractable problem for analysis, interpretation, and recommendations.

PART II: ANALYSIS OF THE SEGMENTS

The direct results of this analysis will be treated in the following sections of this report in much the same format as described in the previous methodology section. The CREO segments, operations technicians, weapons technicians, main propulsion, and engineering support will be considered in that order. After a review of the numbers involved in the specific CREO segment, the results of discriminant analysis will be displayed. First, the numerical results will be explored, followed by a qualitative analysis of the stayers and leavers. Next, the reentries and nonreturners will be analyzed with regard to their numbers and characteristics. Interpretation will be facilitated as needed by Chi-square analysis of the discriminating variables plus a few additional variables of interest. After the four CREOs have been analyzed, the geographical locations of any favorable segments will be investigated.

A number of preliminary stepwise discriminant analyses were run to develop an efficient common set of variables. The final selection needed to distinguish stayers from leavers as well as reentries from nonreturners yet retain comparability among the four CREOs. Starting with the significant variables from Chi-square analysis, variables which did not retain significance in the multivariate discriminant analysis were eliminated. The final criteria for selection included the requirement of significance for each variable in at least three of the four CREOs, and ability of the combined variables to obtain the largest percentage of correct classifications. Several of the variables were found to "work" best for the stayers and leavers as displayed in the upper portion of Exhibit 1.

EXHIBIT 1

The Consolidated Set of Variables

For Stayers versus Leavers

Age at initial entry: coded by years from 17 through 52.

AFQT scores: coded by percentiles from 1 through 99.

Race: coded in this instance as 0 = nonwhite and 1 = white. Nonwhite includes blacks, Hispanics, and some "other."

Paygrade at initial entry: coded EØ1 through EØ9; especially among the technical occupations, many entered training schools or with qualifications which permitted advanced paygrades, mainly EØ3.

Waiver at initial entry: 0 = those who entered needing no waiver or who entered with a favorable code and 1 = unfavorable. Examples of unfavorable codes include security risk or moral disqualification, while minor problems such as age or paygrade were considered favorable.

Number of dependents: coded as 0 for self through 9, for 9 or more from the most recent records.

Most recent education: coded 1 through 12 by years of education, centered on 6 as high-school graduate or G.E.D. equivalent.

For Reentries versus Nonreturners

Repeated and coded as above: (1) Age at initial entry, (2) AFQT scores, (3) Waiver at initial entry, and (4) number of dependents.

Race: now coded as 0 = nonblack, 1 = black.

Paygrade: coded as above but with a change in timing of the measure.*

Education at initial entry: coded 1 through 12 as above, but measured at the time of initial entry.

Reenlistment eligibility: coded as 0 = eligible, 1 = ineligible, i.e., the source tape codes 1, 1R, R1, 3A, 3R all indicate immediate eligibility for reenlistment, while all others, 2, 3, 4, 5, etc. supposedly are not immediately eligible.*

Separation code: coded 0 = voluntary, 1 = involuntary separation; examples considered voluntary include expiration of term, or early release to attend school, while courts martial, drugs, etc., were considered involuntary. Reasons were specified by an extensive set of interservice separation codes on the source tape.*

*Variables marked with an asterisk were measured at separation before reentry for reentries and at separation for the nonreturners.

Others served to classify the reentries and nonreturners as indicated in the lower portion of the exhibit. Naturally, the common set of variables applied to the CREOs tended to enter separate discriminant analyses in different numbers and orders.

Operations Technicians

Among the four CREO segments, the electronics technicians and data systems technicians who make up the operations technician (OT) segment require careful training and technical skill. Reference to Table 1, p. 18, will show that the OTs had by far the largest proportion of stayers, 51.2 percent, of any of the CREOs. In part, as a consequence, the OTs had the smallest proportions of nonreturners and reentries, 42.7 percent and 6.1 percent, respectively. These percentages should be kept in mind as the segment is subjected to further analysis.

The analytical techniques applied to the OTs will be explained in detail. Explanations for the remaining CREO segments can then be more succinct. Before the terms cause confusion, recall that segmentation here takes place in several stages. First, the CREO segments are identified. Second, these are subdivided by the sequential stayer-leaver and reenter-nonreturn decisions. These have been referred to as the base segments. As the base segments are now further classified by a set of demographic and other profile variables, the classifications can be verified against the actual previous events as correct or incorrect. These classifications have been called terminal segments.

Within the base total of 71,678 cases available for analysis, 10,459 or 14.6 percent were OTs. This proved to be the smallest of the CREO segments. If missing data occurs in any one of the variables

entered in discriminant analysis, that case is lost for purposes of analysis. Further attrition in the number analyzed took place as missing data accumulated over the set of seven profile variables. The total was reduced as follows:

Available cases	10,459
Cases with missing data	-238
Cases analyzed	10,221

The cases with missing profile data amounted to 2.3 percent of the total, leaving 97.7 percent after analysis. The main potential source of statistical bias occurred when the total 81,248 source cases were reduced for various reasons to 71,678 available for analysis. This loss of 9,570 cases may or may not have been reasonably random. The relatively small loss of 238 cases reported above could hardly bias results to any degree.

Stayers and leavers

Discriminant analysis starts from an actual identification of the groups to be analyzed. Of the 10,459 OTs, close to 51 percent were actually stayers and 49 percent were leavers. In the 10,221 cases analyzed, 52.1 percent were stayers and 47.9 percent were leavers. Comparing the two sets of figures, we have a 52.1 - 51 = 1.1 percent gain for stayers. An equivalent loss occurs for leavers. Considering the totals involved, the proportionate change in the two categories is small and little or no bias should result.

Stepwise discriminant analysis first selects the variable which best classifies the numerous individuals as belonging to either the stayer or leaver categories. The criterion is calculated to minimize the variance within each of the two groups while maximizing the variance

between the two groups. A second variable is then selected in a similar manner, and the process continues until all the variables are used or until the remaining variables fail to distinguish between the two groups. The number of dependents was the first variable to enter in this instance, and paygrade at initial entry was the second. In all, six variables, later described, helped to discriminate the stayers from the leavers. AFQT scores provided the only variable of the seven considered which was not significant.

Size of segments. One product of the analysis is a matrix which indicates the extent to which the profile variables are able to identify the individuals as stayers or leavers. While the actual stayer-leaver classifications are known for the eight-year period, the profile variables help to explain and potentially to predict the decisions of current recruits drawn from the same pool. Table 3 shows the matrix for the OTs, and its meaning will be explored in several different ways.

TABLE 3

Operations Technicians: Stayers and Leavers

		Classified as		
		Stayers	Leavers	Total
Actual	Stayers	3,343 62.8%	1,979 37.2%	5,322 100.0%
	Leavers	1,412 28.8%	3,487 71.2%	4,899 100.0%
	Total	4,755 46.5%	5,466 53.5%	10,221 100.0%

The overall percentage correct is 66.8%.

Among the 5,322 OTs who actually remained in the Navy over 72 months, 3,343 or 62.8 percent can be correctly identified as stayers by the profile variables. A somewhat larger 71.2 percent of the leavers can be correctly classified. The total correct classifications for the matrix is 3,343 + 3,487/10,221 or 66.8 percent, the right diagonal in the table.

A Bayesian technique is incorporated in discriminant analysis as the profile variables are used in the classification process. Prior experience provides a base source of experience to combine with current data. The prior proportions used here are taken from the stayer-leaver proportions (Table 1, p. 19) before additional cases were lost due to missing data in the discriminant variables. These priors are then integrated with the additional information provided by the variables in order to obtain the posterior estimates in the classification matrix.

If one had to guess, for a current group of OTs, the prior probability of correctly identifying an individual as a stayer or a leaver would be $(.51)^2 + (.49)^2 = .50$ (Table 1, p. 19, and Morrison, 1969, p. 158). Given the profile information from discriminant analysis, the probability could be raised to .668, the posterior estimate as indicated by the overall percent correct for Table 3. The resulting improvement is .168 or 16.8 percent better identification than could be expected from underlying experience alone. Since improved identification exists, it could help target efforts toward retention, and an astute use of information from the profile variables might help convey productive retention messages. While the above type of calculation could be used throughout the research, reliance will be placed instead on more direct percentage and numerical comparisons.

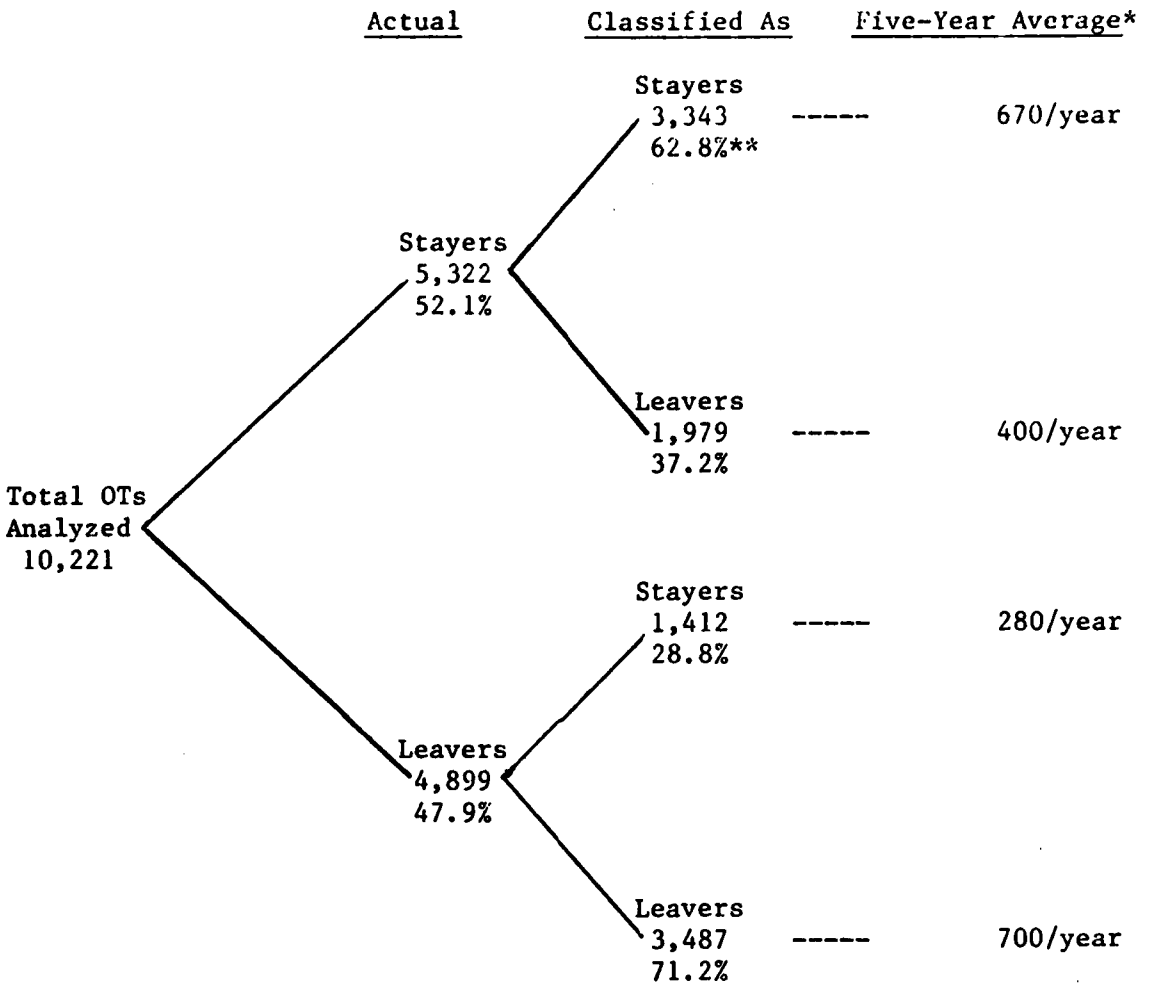
The approach in the paragraph above indicates the combined ability to classify stayers and leavers. Another way of looking at the data is to ask: "how many of the total individuals classified as stayers are correctly classified?" Referring to the columns of Table 3, 3,343 of the 4,755 individuals classified as stayers were correctly classified. This is 70.3 percent correct, considerably better than the 50 percent expectation without the profile variables. If interest is directed toward the leavers, 3,487 of 5,466 or 63.8 percent are correctly classified as compared to the 50 percent expectation without the added information. The revised percentages suggest a potential, not a forecast, for targeting the retention of operations technicians.

While all the variables which enter discriminant analysis are statistically significant at better than the .05 level, the very large numbers in the analysis create a situation in which significance is likely to occur even though the differences tested are quite small. Once significance is obtained, the practical value of the exercise is best estimated by the actual differences themselves, by the numbers in the classification performance as well as by the possible improvement of posterior percentages over the priors (Morrison, 1969).

The information provided in Table 3 can be spelled out in the diagram in Figure 4 to illustrate the transition from the OT CREO to the base segments to the terminal segments. The one added piece of information is the division of the terminal segments by five to indicate the average yearly size of the terminal segments. New entries were excluded from the data base for the last three years of the eight-year period; hence the division by five.

FIGURE 4

Classification of Operations Technicians



*FY74 through FY78 are represented in the (rounded) averages since new entries were excluded from the data base after the latter year.

**The percentages in the "classified as" column are calculated from either the total stayer base or the total leaver base.

As the diagram illustrates, past practices would provide about 50 percent stayers from among the total pool of OTs. Of these, about 63 percent could be correctly identified by information in the discriminant function, and about 37 percent could be expected to be retained even though misclassified as leavers. With redesigned recruiting practices based on the added information, the 1,412 (roughly 280 per year) leavers who have the characteristics of stayers become an added retention target segment. Some portion of this terminal segment might be more easily persuaded to reenlist with no break in service, especially as compared to the residual leaver segment. Thus the target for retention is increased by about 29 percent of the leavers or 14 percent of the total OTs. Retention efforts, in addition, would deal with a current "captive" audience and current records, records which include performance and other data not available in the study data base.

The above suggests a hypothetical target segment of about 1,400 for a typical five-year period. Adding one more step, it was previously noted that the probability of correctly identifying a classified stayer was about .7, and 1,400 x .7 = 980 or about 196 per year. Especially if stayer-leaver distinctions from the profile variables could be used to encourage retention, up toward 196 OTs might be persuaded to extend their terms of service beyond 72 months in an average year.

Segment profiles. In addition to spelling out the numbers in the base and terminal segments, discriminant analysis also supplies information concerning the relative importance of the profile variables as they distinguish one base segment from another. The standardized canonical coefficients provide both the classification equation and the ability to interpret the impacts of the predictor variables in the profile.

Because each predictor variable is interdependent with all others, interpretation sometimes becomes a bit murky. Interpretation is therefore aided where possible by Chi-square analysis applied to the base segments.

The standardized coefficients in the classification equation for the OT stayers and leavers appear as follows:

Intercept	-3.57217
Number of dependents	0.79336
Paygrade at initial entry	0.63542
Most recent education	0.48659
Waiver at initial entry	0.46372
Race: nonwhite-white	-0.43297
Age at initial entry	-0.11306

The AFQT score variable was not statistically significant and failed to enter the equation. Strictly speaking, the waiver and race variables, which happen to be dummy variables, can be compared with one another, but not with the remaining variables which are or closely approach interval scaling. Lacking other evidence of relative importance, however, the coefficients will be considered at least a rough ranking of order of importance in spite of the problem created by the presence of dummy variables.

If the equation were graphed, the intercept would indicate the point at which the line separating the two segments would cross the vertical axis of the diagram. The larger the remaining coefficients, regardless of sign, the more impact that variable has in distinguishing one segment from the other. They have been listed in order of importance accordingly. Where the coefficients are positive, the greater the variable, the more it tends to characterize the stayers. The more negative the coefficient, the more it tends to classify the leavers. Larger

numbers of dependents, for example, tend to classify stayers. Conversely, fewer dependents classify the leavers. Where the coefficients are derived from 0 and 1 dummy variables, the interpretation is similar. Nonwhites, for example, tend to be among stayers and whites among the leavers.

Exhibit 2 provides a quick summary interpretation of these coefficients. They are numbered in order of importance. Recall that interpretations are relative, not absolute. That is, all stayers do not have drastically dubious waivers upon initial entry.

The profiles of Exhibit 2 provide the characteristics which distinguish the stayer base segment from the leavers. While the combined impact of the six variables is estimated, the number of dependents discriminates between the two segments more powerfully than the remaining variables. The respective segment means, 2.2 dependents for stayers and 1.5 for leavers, indicate the difference. The Chi-square percents (Table A-1; $p < .0001$, $C = .299$ in the appendix) perhaps better illustrate this difference. Two or more dependents are present among 64.3 percent of the 5,322 stayers, but only among 33.0 percent of the 4,899 leavers. Discriminant analysis thus provides the coefficients and the means (along with other information), and the Chi squares often help to explain the meaning of individual variables.

Paygrade at initial entry is the second most important variable. Higher paygrades, notably EØ3, typify the stayers. Of the 5,322 stayers (Table A-2; $p < .001$, $C = .230$), 88.4 percent entered with an EØ3 paygrade. The similar percent for the 4,899 leavers was 69.2. The nearly inverse percentages for the EØ1-2 category actually had a greater impact on the Chi-square value as may be noted by the cell contributions. The

interpretation for lower entry paygrades is similar in that lower paygrades are prevalent among the leavers.

While both the discriminant analysis and Chi square indicate that some education beyond high school is more typical of stayers than leavers, the conclusion is leveraged by a relatively small group of stayers. This is apparent in the Chi-square table (A-3; $p < .0001$, $C = .191$). About 13.8 percent of the stayers, but only 3.4 percent of the leavers, had education beyond high school.

EXHIBIT 2

Comparative Profiles of OT Stayers and Leavers

Stayers Are Characterized By:	Leavers Are Characterized By:
1) More dependents: most recent records	Fewer dependents: most recent records
2) More OTs with higher paygrades at initial entry	More with lower paygrades at initial entry
3) More years of education: most recent records	Fewer years of education: most recent records
4) More OTs with adverse waivers at initial entry	More with favorable waivers
5) Relatively more nonwhites	Relatively more whites
6) Younger at initial entry	Older at initial entry

Note: The AFQT score variable did not enter the discriminant equation.

The three Chi-square tables mentioned do help to illustrate the results of discriminant analysis. Unfortunately, such tables are not always helpful for other variables. As one example, the brackets for

entry ages of OTs in Chi square (17-20, 21-25, etc.) do not match the point at which stayers are separated from leavers along a continuous scale of actual ages in discriminant analysis (19.6). If many of the 19- and all of the 20-year-olds were shifted into the older brackets of Chi square, any conclusions would differ and might even reverse. As a bivariate analysis, also, Chi square does not account for the combined influence of the multiple descriptor-predictor variables. For these reasons, greater reliance is placed on discriminant analysis. Where Chi square fails to act as a good illustration, the tables are not included in the appendix.

Three remaining profile variables helped to distinguish the OT stayers from the leavers. Upon initial entry, more stayers needed waivers for reasons judged to be adverse than was the case for leavers. Most such waivers were for moral disqualifications, but the total number was small, only 6.4 percent for all OTs. The leaver segment contained a larger proportion of whites and the stayers of nonwhites; however, whites made up 92.6 percent of the total. The leavers, too, tended to be older at initial entry and the stayers younger. As with education, the discriminating ability of the waiver and race variables was leveraged by small components within the total, and the age variable was the weakest of the six.

Since a large percentage of stayers enter at EØ3 paygrade and have a high school education or perhaps more, the suggestion is that the OTs contain a core of qualified people. The number who entered with dubious waivers suggests the reverse, at least for a small portion of the total. The tendency to have more dependents is more a cost problem for the Navy

than an indication of quality. Nevertheless, the lure of security--regular paychecks and fringe benefits--is a logical factor in encouraging reenlistments. That nonwhites tend to be stayers is favorable or otherwise only as race is associated with the other characteristics. Whites may be less favorable candidates for long-term service to the extent that they have better opportunities in civilian life and/or the resources to pursue them. The younger entrants may feel less secure, recognize the need for longer training, or be more easily indoctrinated toward the benefits of longer-term service.

In seeking to retain OTs, one would look for indications of adequate personnel, namely those who were able to enter at higher paygrades and who had at least a high-school education. The presence of dependents, along with pay and fringe benefits, suggests incentives for recruiting, provided added costs are not excessive. It is easier to retain nonwhites and those who were younger--just out of high school--at entry. If waivers were adverse, the individuals might be easier to retain, but careful screening is doubtless warranted. For retention, of course, the available records would be far more complete and much more current than the file data used here.

Reentries and nonreturners

Among the 5,100 leavers (Table 1, p. 18), the OT reentries numbered 637 and the nonreturners 4,463. The actual or prior proportions are thus 637/5,100 or close to .12 reentries which leaves .88 for the nonreturners. Of the 5,100 leavers, 4,899 were available for analysis as leavers (Figure 4, p. 37). Additional variables in the present second stage of analysis further reduced the available cases by 183 or 3.7

percent to 4,716 leavers whose records show whether or not they reentered the Navy during the period covered.

When the 4,716 OT leavers were divided into reentries and nonreturners, 438 or 9.3 percent were reentries. For nonreturners, the numbers were 4,278 and 90.7 percent, respectively. Comparing the .12 or 12 percent prior experience with the 9.3 percent result, the 2.7 percent difference indicates a loss of reentries and an equivalent gain of nonreturners. Little bias is likely to occur as a result of these classification differences.

Size of segments. The matrix produced by discriminant analysis for the reentries and nonreturners is exhibited in Table 4. The rows of the table represent the actual reenter or fail-to-reenter decisions of the OTs. The columns of the table indicate the ability of the profile variables to classify the individuals as reentries or nonreturners.

TABLE 4

Operations Technicians: Reentries and Nonreturners

		Classified As		
		Reentries	Nonreturners	Totals
Actual	Reentries	108 24.7%	330 75.3%	438 9.3%
	Nonreturners	124 2.9%	4,154 97.1%	4,278 90.7%
	Total	232 4.9%	4,484 95.1%	4,716 100.0%

The overall percentage correct is 90.4.

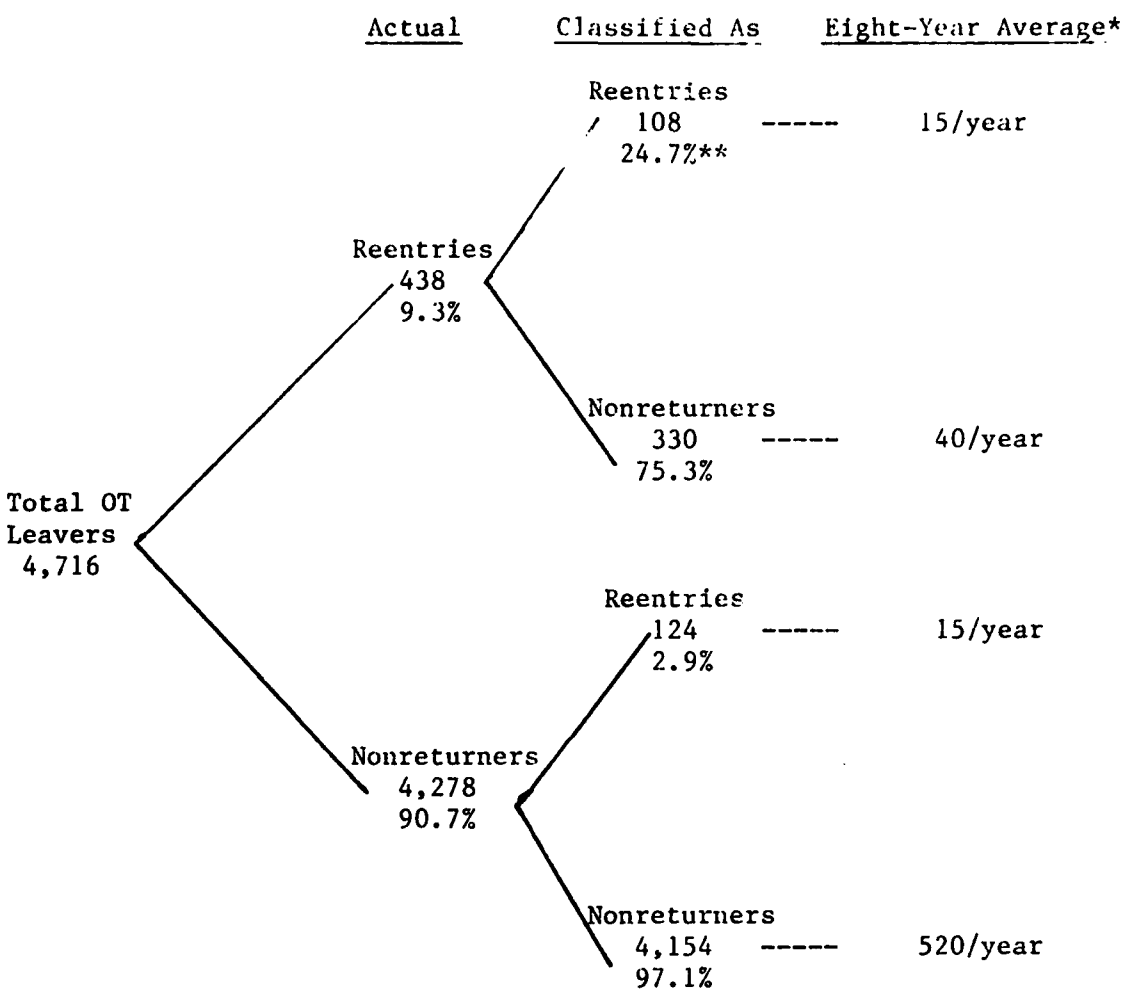
Recall that an important objective is to find the comparative profile characteristics of reentries and nonreturners so that recruiting policies can be adapted to the base (reentry-nonreturner) or terminal (correctly-incorrectly classified) segments. Most reentries, 330 or 75.3 percent, are misclassified as nonreturners. The characteristics of these reentries indicate that they are similar to the nonreturners; they are not easy to identify. However, 108 or 24.7 percent of the actual reentries are so classified. The ability to spot nonreturners is superior since 97.1 percent are correctly identified. Over both classes, a total of 108 + 4,154/4,716 = .904 or 90.4 percent is correctly classified.

The various numbers can perhaps best be visualized in Figure 5. In particular, the size of segments can be followed as the base segments are subdivided into terminal segments.

Unfortunately, the numbers indicate relatively little potential for recruiting prior-service OTs in spite of the fact that the profile variables might perform a bit better than prior experience. Figure 5 shows that only 438 or approximately 55 actual reentries occurred per year. It would seem that targeted recruiting would have to improve substantially to be cost effective unless needs were very small. Of the 438 reentries, 75.3 percent were misclassified as nonreturners. The remaining 24.7 percent correctly classified does not suggest easy identification. The nonreturners who have the characteristics of reentries supply the added target, but only 124 were included in this group. An added target of 2.9 percent of the nonreturners or roughly 15 per year hardly seems encouraging.

FIGURE 5

Operations Technicians: Reentries and Nonreturners



*FY74 through FY81 are represented in the (rounded) averages since reentries were contained in the data base for all eight years of the period and nonreturners had similar opportunities to reenter were they to do so.

**The percentages in the "classified as" column are calculated from either the total reentry base or the total nonreturner base.

The remaining terminal segment of nonreturners who have the characteristics of those who did not reenter is more substantial. They constitute 97.1 percent of all nonreturners or about 520 per year. The numbers present a more feasible target from the point of view of quantity. In the eight-year period covered, however, these were the people who did not reenter service. For the present and future, people with these characteristics will, at minimum, be more difficult to recruit.

Segment profiles. After reviewing the numbers in the base and terminal segments, an indication of the comparative characteristics of the base segments is available from discriminant analysis. The relative strength of the nine variables which serve to distinguish the reentries from the nonreturners can be observed by the canonical coefficients in the classification equation:

Intercept	-2.30944
Reenlistment eligibility	2.12029
Separation codes	1.91849
Waiver at initial entry	0.93695
Race: nonblack-black	0.73225
Education at initial entry	-0.24130
Age at initial entry	0.22195
Number of dependents	0.12380
Paygrade: most recent records	-0.11572
AFQT scores	-0.00710

Note that all variables entered the equation.

The order of importance is retained in Exhibit 3, which provides a summary of the comparative profiles. As in the previous list, the sign of the coefficient tells whether the predictor variable is positively or negatively correlated with reentries. That is, the greater the number of dependents, for example, the more likely an OT is to reenter. Or the more years of education, the less likely an OT is to reenter, thereby becoming a nonreturner.

EXHIBIT 3

Comparative Profiles of OT Reentries and Nonreturners

Reentries Are Characterized By:	Nonreturners Are Characterized By:
1) More OTs not immediately eligible to reenlist	More OTs immediately eligible
2) More OTs separated involuntarily	More voluntary separations
3) More OTs with adverse waivers at initial entry	More with favorable waivers or none needed
4) Relatively more blacks	Relatively more nonblacks
5) More OTs with fewer years of education at entry	More years of education at initial entry
6) Older at initial entry	Younger at initial entry
7) More dependents: most recent	Fewer dependents: most recent
8) More OTs with lower paygrades: most recent	More with higher paygrades: most recent
9) Lower AFQT scores	Higher AFQT scores

Note: All variables entered the discriminant analysis.

Scanning down either side of the exhibit supplies the profile of the particular segment, but additional analysis is in order. The first three variables suggest that some portion of the reentries are of suspect quality. In the appendix, Table A-4 ($p < .0001$, $C = .282$) shows that 212 of 443 or 49.0 percent of reentries had separated with reenlistment codes that classified them as not immediately eligible to reenlist. In comparison, only 12.1 percent of 4,275 nonreturners had adverse reenlistment codes.

An analysis of the interservice separation codes further shows that 47 of 433 or 10.9 percent of reentries versus only 1.5 percent of nonreturners separated for reasons judged involuntary (A-5; $p < .0001$, $C = .177$). Similarly 59 of 443 or 13.6 percent of reentries entered service initially with adverse waivers, while the percent for nonreturners was 5.1 (A-6; $p < .0001$, $C = .104$).

The first of the previous three variables represents a sizeable proportion of the reentries, while the latter two represent relatively small proportions. Doubtless, many of the same people are contained in two or possibly all three percentages. Up toward ten percent of the reentries may have two or three marks against entering or reentering service. If the codes are meaningful, many of these men should not have been permitted to reenter the Navy. Some fraction, perhaps an important faction, of the reentries is made up of questionable reenlistments.

Among the remaining variables in Exhibit 3, race, age, and dependents imply quality only as they are associated with other variables. The reentries are characterized by relatively high proportions (1) of blacks although the total numbers are small, (2) of men with fewer years of education, (3) older at initial entry, (4) with more dependents,

(5) with lower recent paygrades, and (6) lower AFQT scores. The education and paygrade variables, at least, amplify questions concerning the quality of the personnel reentering service.

Another insight comes from a simple percentage. Among the 433 reentries, 235 or 54.3 percent obtained their CREO rating after reentry. If saving the cost of training electronic and systems technicians is a major motive for seeking trained prior-service people, that saving is realized for less than half the slim total.

The profiles raise questions of quality with regard to many of the actual reentries. An added question is raised relative to training costs. Among the nonreturners, no added target segment of adequate size was located since only 124 or 2.9 percent of the nonreturners "looked like" the reentries. Given the characteristics of many reentries, such a target is not likely to be "prime" in any case.

The nonreturners who have the characteristics of nonreturners are a much larger possible target. Since proportionately more were eligible to reenlist, separated voluntarily, entered with higher paygrades and presumably more qualifications, and had more years of education, etc., the nonreturner segment contains many people of reenlistment quality. Most, apparently, have found a place in the civilian economy. They have less need to maintain contact with the Navy and may be harder to locate. If located, incentives have been and may remain inadequate to persuade members of this segment to reenlist.

Weapons Technicians

The weapons technician (WT) segment is made up by the ratings of gunners mates and fire control technicians. Only 25 percent of the WTs were classified as stayers. In contrast, 51 percent of the OTs were

stayers (Table 1, p. 18). Within the 75 percent of the WTs who were leavers, about 63 percent were nonreturners and 12 percent were reentries. The latter percentage approximately doubles that of the OTs. These differences are important to the following analysis.

The WTs account for 16.1 percent or 11,560 of the 71,678 individuals in the base total (Table 1, p. 18). The OT and WT segments are thus not substantially different in size, but, as noted, the proportions and numbers diverge upon analysis. Missing data on the tapes reduced the number analyzed as follows:

Available cases	11,560	100.0%
Cases with missing data	-458	-4.0%
Cases analyzed	11,102	96.0%

Stayers and Leavers

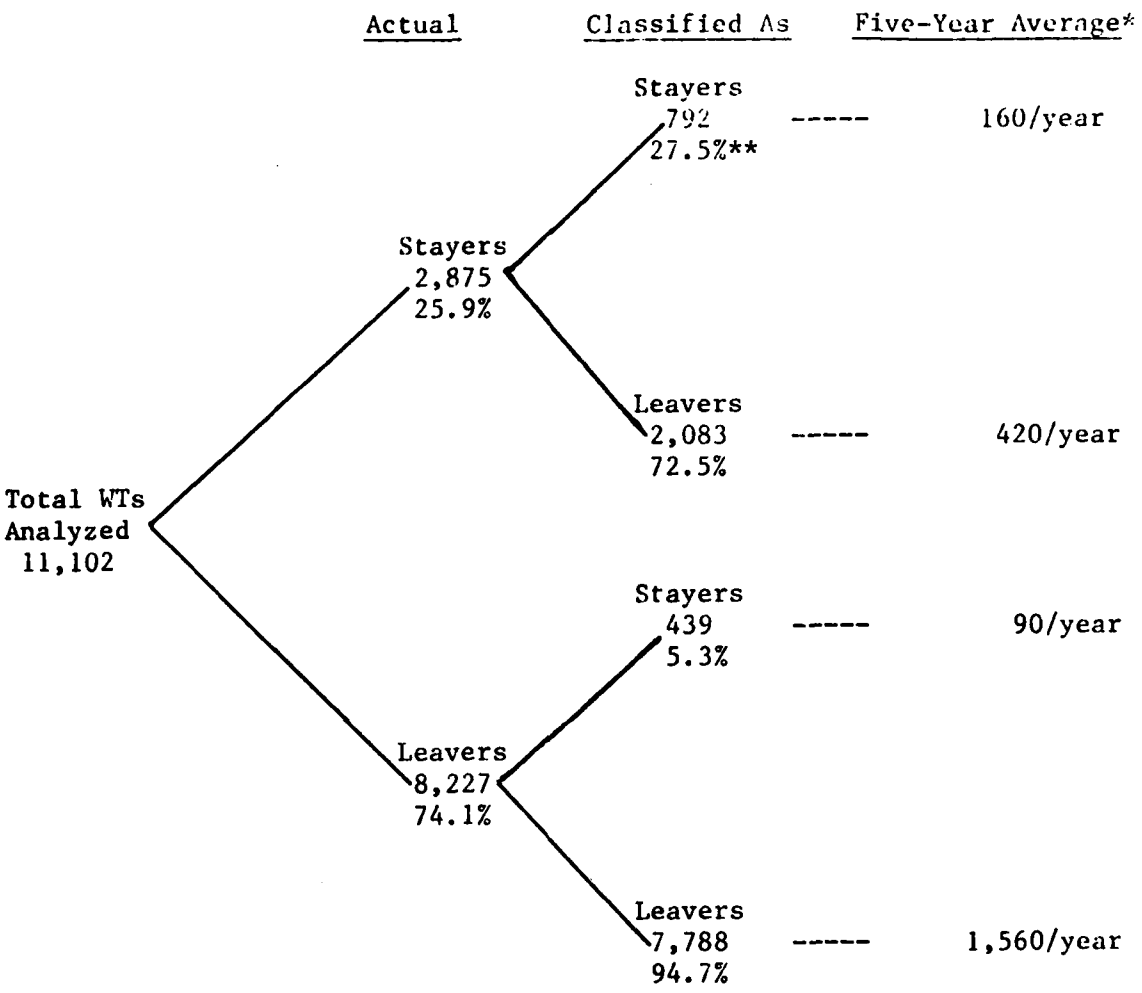
In the initial total, 25 percent were stayers and 75 percent were leavers. In the cases analyzed, the percentages were 25.9 and 74.1, respectively. The difference between initial and analyzed of 0.9 percent is small, and any bias from disproportionate loss of cases in the stayer-leaver categories is minimal.

Size of Segments. A total of 11,102 WTs were analyzed, and Figure 6 displays the numbers and percentages of stayers and leavers plus the subsequent classification ability of the profile variables. As compared to the OTs, stayers are quite scarce, especially those correctly classified. The numbers are much more abundant among the leavers, especially those correctly classified. It may be harder to persuade members of the latter segment to rejoin the service.

In Figure 6, only 25.9 percent of the WTs were stayers, and only 27.5 of these were correctly classified. It is obviously easier to

FIGURE 6

Classification of Weapons Technicians



*FY74 through FY78 are represented in the (rounded) averages since new entries were excluded from the data base after the latter year.

**The percentages in the "classified as" column are calculated from either the total stayer base or the total leaver base.

misclassify the stayers as leavers; 72.5 percent were so misclassified. In a current pool of WTs, present practices would generate a stayer rate of about 25 percent. Variability in numbers is to be expected, but the past period suggests about 580 per year.

The potential added by leavers who have the characteristics of stayers is minimal. Of the 1,231 (792 + 439) classified as stayers, 792 or 64.3 percent were correct. The added potential segment was composed of 439 or about 90 per year. Applying the above percentage or rather the equivalent decimal to these numbers, we have an addition of possibly 282 (439 x .643) for the period or 56 (282/5) per year. Special targeting of the WTs for retention is hardly implied by either the ability to classify or the size of the added potential.

The terminal segment of leavers who "look like" leavers is of much greater size, 7,788 or about 1,560 per year. The size suggests targeting, but the segment is less inviting with respect to ability to retain. It is likely that past practices would have to be substantially altered were this segment designated as a target.

Segment profiles. The linear equation developed for the WT stayers and leavers contains the following standardized coefficients:

Intercept	-2.23683
Number of dependents	1.03969
Paygrade at initial entry	0.38393
Race: nonwhite-white	-0.26394
Most recent education	0.10564
Age at initial entry	-0.03162
AFQT scores	0.00140

Of the variables considered, waiver at initial entry was the only variable which failed of significance and did not enter the equation.

A brief summary interpretation of the segment profiles is provided in Exhibit 4. Note from the coefficients that number of dependents is quite dominant as a variable, and that AFQT scores have very little impact. A more complete explanation of these results is possible as discriminant analysis is supplemented in part by Chi-square analysis.

In conjunction with the other variables, the discriminant coefficient tells us that stayers tend to have more dependents than leavers. The number of dependents, moreover, dominates the remaining variables. Chi-square analysis (Table A-7: $p < .0001$, $C = .311$) similarly indicates that 1,937 of the 2,875 stayers or 67.4 percent had two or more dependents. In contrast, only 2,526 of 8,224 leavers or 30.7 percent had two or more dependents.

EXHIBIT 4

Comparative Profiles of WT Stayers and Leavers

Stayers Are Characterized By:	Leavers Are Characterized By:
1) More dependents: most recent	Fewer dependents: most recent
2) More WTs with higher paygrades at initial entry	More with lower paygrades
3) Relatively more nonwhites	Relatively more whites
4) More years of education: most recent records	Fewer years of education: most recent records
5) Younger at initial entry	Older at initial entry
6) Higher AFQT scores	Lower AFQT scores

Note: Waiver at initial entry did not enter the equation as a variable.

Paygrade at initial entry provides the second most important variable. This variable serves to indicate previous training or quality of the personnel at entry. Following this reasoning, the stayers appear better qualified at the start since 48.9 percent entered at E03 while only 26.5 percent of the leavers entered with a similar paygrade (A-8; $p < .0001$, $C = .207$). In both instances, the Chi-square analysis proved closely comparable to the interpretations based on discriminant analysis.

In addition to more dependents and higher entry paygrades, the stayers are characterized by relatively more nonwhites. A relatively large proportion of stayers have a high-school education or possibly some beyond. Stayers tend to be younger, 17 or 18, at initial entry. They typically obtain AFQT scores over the 65th percentile, although this variable distinguishes the two segments only weakly. The opposite pattern applies to the leavers. Over 90 percent of the total WTs are white, and they are slightly more often leavers than stayers. The leavers are comparatively older at entry. Very few leavers have any education beyond high school, and more have AFQT scores in the lower percentiles.

On balance, these results indicate that past ability to retain CREO personnel among the WTs was nowhere near as good as the OTs. The 25.9 percent of actual stayers, Figure 6, might be supplemented by the small numbers of leavers who have the characteristics of stayers. This number may be estimated at roughly 58 per year. The bulk of the leavers present a potentially less favorable target for retention and, subject to further analysis, for reentry.

Reentries and Nonreturners

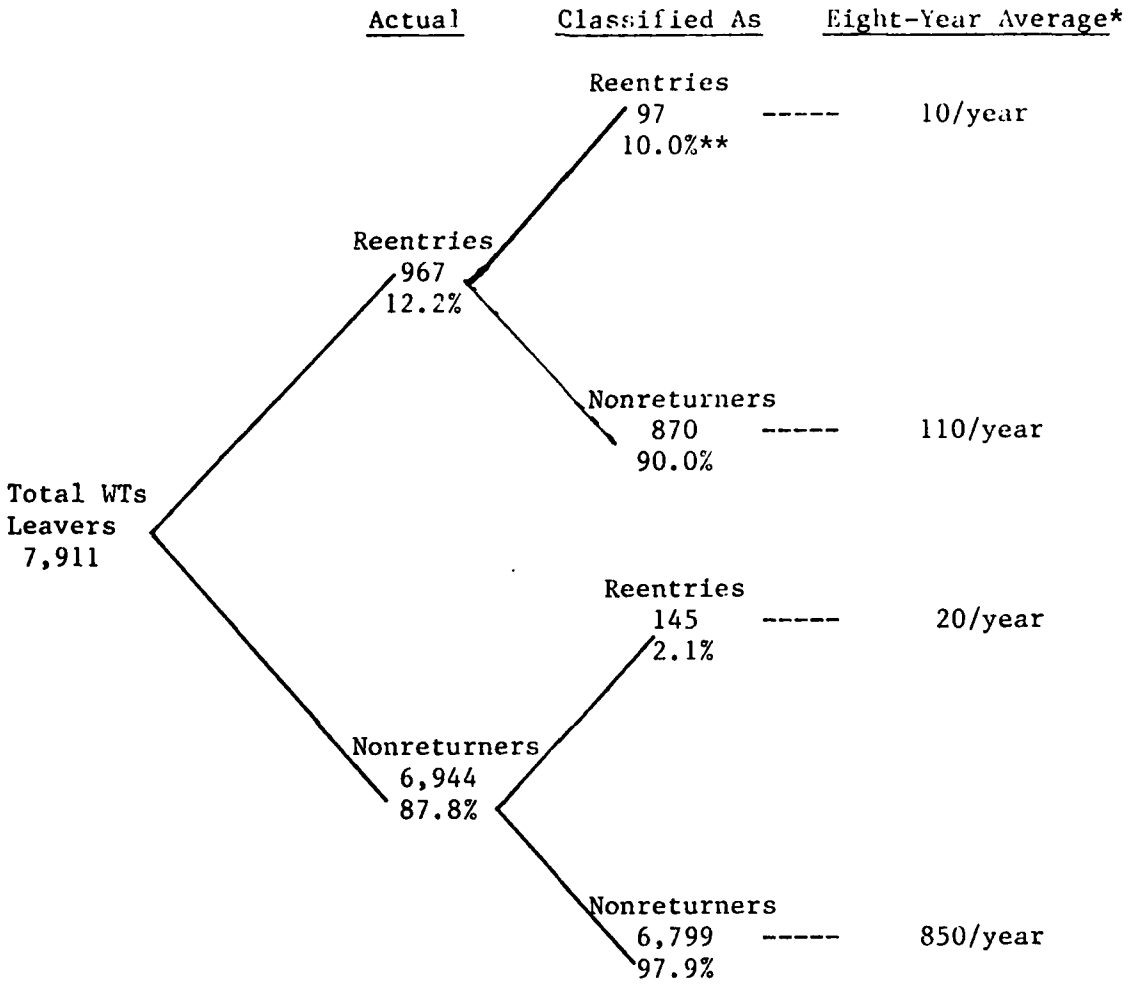
In the previous analysis of stayers and leavers, 8,227 leavers remained for further analysis. Upon subdividing these into reentries and nonreturners, an additional 316 or 3.8 percent were deleted due to missing data. The total remaining is then 7,911, and the problem of lost cases is not substantially compounded. The prior proportions to enter in discriminant analysis may be calculated from Table 1. There, the number of reentries divided by the total of reentries and nonreturners is 1,385/8,645 = .160. The prior proportions which result are .16 for the reentries and .84 for the nonreturners.

Missing cases may occasion statistical bias where disproportionate losses occur between the two segments. The possibility can be partially evaluated through the following calculation. From 1,385 reentries in Table 1, only 967 remain at this stage of analysis. The 967 reentries are 12.2 percent of the 7,911 total. The nonreturners are 87.8 percent of the same total. Compared with the priors, there are 3.8 percent fewer reentries and a similar percent more nonreturners. Consequently, some small amount of bias may be present in the analysis.

Size of segments. The nature of the numerical results can be quickly observed in Figure 7. The reentries are obviously very difficult to classify. Only 97 or 10.0 percent of the actual reentries are classified correctly. They are overwhelmed by the fact that the remaining 90.0 percent or 870 have characteristics similar to nonreturners. The actual nonreturners constitute the great majority, 6,944 or 87.8 percent, of the total WTs in any case. And 6,799 or 97.9 percent of these are correctly identified, leaving only 145 incorrectly classified as reentries.

FIGURE 7

Weapons Technicians: Reentries and Nonreturners



*FY74 through FY81 are represented in the (rounded) averages since reentries were contained in the data base for all eight years of the period and nonreturners had similar opportunities to reenter were they to do so.

**The percentages in the "classified as" column are calculated from either the total reentry base or the total nonreturner base.

The characteristics of the nonreturners are present in the reentries to such an extent that ability to identify reentries actually deteriorates as compared to the prior percentages. Any attempt to use the profile characteristics to locate and persuade reentries would not be helpful. It would probably be better merely to maintain past procedures. The nonreturners, of course, can be readily characterized, but that is not a contemplated objective.

Of the 242 (97 + 145) WTs classified as reentries, 97 or .401 were correctly identified. The additiona' target of 145 nonreturners with reentry-like characteristics supplies an expectation of about 20 more per year. By multiplying the 145 and the 20 by .401, the proportion correct after classification, indicates limited possible additions of 58 for the period or 8 per year. Even combining the 967 actual reentries with the added possible segment of 58 adds up to only 1,025. The annual expectation would be possibly 128 per year. Specialized targeting of WTs does not appear to be at all productive.

The 6,799 correctly classified nonreturners, about 850 per year, account for the largest numbers. Quality provided, they might make a target. The fact that these individuals did not reenter service over the eight-year period makes them a doubtful market. Since they were not attracted by previous recruiting procedures, little is known about how to attract these people into a recruiting station or what types of persuasion to use should any inquire. Developing cost-effective recruiting techniques for the "hard sell" core of nonreturners would appear to be very difficult.

Segment profiles. To distinguish reentries from nonreturners, all nine of the variables selected as possibly significant to the analysis

were found significant and thus entered the discriminant equation. The variables entered, together with their canonical coefficients, include:

Intercept	-2.20451
Separation codes	3.49591
Reenlistment eligibility	1.53324
Race: nonblack-black	1.43994
Waiver at initial entry	0.59141
Education at initial entry	-0.33001
Age at initial entry	0.25301
Number of dependents	0.13332
Paygrade: most recent records	-0.10020
AFQT scores	-0.01230

Since the available numbers of reentries and especially of additional potential reentries is very small, it is appropriate to look more closely at the nonreturners. Exhibit 5 helps to perform this task, and the reentries will be characterized by the contrast.

The first, second, and fourth variables tell us that larger proportions of nonreturners were likely to have separated voluntarily, to be eligible for immediate reenlistment, and to have needed no waivers or relatively favorable waivers upon initial enlistment. The opposite information does not speak well for at least a subgroup of the reentries. The comparative percentages from Chi-square tables, located in the appendix to this report, look like this:

	Reentries	Nonreturners
Voluntary separations	95.0%	99.2%
Involuntary	5.0%	0.8%
Immediately eligible to reenlist	65.6%	84.6%
Not immediately eligible	34.4%	15.4%
Favorable initial waivers or none	89.7%	93.1%
Adverse waivers	10.3%	6.9%

(A-9: $p < .0001$, $C = .120$; A-10: $p < .0001$, $C = .160$; A-11: $p < .0002$, $C = .042$)

EXHIBIT 5

Comparative Profiles of WT Reentries and Nonreturners

Reentries Are Characterized by:	Nonreturners Are Characterized By:
1) More WTs separated involuntarily	More voluntary separations
2) More WTs were not immediately eligible to reenlist	More WTs eligible for immediate reenlistment
3) Relatively more blacks	Relatively more nonblacks
4) More WTs with adverse waivers at initial entry	More with favorable waivers or none needed
5) More WTs with fewer years of education at entry	More years of education at initial entry
6) Older at initial entry	Younger at initial entry
7) More dependents: most recent	Fewer dependents: most recent
8) More WTs with lower paygrades: most recent	More with higher paygrades: most recent
9) Lower AFQT scores	Higher AFQT scores

Note: All variables entered the discriminant analysis.

As the three Chi-square tables independently evaluate the two base segments, the nonreturners are rated as more qualified and different proportions of the reentries are less qualified. Of the 967 reentries during the period, 34.4 percent ineligibles indicates 332, and 5.0 percent involuntary separations means 48 men were not considered qualified because of involuntary separations.

The remaining qualitative variables also favor the nonreturner segment. The nonreturners exhibit relatively more years of education, high school or possibly more, as well as higher AFQT scores. They also separated with higher paygrades, E04 or possibly over, which means that men are leaving the more highly trained or more responsible positions. There were relatively more nonblacks; the nonreturners were younger at initial entry; and they had fewer dependents at the time of separation.

As to the possibility of saving training costs by seeking prior-service men who hold CREO ratings, the prospects are not good. Of 967 WT reentries, 223 or 23.1 percent obtained their WT rating after reentry rather than before. In other words, over one-fifth needed specialized training after being readmitted in the Navy.

The terminal segments (Figure 7, p. 57) show that the expected flow of reentries, about 120 per year, is not large. If adequate, additional specialized recruiting procedures would not be needed. If not sufficient, the expectation of added potential from the nonreturners who "look like" reentries is not substantial. This potential amounts to perhaps 8 per year. Even more discouraging is the fact that the quality of men classified as reentries does not look favorable (Exhibit 5, p. 60), at least as compared to the nonreturners.

Size and larger proportions of satisfactory quality personnel favor regarding the nonreturners as a target segment for encouraging the reentry of WTs. As in the case of operations technicians, however, little is known concerning how to attract a segment which has not reacted to past recruiting practices.

Main Propulsion

The ratings of boiler technician and machinist's mate make up the main propulsion (MP) segment. As Table 1, p. 18, shows, about 28.3 percent of the MPs were stayers, 60.1 percent were nonreturners, and 11.6 percent were reentries. Adding the latter two percentages, there were 71.7 percent leavers. These percentages are quite close to those of the weapons technicians even though the total number of MPs was more than twice that of the WTs. Compared to the engineering support segment, the MPs retained about nine percent more stayers, ten percent fewer nonreturners, and roughly the same percentage of reentries.

Of the 71,678 total records, the MP segment contained 26,419 or 36.9 percent of the men. The segment size is more nearly comparable to the 23,240 engineering support people than the much smaller numbers of operations technicians or weapons technicians. Missing data in the variables used in the analysis again caused some deterioration in the segment numbers:

Available cases	26,419	100.0%
Cases with missing data	-1,006	-3.8%
Cases analyzed	25,413	96.2%

Stayers and Leavers

Very little difference exists due to the above-mentioned deterioration between the initial proportion of stayers and leavers and the proportions as actually analyzed. The prior probabilities entered in the

discriminant analysis were .28 and .72 for the stayers and leavers, respectively. These proportions compare closely to the percentages in Table 1. After analysis, the equivalent proportions were .289 and .711. The difference, a 0.9 percent gain for stayers or loss for leavers, is not considered sufficient to add any statistical bias.

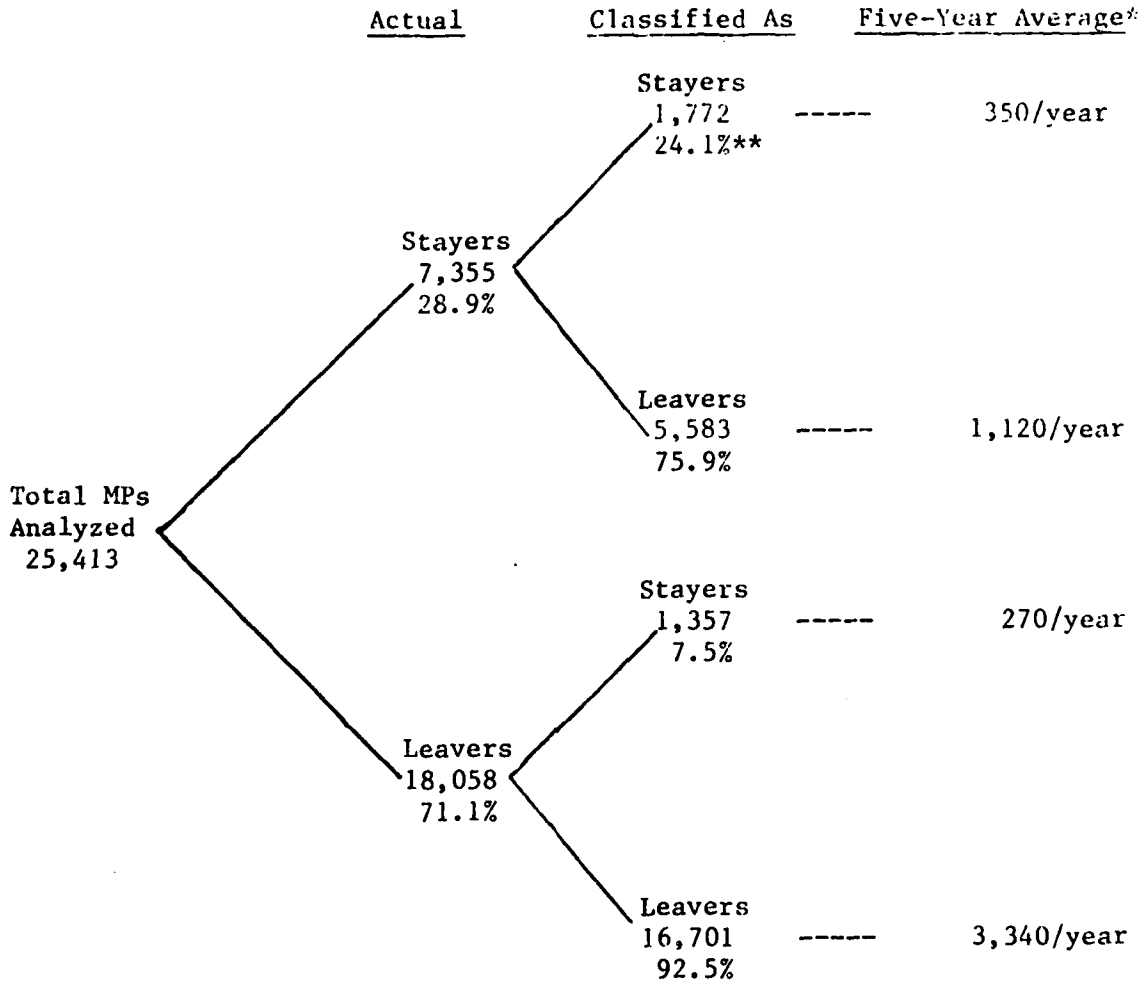
Size of segments. Within the total of 25,413 MPs analyzed, there were 7,355 stayers and 18,058 leavers. The percentages and further classifications are shown in Figure 8. Stayers are slightly more prevalent among the MPs than among the weapons technicians but far less prevalent than the operations technicians. The proportion of leavers is very close to that of the weapons technicians and more substantial than that of the operations technicians.

The ability to classify actual stayers as stayers with the profile variables is 24.1 percent. Applying these variables to identify possible stayers in a new group of MPs would fail to identify over 75 percent of all those who might actually remain in service over 72 months. Specialized targeting would not identify prospects for retention well, especially if additional costs were involved.

The total stayers classified as stayers is 1,772, and the total leavers classified as stayers is 1,357. Adding the two, we have 3,129 classified as stayers. Of all so classified, 1,772/3,129 = .566. Applying this proportion of experience to the added segment of leavers who "look like" stayers, we have 1,357 x .566 = 768 added potential. Or the same multiplication applied to the approximate added potential of 270 per year provides a possible annual addition of around 150. The minimal potential relative to apparent requirements is based primarily in the fact that the stayers themselves cannot be accurately classified.

FIGURE 8

Classification of Main Propulsion



*FY74 through FY78 are represented in the (rounded) averages since new entries were excluded from the data base after the latter year.

**The percentages in the "classified as" column are calculated from either the total stayer base or the total leaver base.

Segment profiles. For the MP stayers and leavers, the linear equation resulting from discriminant analysis follows:

Intercept	-1.31629
Paygrade at initial entry	0.81171
Number of dependents	0.76442
Race: nonwhite, white	-0.76233
Waiver at initial entry	0.26026
Most recent education	-0.15340
AFQT scores	0.00720

The variable age at initial entry failed to enter the equation.

The strongest profile variables are paygrade at entry, number of dependents, and race. The remaining three variables are comparatively weak. The order is retained and the qualitative distinctions between MP stayers and leavers are brought out in Exhibit 6.

EXHIBIT 6

Comparative Profiles of MP Stayers and Leavers

Stayers Are Characterized By:	Leavers Are Characterized By:
1) More MPs with higher paygrades at initial entry	More with lower paygrades
2) More dependents: most recent	Fewer dependents: most recent
3) Relatively more nonwhites	Relatively more whites
4) More MPs with adverse waivers at initial entry	More with favorable waivers or none needed
5) More MPs with fewer years of education: most recent	More years of education: most recent
6) Higher AFQT scores	Lower AFQT scores

Note: The age at initial entry variable failed to enter the equation.

The Chi-square tables nicely confirm that stayers entered service with generally higher paygrades and tended to have more dependents than leavers (A-12: $p < .0001$, $C = .251$; A-13: $p < .0001$, $C = .193$). The first of these tables shows that 42.5 percent of the stayers entered service with an EØ3 paygrade in contrast to 17.8 percent of the leavers. In the second table, 51.1 percent of the stayers claimed two or more dependents while only 30.3 percent of the leavers had as many. With regard to race, a larger proportion of the stayers were nonwhite, that is, blacks and Hispanics, as compared to the leavers.

Three additional variables are teamed with paygrades, dependents, and race in distinguishing the stayers from the leavers. A greater proportion of the stayers had adverse waivers at initial entry, fewer years of education, and higher AFQT scores. Only the higher paygrades and AFQT scores imply better qualifications for the stayers, although educational levels contradict the latter. Education plus needing relatively favorable waivers or none at all provides a positive indication for the leavers. Dependents and race are neutral characteristics except as they are associated with other characteristics or costs.

Note that the two education-related variables were not very strong, nor were the overall averages very high. The average years of education for the MPs was a little less than high-school graduation. (The code for high-school graduation or equivalent was 6, while the coded average was 5.7.) The average percentile score for the MPs was 60.3, below the 65 cutoff for group II when the percentiles were combined into appropriate groups.

The composite indication of the profile variables is mixed. The larger problem is that stayers are scarce, only 28.9 of the total MPs.

Even so, the majority of the actual stayers, 75.9 percent, look like leavers. Nor is the added possible target of leavers who have the characteristics of stayers large. There were 1,357 such prospects, but they amounted to only 7.5 percent of the leavers and a much smaller percent of the total MPs. The marginal annual gain might amount to about 150.

Reentries and Nonreturners

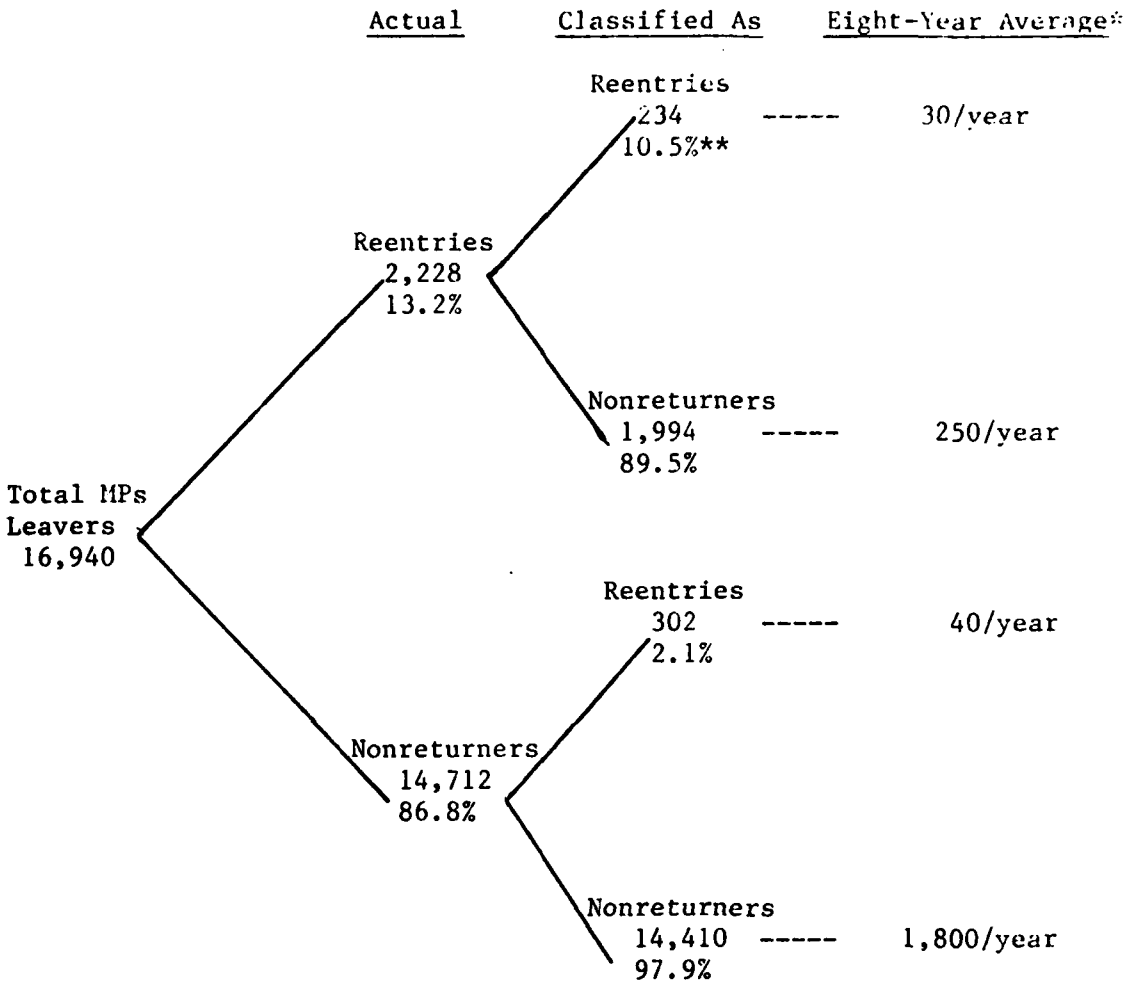
Upon further analysis of the 18,058 leavers, missing data in the several added variables reduced the number of cases actually analyzed. This reduction proved fairly large--1,118 cases or 6.2 percent of the leavers. Analysis involved the remaining 16,940 or 93.8 percent of the leavers. The prior percentages for reentries from Table 1 are 16 and 84, respectively. Among the 16,940 cases analyzed, 2,228 or 13.2 percent were reentries and 14,712 or 86.8 percent were nonreturners. The difference between these percentages and the priors, 16 - 13.2 = 2.8, indicates a loss in the proportion of reentries and a gain in nonreturners. The relative change after missing data is not large, but may inject a small amount of statistical bias in the data.

Size of segments. Among the 16,940 MP leavers analyzed, only 2,228 or 13.2 percent were reentries. Of the reentries, only 234 or 10.5 percent could be identified as reentries using the profile variables. The remainder, 1,994 or 89.5 percent of the reentries, were misclassified as nonreturners. The dominant number is the terminal segment of 14,410 or 97.9 percent of nonreturners who are correctly classified. These statistics are displayed in Figure 9.

The classification ability with regard to reentries is certainly poor in this instance. The 234 correctly classified reentries added to the 302 leavers misclassified as reentries provides a target of only 536

FIGURE 9

Main Propulsion: Reentries and Nonreturners



*FY74 through FY81 are represented in the (rounded) averages since reentries were contained in the data base for all eight years of the period and nonreturners had similar opportunities to reenter were they to do so.

**The percentages in the "classified as" column are calculated from either the total reentry base or the total nonreturner base.

potential reentries from an equivalent current pool of MPs. Of these, 234/536 = .437 or 43.7 percent were correct. Once classified as reentries, a correct percentage this large might be helpful. The problem is that very few leavers actually reentered service, and only about ten percent of these could be classified correctly.

Or as Figure 9 shows, the actual reentry segments might be expected to supply 30 + 250 or about 280 reentries on an annual basis. The look-alike segment adds only about 40 per year for a potential of about 320 per year. The remaining segment of 14,410 nonreturners, about 1,800 per year, is the only one of substantial size; however, this terminal segment is of doubtful productivity.

Segment profiles. The coefficients of the discriminant equation show that the interservice separation codes, race, and reenlistment eligibility codes are most powerful in distinguishing the reentries from the nonreturners. The full equation follows:

Intercept	-1.18381
Separation codes	3.13597
Race: nonblack-black	1.93606
Reenlistment eligibility	0.90264
Education at initial entry	-0.38751
Waiver at initial entry	0.30176
Number of dependents	0.24018
Age at initial entry	0.21797
Paygrade: most recent records	-0.14235
AFQT scores	-0.01363

Because the nonreturners turned out to be the only segment of sufficient size, the emphasis of qualitative analysis will be placed on them rather than on the reentries. Exhibit 7 contrasts the base segments of nonreturners with the reentries.

Among the more powerful variables, the exhibit shows that larger proportions of nonreturners separated voluntarily and were classified as eligible to reenlist. Relatively more nonblacks were present among the nonreturners as well. The Chi-square tables verify these differences. Nonreturners separated voluntarily 98.9 percent of the time versus 94.0 percent for the reentries (A-14: $p < .0001$, $C = .124$). Where 78.0 percent of nonreturners were considered immediately eligible to reenlist, only 62.2 percent of reentries were labeled immediately eligible (A-15: $p < .0001$, $C = .124$).

EXHIBIT 7

Comparative Profiles of MP Reentries and Nonreturners

Reentries Are Characterized By:	Nonreturners Are Characterized By:
1) More MPs separated involuntarily	More voluntary separations
2) Relatively more blacks	Relatively more nonblacks
3) More MPs not immediately eligible to reenlist	More MPs immediately eligible
4) More MPs with fewer years of education at initial entry	More years of education at initial entry
5) More MPs with adverse waivers at initial entry	More with favorable waivers or none needed
6) More dependents: most recent	Fewer dependents: most recent
7) Older at initial entry	Younger at initial entry
8) More MPs with lower paygrades: most recent	More with higher paygrades: most recent
9) Lower AFQT scores	Higher AFQT scores

The composite profile of discriminant analysis accounts for interrelationships among the variables where the bivariate Chi squares do not. Along with the impact of voluntary separations, nonblacks, and reenlistment eligibility, six more variables helped to discriminate nonreturners from reentries. Nonreturners are further characterized by larger proportions of MPs with (1) more years of education, (2) no need for waivers or favorable waivers at initial entry, (3) fewer dependents at separation, (4) younger at initial entry, (5) higher paygrades at separation, and (6) higher AFQT scores at entry. Most of the variables in this composite profile (Exhibit 7) indicate a higher quality for the nonreturners as compared to the reentries.

When categorized by the timing of their MP rating, 568 of 2,214 traceable reentries or 25.6 percent obtained their rating after rather than before reentry. An impact on training costs occurred for over a quarter of the reentries.

The terminal segments (Figure 9, p. 68) reflect the numbers of reentries and nonreturners as the profile variables were able--or not able--to identify them. The accessible segments, reentries whether correctly identified or not and the nonreturners misclassified as reentries, are very small in numbers whether compared to the correctly classified nonreturners or the total leavers. On average there were, or currently one might expect, about 320 per year, counting both the past flow and the added potential. The base segment of reentries (Exhibit 7, p. 70) suffered when its characteristics were compared to the nonreturners.

The nonreturners compose the largest segment, about 14,712 when both terminal segments are counted. This segment also contains men who show evidence of the more desirable characteristics. While their very

characteristics suggest some appeals to attract them, their alternative opportunities may inhibit recruiting efforts.

Engineering Support

The engineering support segment (ES) consists of three ratings: electricians mate, interior communications electrician, and hull maintenance technician. Segmentation identified 19.0 percent stayers, 70.3 percent nonreturners, and 10.7 percent reentries (Table 1, p. 18). The latter two base segments add up to 81.0 percent leavers. Compared to the previous segments, the ES segment contains the lowest percent of stayers and the highest percent of leavers. Within the leaver category, the ES segment experienced the largest percent of nonreturners and an intermediate percent of reentries.

In the 71,678 cases available for analysis, the ESs account for 23,240 or 32.4 percent of the total. The segment is thus the second largest and well above either the operations technicians or the weapons technicians. Some additional cases became unavailable during analysis because of missing data in the variables applied. This reduction in data occurred as follows:

Available cases	23,240	100.0%
Cases with missing data	-889	-3.8%
Cases analyzed	22,351	96.2%

Stayers and Leavers

As a consequence of missing data, some minor changes took place in the base segment of stayers and leavers. The proportion of stayers and leavers actually analyzed were 19.3 and 80.7 percent, respectively. These figures amounted to a minimal 0.3 percent gain for stayers and an identical loss for leavers over the 19.0 and 81.0 percent prior values.

Size of segments. Figure 10 displays the 22,351 records analyzed and the further breakdowns which resulted. Although the diagram starts with the smallest proportion of stayers and the largest of leavers of any of the CREOs, the further divisions are similar to previous findings.

The profile variables more often misclassify stayers as leavers, 88.0 percent, than correctly classify them as stayers, 12.0 percent. Over seven actual stayers are misclassified as leavers for each stayer correctly classified. Since the classification power for stayers is poor, only 507 or 2.8 percent of the leavers are identified as potential stayers. Adding this 507 to the 517 correctly classified stayers, we have an identified target of only 1,024. In this identified target, 50.5 percent are correct.

Discounting the large segment of correctly identified leavers, the annual potential would amount to approximately 100 + 760 + 100 = 960. In a present active duty group of the same size, the potential would be 960/22,351 = 4.3 percent. Most of this percentage would be generated by current retention practices, and only about half of the added potential of 100 could be effectively convinced to reenlist immediately.

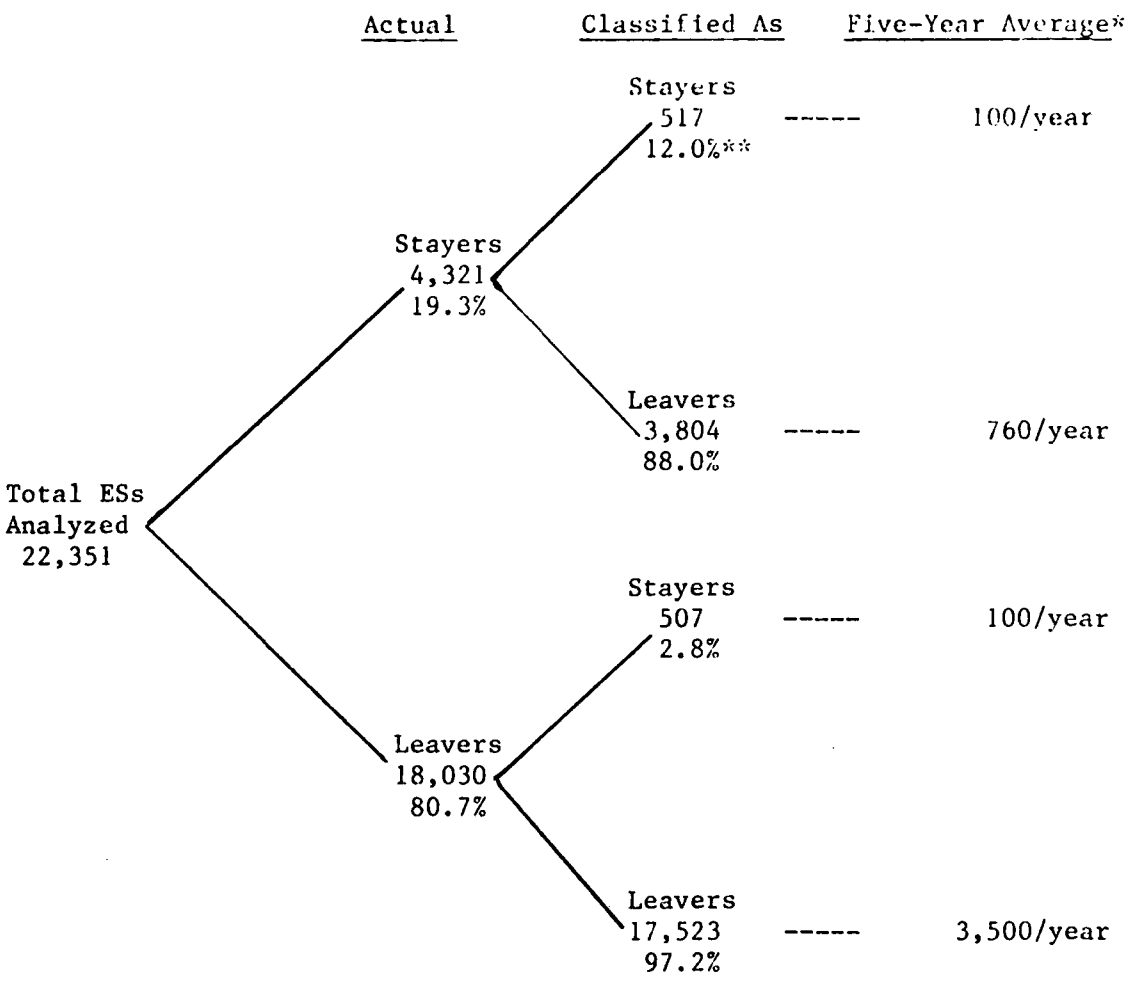
The leaver segment of 17,523, about 3,500 annually, provides the largest target. As pointed out with regard to the other CREO segments, however, the means of cultivating this leaver segment are much more difficult to design.

Segment profiles. Upon analysis, the discriminant equation for the ES CREO contained the following variables:

Intercept	-1.49511
Paygrade at initial entry	0.83018
Race: nonwhite-white	-0.76069

FIGURE 10

Classification of Engineering Support



*FY74 through FY78 are represented in the (rounded) averages since new entries were excluded from the data base after the latter year.

**The percentages in the "classified as" column are calculated from either the total stayer base or the total leaver base.

Number of dependents	0.73328
Most recent education	-0.12056
AFQT scores	0.00797

Waiver at initial entry and age at initial entry were the variables considered for inclusion in the model which did not contribute to distinguishing the stayers from the leavers. Exhibit 8 provides the usual brief interpretation.

EXHIBIT 8

Comparative Profiles of ES Stayers and Leavers

Stayers Are Characterized By:	Leavers Are Characterized By:
1) More ESs with higher paygrades at initial entry	More with lower paygrades
2) Relatively more nonwhites	Relatively more whites
3) More dependents: most recent	Fewer dependents: most recent
4) More ESs with fewer years of education: most recent	More with more years of education: most recent
5) Higher AFQT scores	Lower AFQT scores

Entry paygrades provided the best distinction between stayers and leavers in both the multidimensional discriminant analysis and the bivariate Chi-square table. In the latter, 47.0 percent of the stayers rated an EØ3 paygrade at initial entry whereas only 18.1 percent of the leavers did so (A-16: $p < .0001$, $C = .262$). For number of dependents, 53.5 percent of the stayers but only 31.8 percent of the leavers had two or more dependents (A-17: $p < .0001$, $C = .176$). Although the nonwhite-white dichotomy was not as distinct because whites dominate the totals, larger proportion of the stayers than the leavers were nonwhite.

In the remaining two variables, stayers had fewer years of education than leavers as recorded in the most recent data. Though more years of education favored the leavers, the impact of higher AFQT scores was to favor the stayers if only to a moderate degree. More striking is the fact that the average for all ESs was low on both measures. The average years of education was a little less than high-school graduation. (The actual average was 5.8 where code 6 indicated a high-school graduation or equivalent.) Similarly, the average AFQT score was 61.2, below the 65th percentile cutoff for the preferred group II as coded in the data.

Over all the variables, paygrades, and possibly AFQT scores favor the stayers, while educational levels seem to favor the leavers. Actually, there is no strong indication either way. Considering the inability to classify stayers with any degree of accuracy for targeting and the lack of qualitative interpretation for screening, no obvious strategy is apparent.

Reentries and Nonreturners

An additional 647 missing cases reduced the 18,030 leavers from stayer-leaver analysis to 17,383 cases actually analyzed to discriminate between reentries and nonreturners. The loss of cases amounted to a relatively minor 3.6 percent, or 96.4 percent of the available cases were analyzed. From Table 1, p. 18, the percentages of reentries and nonreturners were 13 and 87, respectively. After analysis, these percentages were 10.3 and 89.7, a loss of 2.7 percent for the reentries and a like gain for the nonreturners. Possible bias from this differential change in the proportion of cases is not substantial.

Size of segments. The 17,383 ES leavers subdivided into 1,796 reentries and 15,587 nonreturners. Each of these were further correctly

classified or misclassified by the profile variables as shown in Figure 11.

Only 6.4 percent of the actual ES reentries were classified correctly, the worst showing of any of the CREO segments. The subsequent ability to identify a similar added target segment was also an exceedingly low 1.3 percent. Nonreturners were so prevalent and so dominated the characteristics of the ES segment that the ability to identify either the usual flow of reentries or to target additional potential reentries is almost nil.

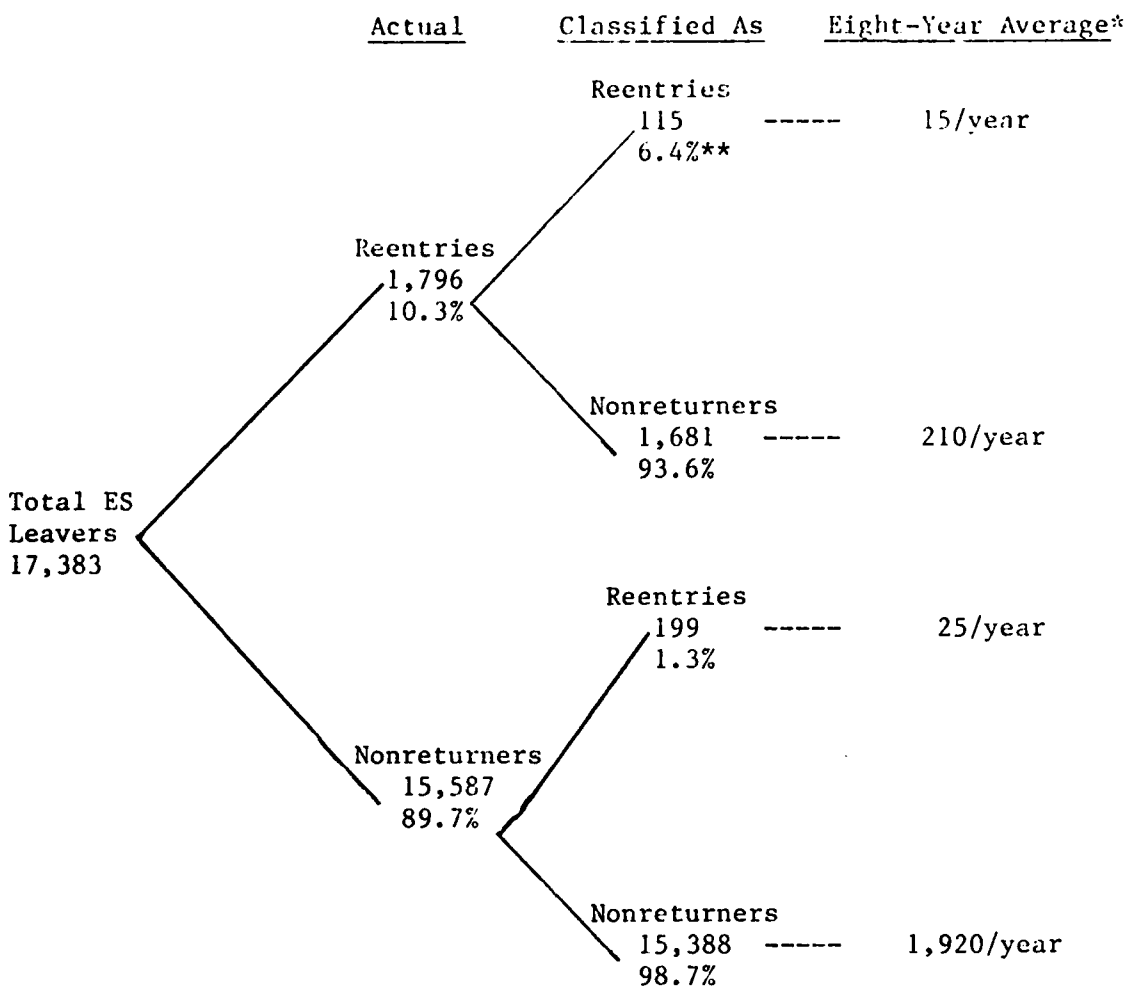
Segment profiles. The discriminant function turned out to be very similar to that of the main propulsion segment. The only exception as to variables and order is that waiver at initial entry did not enter the equation for the ES segment. The variables and coefficients in the equation appear as follows:

Intercept	-1.42311
Separation codes	2.97587
Race: nonblack-black	1.76104
Reenlistment eligibility	0.84553
Education at initial entry	-0.65376
Number of dependents	0.33702
Age at initial entry	0.29121
Paygrade: most recent records	-0.04942
AFQT scores	-0.01360

Exhibit 9 contrasts the ES reentries and nonreturners as they are distinguished by the variables of the discriminant equation. As with the main propulsion segment, emphasis will be placed on the nonreturners since they dominate reentries in regard to number and classification ability.

FIGURE 11

Engineering Support: Reentries and Nonreturners



*FY74 through FY81 are represented in the (rounded) averages since reentries were contained in the data base for all eight years of the period and nonreturners had similar opportunities to reenter were they to do so.

**The percentages in the "classified as" column are calculated from either the total reentry base or the total nonreturner base.

The discriminant coefficients tell us that ES nonreturners had relatively more voluntary separations, more men eligible for reenlistment, and more nonblacks than the reentries. While the majority of ESs separated and stayed out, most did so voluntarily. The figures show that 99.2 percent of the nonreturners and 96.8 percent of the reentries were voluntary separations (A-18: $p < .0001$, $C = .074$). Among the nonreturners, 78.3 percent were considered immediately eligible for

EXHIBIT 9

Comparative Profiles of ES Reentries and Nonreturners

Reentries Are Characterized By:	Nonreturners Are Characterized By:
1) More ESs separated involuntarily	More voluntary separations
2) Relatively more blacks	Relatively more nonblacks
3) More ESs ineligible to reenlist (or not eligible for immediate reenlistment)	More ESs eligible
4) More ESs with fewer years of education at initial entry	More years of education at initial entry
5) More dependents: most recent	Fewer dependents: most recent
6) Older at initial entry	Younger at initial entry
7) More ESs with lower paygrades: most recent	More with higher paygrades: most recent
8) Lower AFQT scores	Higher AFQT scores

Note: The waiver at initial entry variable proved not to be significant and did not enter the equation.

reenlistment versus only 66.7 percent of the reentries (Λ-19: $p < .0001$, $C = .084$). Nonblacks accounted for a larger proportion of the nonreturners than the reentries.

Along with the joint impact of voluntary separation, reenlistment eligibility, and larger proportions of nonblacks, the nonreturners typically had more years of education and higher AFQT scores. The nonreturners also tended to have more dependents, to be younger at initial entry, and to have separated with higher paygrades. Proportionately, of course, the reentries exhibited opposite characteristics. The composite profile indicated by these variables favors the nonreturners over the reentries.

As to impact on costs of recruiting trained personnel, 325 of 1,788 or 18.2 percent of the reentries analyzed obtained their ES qualifications after reentering service. Or, tracing a greater number, 591 of 2,467 or 24.0 percent obtained their ratings after reentry. The first estimate considers almost all the reentries noted in Figure 11, p. 78; the second provides a close match to the ES reentries in Table 1, p. 18.

Logically, ES dropouts with characteristics similar to those who separated and later reentered should provide an accessible target for recruiting trained, prior-service personnel. This segment, unfortunately, proved to be exceedingly small and was not necessarily made up of the better potential ES recruits. Similar problems occur with respect to targeting the segment of correctly classified reentries who presumably constitute part of the normal flow of reentries. The big segment of actual nonreturners contains numerous eligible recruits, but cultivating this segment doubtless involves changes in recruiting incentives and methods.

PART III: IMPLICATIONS OF ANALYSIS

The basic question to be answered in this analysis was initially posed as: "Among prior-service personnel, which groups or segments, if any, provide favorable prospects for reenlistment in chronically short, mid-grade, petty officer ratings?" By identifying (1) numbers per segment, (2) segment profiles, and (3) locating possible geographic concentrations, recruiting efforts could be targeted toward favorable and away from unfavorable segments.

The strategy inherent in this approach is to evaluate the size, characteristics, and location of segments as a foundation for designing marketing efforts. The size, quality, and accessibility of possible segments must be assessed in order to design or adjust a marketing campaign. Under the assumptions that (1) CREO ratings [product], (2) rates [price], and (3) MEP stations [channel] are all relatively fixed, the remaining controllable elements are the persuasion of advertisements and recruiters [promotion]. For promotion efforts to be successful, the further assumption is that viable segments exist.

The implications of analysis will be developed by first summarizing the findings relative to the size and characteristics of the segments. Some added data will next consider the problem of locating such prospects as appeared to be favorable in the analysis.

Identification of segments. Analysis singled out four CREO segments and divided these into sixteen stayer-leaver and reentry-nonreturner base segments. Each of these base segments was further subdivided by the ability or minimal ability to classify (or predict) members of the segment correctly. The base segments can be

distinguished by differences between the characteristic profiles of each pair. In general, however, the size, especially of the reentry segments of interest, is limited. For purposes of developing strategy and policy, the distinctions among the CREO segments are not always decisive. The order in which the characteristics appeared in the analysis was roughly the same. The differences in proportions of men exhibiting each of the several characteristics was not usually large. The similarity permits much the same interpretation for all four CREO segments, and they will be treated in combination in most of the following summary.

Because initial interest focused on the prior-service potential, attention will be directed first to the reentry-nonreturner comparisons. Having thus analyzed the leavers, attention will be directed to the stayers as the remaining potential for reentry.

Prior-service segments. In the previous analysis, the prior-service people--reentries and nonreturners--were subdivided into the terminal segments by Figures 5, 7, 9, and 11. The information from these figures is summarized in Table 5. The percents, however, are now revised to sum by columns to the subtotals of actual classifications and to the overall column totals.

The table clearly displays the lack of sufficient numbers in the primary segments of interest and the consequent difficulty in classifying the target population to identify better prospects for reenlistment. The first three rows of the table show that most reentries share characteristics in common with nonreturners rather than with their own reentry segment. The percents correct (row one) range from 24.7 for the OTs to 6.4 for the ESs. Across the four CREOs, the percent correct is 10.2, a very limited classification power for targeting reentries.

TABLE 5

Summary of Prior-Service Segments

CREO CLASSIFICATIONS

Terminal Segments	Operations Technicians	Weapons Technicians	Main Propulsion	Engineering Support	Total CREOs
Reentries Classified as Reentries	108 (24.7) [2.3]	97 (10.0) [1.2]	234 (10.5) [1.4]	115 (6.4) [0.7]	554 (10.2) [1.2]
Reentries Misclassified as Nonreturners	330 (75.3) [7.0]	870 (90.0) [11.0]	1994 (89.5) [11.7]	1681 (93.6) [9.7]	4875 (89.8) [10.4]
Total of Actual Reentries	438 (100.0) [9.3]	967 (100.0) [12.2]	2228 (100.0) [13.2]	1796 (100.0) [10.3]	5429 (100.0) [11.6]
Nonreturners Misclassified as Reentries (Target)	124 (2.9) [2.6]	145 (2.1) [1.8]	302 (2.1) [1.8]	199 (1.3) [1.1]	770 (1.9) [1.6]
Nonreturners Classified as Nonreturners	4154 (97.1) [88.1]	6799 (97.9) [85.9]	14410 (97.9) [85.1]	15388 (98.7) [88.5]	40751 (98.1) [86.8]
Total of Actual Nonreturners (Leavers)	4278 (100.0) [90.7]	6944 (100.0) [87.8]	14712 (100.0) [86.8]	15587 (100.0) [89.7]	41521 (100.0) [88.4]
Total Members of CREO	4716 [100.0]	7911 [100.0]	16940 [100.0]	17383 [100.0]	46950 [100.0]

( ) Percent of column subtotals, the actual reentries or nonreturners.
[ ] Percent of column totals.

* A slight rounding error is present in a few of the percentages

Whether classified correctly or not, approximately the same numbers and percentages may be expected--or predicted--to reenter the service provided recruiting practices and external conditions remain approximately as they were during the period analyzed. Typically (row three), about 11.6 percent of separated personnel may be expected to reenter service without additional specially targeted recruiting procedures.

Any added target population must thus come from the actual nonreturners, rows four through six in Table 5. The primary target should be the nonreturners who are misclassified as--look like--reentries. Over the eight-year period, the greatest number in row four is 302 for the MPs, and the best percentage is 2.9 for the OTs. Over all the CREOs, only 770 or 1.9 percent of the nonreturners are classified into this target segment. The potential yearly increment is approximately one-eighth of the row figures. Considering the small numbers observed in addition to the limited classification power, targeting prior-service personnel who have essentially the same characteristics as reentries is unlikely to be an effective procedure.

In addition, exhibits 3, 5, 7, and 9, pp. 48, 60, 70, and 79 suggest that many of those classified as reentries may have less desirable characteristics than those classified as nonreturners. This condition applies to the segment of row one as well as to the segment in row four of Table 5. Other information indicated that substantial proportions of the reentries came back into service before rather than after obtaining a CREO rating. Possible savings of training costs are thereby reduced or eliminated.

The remaining segment of possible additional reentries is represented in row five of Table 5. The numbers and percentages of correctly

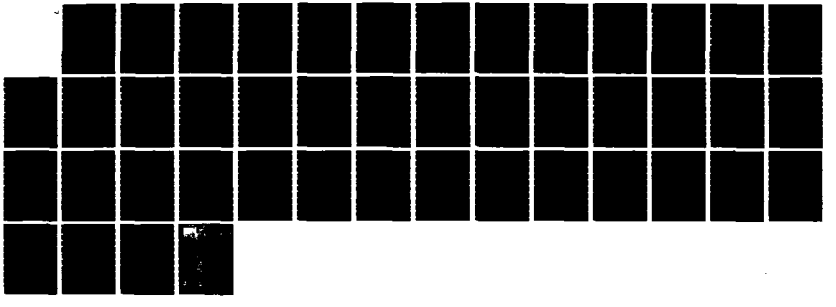
classified nonreturners are far greater than the nonreturners who are similar to the reentries. Their characteristics, while comparatively advantageous, fail to supply strong evidence for directing recruiting efforts. Then too, these are the people who have failed to respond to past recruiting efforts. Apparently, they have favorable alternative opportunities, and little is known about how to make service opportunities sufficiently attractive to encourage reenlistment of well qualified individuals. Doubtless, changes in recruiting incentives would have to go beyond the persuasion of recruiting advertisements and personal recruiting messages.

The non-prior-service segments. While analysis of the non-prior-service segments was intended primarily as a foundation for analysis of the prior-service segments, some of the results turn out to be interesting in their own right. First, very few of the stayers are really career men, and they themselves become prior-service and a potential segment for reenlistment upon separation. Second, among the stayers at least the OTs appear to be a target for longer-term retention with no break in service.

Table 6, based on Figures 4, 6, 8, and 10, summarizes the CREO segments as they are partitioned by the stay or leave decisions and by the ability or inability to classify the stayers and leavers correctly. As in Table 5, the percents are revised from the previous figures. The percents sum by columns to subtotals of actual stayers and leavers and to the overall column totals. Primary interest is focused on the first three rows of the table and for a special purpose on the fourth row since the leavers have otherwise been analyzed as reentries and nonreturners. With only an eight-year period analyzed, the very great

AD-A139 379 PROSPECTS FOR REENLISTMENT OF PRIOR-SERVICE PERSONNEL (U) PENNSYLVANIA STATE UNIV UNIVERSITY PARK INST FOR PPOLICY RESEARCH AND EVALUATION L L BEIK ET AL. FEB 84 2/2

UNCLASSIFIED TR-84-4-ONR N00014-82-K-0262 F/G 5/9 NL



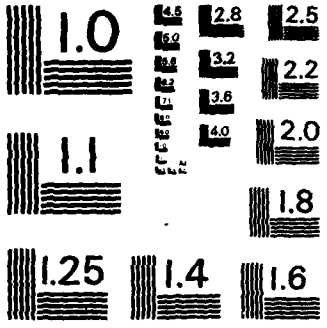


TABLE 6

Summary of Non-Prior-Service Segments

Terminal Segments	CREO CLASSIFICATIONS: Operations Technicians	Weapons Technicians	Main Propulsion	Engineering Support	Total CREOs
Stayers classified as Stayers	3343 (62.8) [32.7]	792 (27.5) [7.1]	1722 (24.1) [7.0]	517 (12.0) [2.3]	6424 (32.3) [9.3]
Stayers Misclassified as Leavers	1979 (37.2) [19.4]	2083 (72.5) [18.8]	5583 (75.9) [22.0]	3804 (88.0) [17.0]	13449 (67.7) [19.5]
Total of Actual Stayers	5322 (100.0) [52.1]	2875 (100.0) [25.9]	7355 (100.0) [28.9]	4321 (100.0) [19.3]	19873 (100.0) [28.8]
Leavers Misclassified as Stayers	1412 (28.8) [13.8]	439 (5.3) [4.0]	1357 (7.5) [5.3]	507 (2.8) [2.3]	3715 (7.5) [5.4]
Leavers Classified as Leavers	3487 (71.2) [34.1]	7788 (94.7) [70.1]	16701 (92.5) [65.7]	17523 (97.2) [78.4]	45499 (92.5) [65.9]
Total of Actual Leavers	4899 (100.0) [47.9]	8227 (100.0) [74.1]	18058 (100.0) [71.1]	18030 (100.0) [80.7]	49214 (100.0) [71.2]
Total Members of CREO	10221 [100.0]	11102 [100.0]	25413 [100.0]	22351 [100.0]	69087 [100.0]

( ) Percent of column subtotals, the actual reentries or nonreturners.
[ ] Percent of column totals.

* A slight rounding error is present in a few of the percentages.

majority of men whose terms of service extended beyond 72 months were still in service at the end of FY81. Of the 2,421 defined stayers who had separated, 2,124 had less than or equal to eight years of service and 297 had more than eight years. The former must have entered service during FY74 or FY75 and the latter must have entered before FY74. After completing 72 months, 1,576 or 65.1 percent of the 2,421 men separated within a year. An additional 548 or 22.6 percent separated within a second year for a combined 87.7 percent. These percentages are the recent, FY80-81, separation rates of relatively long-term personnel. If similar rates hold for men who entered later in the period, potential tenure beyond the 72-month mark is quite limited.

Once separated, the stayers themselves become a sizeable target for reentry. As indicated in row three of Table 6, there were 19,873 stayers or 28.8 percent of the total analyzed in the stayer segments of the combined CREOs. Adding the 3,715 leavers who have the characteristics of stayers (row 4), the potential of the stayer segment becomes 34.2 percent.

The characteristics which discriminate the stayers from the leavers are generally favorable to the stayers (Exhibits 2, 4, 6, and 8, pp. 41, 54, 65, and 75). Several characteristics tend to explain why no break in service exists for the stayers, and to suggest appeals for encouraging further reenlistments after separation. The stayers, for instance, tended to enter service with higher paygrades than leavers and presumably maintained or advanced their paygrades in a satisfactory manner. This variable ranked first or second in importance for all four CREO-stayer segments, and it implies adequate performance at least for many in these segments.

These four stayer segments also tended to have more dependents than the leavers, and this variable ranked first to third in importance. Dependents imply a need for stable pay and fringe benefits. Relatively more nonwhites, mostly blacks but some Hispanics, characterized the stayers, and perhaps these people have fewer external opportunities and have need of the pay and benefit advantages noted above. Careful references to the exhibits and the supporting appendix tables may suggest additional interpretations for the separate CREO-stayer segments.

Some further advantages of recruiting stayers after they have separated may be noted. Because of their greater total time in service, they are more acclimated to the life-style of the Navy; they have attained rank and status; and they have a substantial investment of time toward retirement. Such ideas can enrich recruiting messages. Note too, that emphasis could be concentrated on the leavers who have characteristics similar to the stayers, as well as on the actual stayers whether correctly identified or not (Table 6). These three terminal segments amount to 34.2 percent of the total cases analyzed.

The size, added experience, established performance, and basic needs suggest retention of the CREO-stayer segments before separation. Data would doubtless be more adequate and certainly more current. An estimated termination of service would be available for each individual to aid timing of effort, and there would be no problem of location. Locations are known through the respective units of assignment.

The conclusion here is that the stayers, once separated, are likely to be a more productive segment for reentry than developed from analysis of the nonreturners. The potential for retention has also been

suggested, but that will be considered along with a discussion of the method for locating prospects.

Locating the Prospects

Tracing the source locations of the 5,429 actual reentries (Table 5) would hardly be productive since that number represents an eight-year period and would subdivide among the numerous MEP districts as well. There would be too few reentries per district per year to make targeting worthwhile. Tracing source locations of the total 69,087 (Table 6) individuals present in the analysis provides some indications for seeking CREO recruits generally, but not prior-service people in particular.

Current or even recent addresses are unavailable in the DMDC files, and the MEP districts of entry supply what information is available concerning geographic location. The assumption here is that similar clusters of recruits are available, district by district, given that district populations are reasonably consistent. Their initial districts of entry locate sources of stayers and nonreturners, while the most recent entry points provide information about the reentries.

Were the discriminant or equivalent classification analysis applied as personnel were about to separate from service, prospects could be qualified and follow-up recruiting activated. While individuals are still located by their unit of affiliation, recruiting could target the best qualified people for retention. Upon separation, the target individuals could be located while addresses are still current.

Tracing Clusters of Prospects

The analysis reported above has shown that the stayers, once separated, make up the best target segment. The nonreturners and reentry

segments follow in that order when potential persuasibility, volume, and profile characteristics are considered. The profiles of the four CREOs turned out to be sufficiently similar that geographical sources are considered for the combined segments. If interest focuses on locating potential CREO recruits generally, some geographical differences are indicated.

Upon comparing the relative numbers and proportions of stayers, nonreturners, and reentries, differences among the six recruiting areas are statistically significant (Appendix Table A-20; $p. < .0001$, $C = .086$). The degree of association as recorded by the contingency coefficient, however, is not strong. For actual recruiting decisions, then, one should observe the relative availability in actual numbers by subtracting the expected from the observed values in the table as well as the statistical indicators. In the Southeast area, for example, stayers and reentries are relatively abundant, while nonreturners are scarce. The respective calculations provide differences of 504 stayers, 242 reentries, and 746 fewer nonreturners. Reentries are also relatively available in the Pacific/Mountain area, but scarce in the Northeast.

Six additional tables (A-21 through A-26) show the distributions of stayers, nonreturners, and reentries for the districts within the areas. While the area differences for the Southeast are the most substantial as calculated above, the distribution within that area shows less divergence. Stayers are a bit more prevalent in all but one of the eight districts (A-22; $p < .0001$, $C = .087$). Only in the Nashville-Knoxville district do the observed and expected values diverge substantially. In that district, stayers are less prevalent and the difference can be calculated as -57. For the Southeast, the conclusion is that the

recruiting pattern indicated in the area table (A-20) appears with substantial consistency within the area. The internal differences which occur among the districts do not alter the area indication to any great extent.

The Pacific/Mountain area exhibits smaller proportions of stayers and nonreturners, but a larger proportion of reentries. Within the area (A-26; $p < .0001$, $C = .186$), the San Diego-Phoenix district amplifies the pattern with differences of 68 fewer stayers, 133 fewer nonreturners, and 201 more reentries. The Los Angeles district reverses the pattern with respective differences of 66 more stayers, 78 more nonreturners, and 145 fewer reentries.

In part, of course, the numbers are much smaller in district than in area tables. The numbers would also be much smaller for one year than for the period as recorded in the tables. The question is whether the numerical differences noted are large enough to be actionable.

If interest continues to be focused on the location of prior-service, CREO personnel, the subject of this project, the geographical differences have been developed in a previous technical report (Beik, Mitchell, and Fitch, 1983). That report considered only reentries--all prior service--in the same CREO segments for FY78 through FY81, the most recent and relevant years. While statistical differences were present in some of the tables, the numerical differences per district were small, especially if calculated per year. Very likely, few of the numerical differences were large enough to be actionable in most areas.

The most favorable area in the previous report, for example, showed that the Pacific/Mountain states provided a relatively large proportion of main propulsion ratings. San Diego, within the area, exceeded even

the West Coast proportions of main propulsion reentries (p. 14). Similarly, in the present analysis, both the Pacific/Mountain area and the San Diego district show proportionately more reentries when compared to stayers and nonreturners. The present report, thus, adds nonprior-service people and indicates that quite moderate geographical patterns exist among reentries, stayers, and nonreturners over most of the nation.

Retention of Operations Technicians

The possible improved retention of OTs stands out as a feasible application of segmentation analysis. That the OTs exhibited the most favorable proportions among the CREO segments has been demonstrated. Measured over the research period, the base segment of stayers amounted to about 52 percent of the OTs analyzed. The added potential in the terminal segment of leavers who looked like stayers was about 29 percent of the leavers or 14 percent of the total OTs (Table 6, p. 86, row 4). Additionally, the characteristics which described the actual and apparent stayers was generally more favorable than the profile of the actual and apparent leavers. From the point of view of location, any active-duty individual is assigned to a unit and therefore has a known address.

In addition to classifying individuals into segments, the discriminant function provides a score for each individual. This score represents or predicts the extent to which a given individual's characteristics are similar to stayers or to leavers. Upon classifying the OTs, a positive score indicates similarity to the stayers and a negative score to the leavers. The scores can then array all the OTs along a continuum from most like stayers to most like leavers.

TABLE 7

A Sample Array of the Discriminant Scores Which Created the Segments**

Observation	Scores Predicting Stayers	Observation	Scores Predicting Leavers
1	2.290	15	-0.308
2	1.733	16	-0.421 S
3	1.486	17	-0.421
4	1.166 L*	18	-0.421
5	0.940	19	-0.534 S
6	0.497	20	-0.534 S
7	0.462 L	21	-0.534
8	0.372	22	-0.647 S
9	0.372	23	-0.647
10	0.259	24	-0.873
11	0.259	25	-1.125 S
12	0.259 L	26	-1.326
13	0.259 L	27	-1.578 S
14	0.043	28	-1.805
		29	-1.918
		30	-1.961

*The L indicates an actual leaver misclassified as a stayer, and the S indicates an actual stayer misclassified as a leaver.

**The proportions approximate the results previously displayed in Figure 4, p. 37.

Obviously, an array of 10,221 OTs would make a rather extensive table. Instead, a sample of 30 OTs has been extracted from the total to illustrate the process. Table 7 provides a sample which was drawn to represent approximately the same terminal segment proportions as developed in the previous analysis (Table 6, p. 86, column 1). As before, the segments are indicated by (1) the stayers, (2) the stayers who have the characteristics of leavers, (3) the leavers who have characteristics of stayers, and (4) the residual leavers.

Generally, the higher the score in the table, the more likely an individual is to be retained over 72 months by the previous definition. The negative scores include some individuals who would be retained in spite of their predicted decision. The positive scores identify individuals likely to be retained in any event plus potential retainees who might otherwise separate. Numbers close to each other in the array cannot provide a precise distinction. Of the four +0.259 scores predicting stayers, for example, two were actually leavers. Early identification of possible stayers together with recruiting efforts, however, might persuade these two and others like them to remain in service. Over a substantial array, the range of scores would include probable stayers and likely prospects along with the probable leavers who would actually stay and the residual leavers.

The existing discriminant function could be applied to present active-duty OTs with probable rough results. The function would require data identical to that in the present analysis for the current OTs. For all those nearing the end of their terms of service, scores could be calculated to array the individuals roughly in line with their likelihood of being retained in the Navy. As in the table, the positive

scores would predict stayers and the negative scores leavers. The predictive errors would not become apparent but would be implicit within the positive and negative portions of the array. Recruiting effort could be directed in accord with the size and sign of scores in the array.

In actual application, new functions would have to be calculated periodically. Even better, a new function could be calculated based on recent active-duty data rather than DMDC files. In particular, active records doubtless contain improved indicators of performance, and obviously they contain the location of present assignment to locate selected individuals. A current function based on long-term retentions and recent separations would be calculated. The function would provide individual scores for OTs as each nears the end of his term of service. Reenlistment attention would then be directed toward high-scoring individuals and, possibly, away from low-scoring individuals to the extent that retention requirements and quality indicators warrant.

Rather than worrying about stayer, etc. segments, the array of scores could be divided arbitrarily into segments. As the equivalent of an index, a proportion of the top scores could be targeted for intensive recruiting, a second proportion for routine recruiting, and so on. The proportions chosen could be dependent upon requirements and the number of segments determined by the tradeoff with potential sources other than separated personnel.

The above discussion suggests a logical follow-up step to the present research. For the OTs, at least, the classification power indicated in this study would be sufficient to direct retention efforts with a reasonable degree of efficiency. Especially if active-duty data

improved the classification power sufficiently, the same approach might be workable for other CREOs.

Future Research Using Active-Duty Data

While it is more efficient to improve retention than to recruit prior-service people, the drastic turnover experienced by the Navy may well require attention to separated personnel. The method just described for retention of OTs could be extended to CREO segments whether or not incorporated in the present study. The array of scores developed to estimate the potential for retention would automatically be available for individuals who then separate from the service. The rank and sign of scores similar to those in Table 7 would indicate the approximate payoff potential of early follow-up recruiting efforts.

That both the classification power and actual numbers from current analysis of active-duty data must be adequate still applies. However, the classification power tended to be generally better for the stayer-leaver analysis than for the reentry-nonreturner analyses, and the quality indicators were better for the stayers as compared to the reentries as well. The numbers, too, are much larger when comparing stayers and leavers than for classifying and seeking out possible reentries as such. Current data with added and improved variables should also surpass that based on the DMDC files. When people separate in spite of retention efforts, the location problem is substantially solved by the presence of recently recorded addresses.

Periodic analysis of active-duty data to evaluate and array near end-of-term CREO category individuals appears feasible for OTs and possibly for other CREO segments. The main advantage of the approach is that it would at once provide information for directing retention and

follow-up recruiting efforts. It would begin to integrate the activities of the career counselors in the units with the activities of the recruiters.

Beyond the follow-up research step just noted, analysis of the recruiting performance of areas and districts retains an interesting promise. The ratios of recruits in selected occupational segments relative to the base district populations would alone supply valuable information. Further comparisons of the numbers of recruiters to recruits per population might improve recruiting efficiency and the allocation of personnel.

By integrating financial data, the efficiency as well as the effectiveness of recruiting policies could be judged. Contacts per district as a ratio to advertising expenditures, for example, could evaluate and suggest reallocation of advertising dollars. Or district recruiting effectiveness could be related to district costs for improved efficiency. Further stages of research could well provide advances in development of a thorough recruiting information system.

Some Speculation on Strategies

The strategy implied by the present research is to analyze an appropriate pool of trained, or relatively trained, personnel with the intent of filling voids in mid-level ratings. Other strategies such as researching equivalent civilian occupations as a source are under way in other projects. Additional strategies should be defined, discussed, and possibly investigated.

Considering the difficulties of attracting nonreturners and even separated stayers, additional incentives might be needed beyond the persuasion of personal contacts and advertising. The jobs themselves might

be restructured, working conditions improved, and rewards such as leave time, job rotation, even payscales reconsidered. Coordination with other commands would be imperative, but other commands need the men.

Preventing a shortage rather than seeking replacements is obviously the superior approach. To do so, the Navy might enlist and train an oversupply of specialists in paygrades one through three sufficient to fill any voids in paygrades four and above. The strategy here is to accept high turnover but to have replacements available.

It might also be possible to cross-train individuals for more than one occupational specialty. By then rotating the men from an adverse to a more favorable position and then back again, and perhaps rotating sea and shore duty advantageously at the same time, greater proportions of specialists might be retained. Improved rotation via cross-training might also be integrated to make use of underutilized people if an initial oversupply approach were adopted simultaneously.

Especially since alternative opportunities may pull some specialists out of the Navy while the adverse nature of other occupations may push some specialists out, a mixture of strategies and concurrent policies may be necessary to replenish chronic shortages. Upon observing current TV and other advertising by the armed forces, it seems obvious that the major appeal is initial training for civilian occupations. Short-term enlistments and drastic turnover should not then be surprising. A reorientation of the entire approach to recruiting, perhaps to emphasize training for career advancement in the Navy, might be more effective. The objective would shift to retention while retaining the supply of initial recruits.

REFERENCES

Beik, L. L., Mitchell, M. E., and Fitch, S. D. Segmentation of prior-service reentrants in the U.S. Navy: A preliminary analysis (Tech. Rep. ONR 83-3). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, April 1983.

Bruning, J. L. and Kintz, B. L. Computational Handbook of Statistics. Glenview, IL: Scott, Foresman and Company, 1968.

Dixon, W. J., Brown, M. B., Engelman, L., Frane, J. W., Hill, M. A., Jennrich, R. I., and Toparek, J. D. (Eds.). BMDP Statistical Software (1981 Ed.). Berkeley: University of California Press, 1981.

Ellison, D. R., Mitchell, M. E., Beik, L. L., Stephenson, S. P., and Fitch, S. D. Separation of prior-service Navy personnel over two- and six-year periods: Fiscal years 1973-1981 (Tech. Rep. ONR 83-2). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, April 1983.

Haley, R. I. "Benefit Segmentation," Journal of Marketing, 32 (July 1968), pp. 30-35.

Klecka, W. R. Discriminant Analysis. Beverly Hills, CA: Sage Publications, 1980.

Kotler, P. Principles of Marketing. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1980.

Morrison, D. G. "On the Interpretation of Discriminant Analysis," Journal of Marketing Research, VI (May 1969), pp. 156-163.

SAS Supplemental Library User's Guide (1980 Ed.). Cary, NC: SAS Institute, Inc., 1980.

Stephenson, S. P., Beik, L. L., Ellison, D. R., and Fitch, S. D. Profile of prior-service accessions to the U.S. Navy: Fiscal Years 1973-1981 (Tech. Rep. ONR 83-1). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, April 1983.

Appendix Tables

Table A-1
Operations Technicians
Term-End Decisions by Dependent Categories

Frequency / Expected / Cell Chisq / Row Percent	One Dependent	Two or More Dependents	Total
Stayer *	1899 2698.8 237.0 35.68	3423 2623.3 243.8 64.32	5322 52.07%
Leaver **	3284 2484.2 257.5 67.03	1615 2414.8 264.9 32.97	4899 47.93%
Total	5183 50.71%	5038 49.29%	10221 100%

Statistics

Chi-Square	1003.153	df = 1	Prob = 0.0001
Contingency Coefficient	0.299		

Table A-2
Operations Technicians
Term-End Decisions by Paygrade at Entry

Frequency / Expected / Cell Chisq / Row Percent	E01-E02	E03	over E03	Total
Stayer *	610 1087.2 209.5 11.46	4705 4215.0 57.0 88.41	7 19.8 8.3 0.13	5322 52.07%
Leaver **	1478 1000.8 227.5 30.1	3309 3880.0 61.9 69.20	31 18.2 9.0 0.63	4899 47.93%
Total	2088 20.43%	8095 79.20%	38 0.37%	10221 100%

Statistics

Chi-Square	573.085	df = 2	Prob = 0.0001
Contingency Coefficient	0.230		

* Stayer information is most recent
** Leaver information is at separation

Table A-3
Operations Technicians
Term-End Decisions by Education Level

Frequency / Expected / Cell Chisq / Row Percent	Less Than High Schl	High Schl Grad	More Than High Schl	Total
Stayer *	64	4524	734	5322
	118.2	4735.2	468.6	52.07%
	24.9	9.4	150.3	
	1.20	85.01	13.79	
Leaver **	163	4570	166	4899
	108.8	4358.8	431.4	47.93%
	27.0	10.2	163.3	
	3.33	93.28	3.39	
Total	227	9094	900	10221
	2.22%	88.97%	8.81%	100%

Statistics

Chi-Square	385.033	df = 2	Prob = 0.0001
Contingency Coefficient	0.191		

Table A-4
Operations Technicians
Reentry Decisions by Type of Reenlistment Eligibility

Frequency / Expected / Cell Chisq / Row Percent	Immediately Eligible	Not Immediately Eligible	Total
Reentrant	221	212	433
	365.9	67.1	9.20%
	57.4	312.6	
	51.04	48.96	
Nonreturner	3757	518	4275
	3612.1	662.9	90.80%
	5.8	31.7	
	87.88	12.12	
Total	3978	730	4708
	84.49%	15.51%	100%

Statistics

Chi-Square	407.381	df = 1	Prob = 0.0001
Contingency Coefficient	0.282		

* Stayer information is most recent
** Leaver information is at separation

Table A-5
Operations Technicians
Reentry Decisions by Type of Previous Separation

Frequency Expected Cell Chisq Row Percent	Voluntary Separation	Involuntary Separation	Total
Reentrant	386 422.9 3.2 89.15	47 10.1 134.5 10.85	433 9.20%
Nonreturner	4212 4175.1 0.3 98.53	63 99.9 13.6 1.47	4275 90.80%
Total	4598 97.66%	110 2.34%	4708 100%

Statistics

Chi-Square	151.628	df = 1	Prob = 0.0001
Contingency Coefficient	0.177		

Table A-6
Operations Technicians
Reentry Decisions by Type of Waiver at Entry

Frequency Expected Cell Chisq Row Percent	None or Favorable	Adverse Waivers	Total
Reentrant	374 407.4 2.7 86.37	59 25.6 43.7 13.63	433 9.20%
Nonreturner	4056 4022.6 0.3 94.88	219 252.4 4.4 5.12	4275 90.80%
Total	4430 94.10%	278 5.10%	4708 100%

Statistics

Chi-Square	51.164	df = 1	Prob = 0.0001
Contingency Coefficient	0.104		

Table A-7
Weapons Technicians
Term-End Decisions by Dependent Categories

Frequency / Expected / Cell Chisq / Row Percent	One Dependent	Two or More Dependents	Total
Stayer *	938 1718.9 354.8 32.63	1937 1156.1 527.5 67.37	2875 25.90%
Leaver **	5698 4917.1 124.0 69.29	2526 3306.9 2184.4 30.71	8224 74.10%
Total	6636 59.79%	4463 40.21%	11099 100%

Statistics

Chi-Square	1190.779	df = 1	Prob = 0.0001
Contingency Coefficient	0.311		

Table A-8
Weapons Technicians
Term-End Decisions by Paygrade at Entry

Frequency / Expected / Cell Chisq / Row Percent	E01-E02	E03	over E03	Total
Stayer *	1466 1934.2 113.3 50.99	1407 928.9 246.1 48.94	2 11.9 8.3 0.07	2875 25.90%
Leaver **	6001 5532.8 39.6 72.97	2179 2657.1 86.0 26.50	44 34.1 2.9 0.54	8224 74.10%
Total	7476 67.28%	3586 32.31%	46 0.41%	11099 100%

Statistics

Chi-Square	496.205	df = 2	Prob = 0.0001
Contingency Coefficient	0.207		

* Stayer information is most recent
** Leaver information is at separation

Table A-9
Weapons Technicians
Reentry Decisions by Type of Previous Separation

Frequency / Expected / Cell Chisq / Row Percent	Voluntary Separation	Involuntary Separation	Total
Reentrant	918	48	966
	953.4	12.6	12.22%
	1.3	99.7	
	95.03	4.97	
Nonreturner	6887	55	6942
	6851.6	90.4	87.78%
	0.2	13.9	
	99.21	0.79	
Total	7805	103	7908
	98.70%	1.30%	100%

Statistics

Chi-Square	115.074	df = 1	Prob = 0.0001
Contingency Coefficient	0.120		

Table A-10
Weapons Technicians
Reentry Decisions by Type of Reenlistment Eligibility

Frequency / Expected / Cell Chisq / Row Percent	Immediately Eligible	Not Immediately Eligible	Total
Reentrant	634	332	966
	794.5	171.5	12.22%
	32.4	150.2	
	65.63	34.37	
Nonreturner	5870	1072	6942
	5709.5	1232.5	87.78%
	4.5	20.9	
	84.56	15.44	
Total	6504	1404	7908
	82.25%	17.75%	100%

Statistics

Chi-Square	208.023	df = 1	Prob = 0.0001
Contingency Coefficient	0.160		

Table A-11
Weapons Technicians
Reentry Decisions by Type of Waiver at Entry

Frequency Expected Cell Chisq Row Percent	None or Favorable	Adverse Waivers	Total
Reentrant	867 895.5 0.9 89.75	99 70.5 11.5 10.25	966 12.22%
Nonreturner	6464 6435.5 0.1 93.11	478 506.5 1.6 6.89	6942 87.78%
Total	7331 92.70%	577 7.30%	7908 100%

Statistics

Chi-Square	14.177	df = 1	Prob = 0.0002
Contingency Coefficient	0.042		

Table A-12
Main Propulsion
Term-End Decisions by Paygrade at Entry

Frequency / Expected / Cell Chisq / Row Percent	E01-E02	E03	over E03	Total
Stayer *	4210 5849.3 298.2 57.24	3129 1834.4 913.6 42.54	16 31.9 7.4 0.22	7355 28.94%
Leaver **	14756 13476.7 121.4 81.72	3029 4503.6 372.1 17.77	92 76.7 3.0 0.51	18057 71.06%
Total	18966 74.62%	6338 24.94%	108 0.42%	25412 100%

Statistics

Chi-Square	1715.822	df = 2	Prob = 0.0001
Contingency Coefficient	0.251		

Table A-13
Main Propulsion
Term-End Decisions by Dependent Categories

Frequency / Expected / Cell Chisq / Row Percent	One Dependent	Two or More Dependents	Total
Stayer *	3598 4685.6 252.4 48.92	3757 2669.4 443.1 51.08	7355 28.94%
Leaver **	12591 11503.4 102.8 69.73	5466 6553.6 180.5 30.27	18057 71.06%
Total	16189 63.71%	9223 36.29%	25412 100%

Statistics

Chi-Square	978.865	df = 1	Prob = 0.0001
Contingency Coefficient	0.193		

* Stayer information is most recent
** Leaver information is at separation

Table A-14
Main Propulsion
Reentry Decisions by Type of Previous Separation

Frequency Expected Cell Chisq Row Percent	Voluntary Separation	Involuntary Separation	Total
Reentrant	2081 2174.9 4.1 93.99	133 39.1 225.1 6.01	2214 13.09%
Nonreturner	14535 14441.1 0.6 98.87	166 259.9 33.9 1.13	14701 86.91%
Total	16616 98.23%	299 1.77%	16915 100%

Statistics

Chi-Square	263.689	df = 1	Prob = 0.0001
Contingency Coefficient	0.124		

Table A-15
Main Propulsion
Reentry Decisions by Type of Reenlistment Eligibility

Frequency Expected Cell Chisq Row Percent	Immediately Eligible	Not Immediately Eligible	Total
Reentrant	1376 1680.5 55.2 62.15	838 533.5 173.8 37.85	2214 13.09%
Nonreturner	11463 11158.5 8.3 77.97	3238 3542.5 26.2 22.03	14701 86.91%
Total	12839 75.90%	4076 24.10%	16915 100%

Statistics

Chi-Square	263.440	df = 1	Prob = 0.0001
Contingency Coefficient	0.124		

Table A-16
Engineering Support
Term-End Decisions by Paygrade at Entry

Frequency Expected Cell Chisq Row Percent	E01-E02	E03	over E03	Total
Stayer *	2289 3299.0 309.2 52.97	2004 997.4 1015.9 46.38	28 24.6 0.5 0.65	4321 19.33%
Leaver **	14775 13765.0 74.1 81.95	3155 4161.6 243.5 17.50	99 102.4 0.1 0.55	18029 80.67%
Total	17064 76.35%	51599 23.08%	127 0.57%	22350 100%

Statistics

Chi-Square	1643.286	df = 2 Prob = 0.0001
Contingency Coefficient	0.262	

Table A-17
Engineering Support
Term-End Decisions by Dependent Categories

Frequency Expected Cell Chisq Row Percent	One Dependent	Two or More Dependents	Total
Stayer *	2008 2766.6 208.0 46.47	2313 1554.4 370.2 53.53	4321 19.33%
Leaver **	12302 11543.4 49.9 68.23	5727 6845.6 88.7 31.77	18029 80.67%
Total	14310 64.03%	8040 35.97%	22350 100%

Statistics

Chi-Square	716.814	df = 1 Prob = 0.0001
Contingency Coefficient	0.176	

* Stayer information is most recent
** Leaver information is at separation

Table A-18
Engineering Support
Reentry Decisions by Type of Previous Separation

Frequency / Expected / Cell Chisq / Row Percent	Voluntary Separation	Involuntary Separation	Total
Reentrant	1730	58	1788
	1769.6	18.4	10.30%
	0.9	84.9	
	96.76	3.24	
Nonreturner	15452	121	15573
	15412.4	160.6	80.70%
	0.1	9.7	
	99.22	0.78	
Total	17182	179	17361
	98.97%	1.03%	100%

Statistics

Chi-Square	95.648	df = 1	Prob = 0.0001
Contingency Coefficient	0.074		

Table A-19
Engineering Support
Reentry Decisions by Type of Reenlistment Eligibility

Frequency / Expected / Cell Chisq / Row Percent	Immediately Eligible	Not Immediately Eligible	Total
Reentrant	1192	596	1788
	1379.1	408.9	10.30%
	25.4	85.6	
	66.67	33.33	
Nonreturner	12199	3374	15573
	12011.9	3561.1	89.70%
	2.9	9.8	
	78.33	21.67	
Total	13391	3970	17361
	77.13%	22.87%	100%

Statistics

Chi-Square	123.787	df = 1	Prob = 0.0001
Contingency Coefficient	0.084		

Table A-20
Combined CREC Groups
Entering From the
Specified Recruiting Area

Frequency Expected Cell Chisq Col Percent	Stayers	Nonreturners	Reentries	Total
North East	3924	9190	794	13908
	4043.4	8811.6	1052.9	
	3.5	16.2	63.7	20.16%
	19.56	21.02	15.20	
South East	3054	4811	906	8771
	2550.0	5557.0	664.0	
	99.6	100.2	88.2	12.71%
	15.22	11.00	17.34	
Mid-Atlantic/ Near-Midwest	4074	9222	1037	14333
	4167.0	9080.9	1085.1	
	2.1	2.2	2.1	20.77%
	20.31	21.09	19.85	
North Central	3020	7246	639	10905
	3170.4	6909.0	825.6	
	7.1	16.4	42.2	15.80%
	15.05	16.57	12.23	
South Central	2449	5414	649	8512
	2474.7	5392.9	644.4	
	0.3	0.1	0.0	12.34%
	12.21	12.38	12.42	
Pacific/Mountain	3540	7835	1199	12574
	3655.6	7966.5	951.9	
	3.7	2.2	64.1	18.22%
	17.65	17.92	22.95	
Total	20061	43718	5224	69003
	29.07%	63.36%	7.57%	100%

Statistics

Chi-Square	513.867	df= 10	Prob=0.0001
Contingency Coefficient	0.086		

Table A-21
Combined CREO Groups
Entering From the
North East Recruiting Area
AREA 1

Frequency Expected Cell Chisq Col Percent	Stayers	Nonreturners	Reentries	Total
Newark	445	1076	80	1601
	451.7	1057.9	91.4	
	0.1	0.3	1.4	11.51%
	11.34	11.71	10.08	
Philadelphia	516	1137	82	1735
	489.5	1146.4	99.1	
	1.4	0.1	2.9	12.47%
	13.15	12.37	10.33	
Portland Manchester Boston	680	1614	141	2435
	687.0	1609.0	139.0	
	0.1	0.0	0.0	17.51%
	17.33	17.56	17.76	
Albany Springfield New Haven	688	1722	110	2520
	711.0	1665.1	143.9	
	0.7	1.9	8.0	18.12%
	17.53	18.74	13.85	
Syracuse Buffalo	692	1457	187	2336
	659.1	1543.6	133.4	
	1.6	4.9	21.6	16.80%
	17.64	15.85	23.55	
Wilkes Barre Harrisburg	320	828	100	1248
	352.1	824.6	71.2	
	2.9	0.0	11.6	8.97%
	8.15	9.01	12.59	
Fort Hamilton	583	1356	94	2033
	573.6	1343.3	116.1	
	0.2	0.1	4.2	14.62%
	14.86	14.76	11.84	
Total	3924	9190	794	13908
	28.21%	66.08%	5.71%	100%

Statistics

CHI-SQUARE 64.135 DF= 12 PROB=0.0001
CONTINGENCY COEFFICIENT 0.068

Table A-22
Combined CREO Groups
Entering From the
South East Recruiting Area
AREA 3

Frequency Expected Cell Chisq Col Percent	Stayers	Nonreturners	Reentries	Total
Atlanta	351	524	88	963
	335.3	528.2	99.5	
	0.7	0.0	1.3	10.98%
	11.49	10.89	9.71	
Fort Jackson	346	486	141	973
	338.8	533.7	100.5	
	0.2	4.3	16.3	11.09%
	11.33	10.10	15.56	
Jacksonville	408	605	148	1161
	404.3	636.8	119.9	
	0.0	1.6	6.6	13.24%
	13.36	12.58	16.34	
Memphis	274	387	82	743
Jackson	258.7	407.5	76.7	
	0.9	1.0	0.4	8.47%
	8.97	8.04	9.05	
Montgomery	410	630	113	1153
	401.5	632.4	119.1	
	0.2	0.0	0.3	13.15%
	13.43	13.09	12.47	
Nashville	314	633	118	1065
Knoxville	370.8	584.2	110.0	
	8.7	4.1	0.6	12.14%
	10.28	13.16	13.02	
Raleigh	409	647	106	1162
Charlotte	404.6	637.4	120.0	
	0.0	0.1	1.6	13.25%
	13.39	13.45	11.70	
San Juan	542	899	110	1551
Coral Gables	540.0	850.7	160.2	
	0.0	2.7	15.7	17.68%
	17.75	18.69	12.14	
Total	3054	4811	906	8771
	34.82%	54.85%	10.33%	100%

Statistics

CHI-SQUARE	67.507	DF= 14	PROB=0.0001
CONTINGENCY COEFFICIENT	0.087		

Table A-23
Combined CPSO Groups
Entering From the
Mid-Atlantic/Near-Midwest Recruiting Area
AREA 4

Frequency Expected Cell Chisq Col Percent	Stayers	Nonreturners	Reentries	Total
Baltimore	509	986	102	1588
	451.4	1021.7	114.9	
	5.2	1.2	1.4	11.08%
	12.27	10.69	9.84	
Cleveland	497	1239	93	1829
	519.9	1176.8	132.3	
	1.0	3.3	11.7	12.76%
	12.20	13.44	8.97	
Cincinnatti Columbus	634	1378	166	2178
	619.1	1401.3	157.6	
	0.4	0.4	0.4	15.20%
	15.56	14.94	16.01	
Louisville Beckley	319	705	101	1125
	319.8	723.8	81.4	
	0.0	0.5	4.7	7.85%
	7.83	7.64	9.74	
Pittsburgh	441	1183	115	1739
	494.3	1118.9	125.8	
	5.7	3.7	0.9	12.13%
	3.08	8.25	0.80	12.13
	10.82	12.83	11.09	
Richmond	294	528	188	1010
	287.1	649.8	73.1	
	0.2	22.8	180.7	7.05%
	7.22	5.73	18.13	
Detroit	1024	2421	183	3628
	1 031.2	2334.3	262.5	
	0.1	3.2	24.1	25.31%
	25.14	26.25	17.65	
Indianapolis	365	782	89	1236
	351.3	795.3	89.4	
	0.5	0.2	0.0	8.62%
	8.96	8.48	8.58	
Total	4074	9222	1037	14333
	28.42%	64.34%	7.24%	100%

Statistics

CHI-SQUARE	272.539	DF= 14	PROB=0.0001
CONTINGENCY COEFFICIENT	0.137		

Table A-24
Combined CREO Groups
Entering From the
North Central Recruiting Area
AREA 5

Frequency Expected Cell Chisq Col Percent	Stayers	Nonreturners	Reentries	Total
Chicago	700	1529	138	2367
	655.5	1572.8	138.7	
	3.0	1.2	0.0	21.71%
	23.18	21.10	21.60	
Kansas City	395	773	106	1274
	352.8	846.5	74.7	
	5.0	6.4	13.2	11.68%
	13.08	10.67	16.59	
Milwaukee	384	1052	69	1505
	416.8	1000.0	88.2	
	2.6	2.7	4.2	13.80%
	12.72	14.52	10.80	
Minneapolis	391	1204	91	1686
	466.9	1120.3	98.8	
	12.3	6.3	0.6	15.46%
	12.95	16.62	14.24	
Fargo Omaha Sioux City Des Moines	623	1571	133	2327
	644.4	1546.2	136.4	
	0.7	0.4	0.1	21.34%
	20.63	21.68	20.81	
St. Louis	527	1117	102	1746
	483.5	1160.2	102.3	
	3.9	1.6	0.0	16.01%
	17.45	15.42	15.96	
Total	3020	7246	639	10905
	27.69%	66.45%	5.86%	100%

Statistics

CHI-SQUARE	64.212	DF= 10	PROB=0.0001
CONTINGENCY COEFFICIENT	0.077		

Table A-25
Combined CPSO Groups
Entering From the
South Central Recruiting Area
AREA 7

Frequency Expected Cell Chisq Col Percent	Stayers	Nonreturners	Reentries	Total
Dallas	417	751	84	1252
	360.2	796.3	95.5	
	9.0	2.6	1.4	14.71%
	17.03	13.87	12.94	
El Paso Amarillo Albequerque	305	791	90	1186
	341.2	754.3	90.4	
	3.8	1.8	0.0	13.93%
	12.45	14.61	13.87	
Houston	288	668	78	1034
	297.5	657.7	78.8	
	0.3	0.2	0.0	12.15%
	11.76	12.34	12.02	
Oklahoma City Little Rock	429	921	99	1449
	416.9	921.6	110.5	
	0.4	0.0	1.2	17.02%
	17.52	17.01	15.25	
San Antonio	340	693	111	1144
	329.1	727.6	87.2	
	0.4	1.6	6.5	13.44%
	13.88	12.80	17.10	
Shreveport New Orleans	230	523	77	830
	238.8	527.9	63.3	
	0.3	0.0	3.0	9.75%
	9.39	9.66	11.86	
Denver	440	1067	110	1617
	465.2	1028.5	123.3	
	1.4	1.4	1.4	19.00%
	17.97	19.71	16.95	
Total	2449	5414	649	8512
	28.77%	63.60%	7.62%	100%

Statistics

CHI-SQUARE 36.628 DF= 12 PROB=0.0003
CONTINGENCY COEFFICIENT 0.065

Table A-26
Combined CPSO Groups
Entering From the
Pacific/Mountain Recruiting Area
AREA 8

Frequency Expected Cell Chisq Col Percent	Stayers	Nonreturners	Reentries	Total
Butte	104	295	22	421
	118.5	262.3	40.1	
	1.8	4.1	8.2	3.35%
	2.94	3.77	1.83	
Los Angeles	1082	2326	199	3607
	1 015.5	2247.6	343.9	
	4.4	2.7	61.1	28.69%
	30.56	29.69	16.60	
Salt Lake City	519	1266	168	1953
Portland	549.8	1216.9	186.2	
Boise	1.7	2.0	1.8	15.53%
	14.66	16.16	14.01	
Spokane	438	1017	191	1646
Seattle	463.4	1025.6	157.0	
Anchorage	1.4	0.1	7.4	13.09%
	12.37	12.98	15.93	
Honolulu	1080	2213	288	3581
Oakland	1 008.2	2231.4	341.5	
Fresno	5.1	0.2	8.4	28.48%
	30.51	28.25	24.02	
San Diego	317	718	331	1366
Phoenix	384.6	851.2	130.3	
	11.9	20.8	309.4	10.86%
	8.95	9.16	27.61	
Total	3540	7835	1199	12574
	28.15%	62.31%	9.54%	100%

Statistics

CHI-SQUARE	452.298	DF= 10	PROB=0.0001
CONTINGENCY COEFFICIENT	0.186		

OTHER TECHNICAL REPORTS OF THIS PROJECT[a]

As part of the project entitled "An Empirical Study to Enhance the Reenlistment Process of Civilian Personnel with Prior Military Service"[b] the following technical reports have been completed.

Stephenson, S. P., Beik, L. L., Ellison, D. R., & Fitch, S. D. Profile of prior-service accessions to the U.S. Navy: Fiscal Years 1973-1981 (Tech. Rep. ONR 83-1). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, April 1983.

Ellison, D. R., Mitchell, M. E., Beik, L. L., Stephenson, S. P., & Fitch, S. D. Separation of prior-service Navy personnel over two- and six-year periods: Fiscal years 1973-1981 (Tech. Rep. ONR 83-2). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, April 1983.

Beik, L. L., Mitchell, M. E., & Fitch, S. D. Segmentation of prior-service reentrants in the U.S. Navy: A preliminary analysis (Tech. Rep. ONR 83-3). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, April 1983.

Beik, L. L., & Fitch, S. D. Prospects for reenlistment of prior-service personnel (Tech. Rep. ONR 84-4). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, February 1984.

Other reports will be completed during the course of the project.

---

[a]Additional copies of these reports can be obtained for a nominal charge. Requests for copies should be sent to:
Research Publications
Institute for Policy Research and Evaluation
The Pennsylvania State University
N253 Burrowes Building
University Park, PA 16802

[b]Office of Naval Research Contract No. N00014-82-K-0262.

Distribution List

Director Technology Programs
Office of Naval Research (Code 200)
Arlington, VA 22217

Director Research Programs
Office of Naval Research (Code 400)
Arlington, VA 22217

Manpower, Personnel and Training
Technology Project Manager
Office of Naval Research (Code 270)
Arlington, VA 22217

Mathematics Group
Office of Naval Research (Code 411MA)
Arlington, VA 22217

Leader Information Sciences Division
Office of Naval Research (Code 433)
Arlington, VA 22217

Associate Director for Life Sciences
Office of Naval Research (Code 440)
Arlington, VA 22217

Engineering Psychology Group
Office of Naval Research (Code 442EP)
Arlington, VA 22217

Organizational Effectiveness Group
Office of Naval Research (Code 4420E)
Arlington, VA 22217

Personnel and Training Group
Office of Naval Research (Code 442PT)
Arlington, VA 22217

Defense Technical Information Center
DTIC/DDA-2
Cameron Station, Building 5
Alexandria, VA 22314

Science and Technology Division
Library of Congress
Washington, DC 20540

Commanding Officer
Naval Research Laboratory
Code 2627
Washington, DC 20375

Psychologist
Office of Naval Research Detachment
1030 East Green Street
Pasadena, CA 91106

Special Assistant for Projects
Office of the Assistant Secretary of
the Navy (Manpower and Reserve Affairs)
5D800, The Pentagon
Washington, DC 20350

Assistant for Long-Range Requirements
CNO Executive Panel (Op-00K)
2000 North Beauregard Street
Alexandria, VA 22311

Head, Manpower, Personnel, Training
and Reserve Team
Office of the CNO (Op-914D)
4A578, The Pentagon
Washington, DC 20350

Assistant for Personnel Logistics Planning
Office of the CNO (Op-987H)
5D772, The Pentagon
Washington, DC 20350

Assistant for Planning and MANTRAPERS
Office of the DCNO(MPT) (Op-01B6)
Department of the Navy
Washington, DC 20370

Assistant for MPT Research, Development
and Studies
Office of the DNCO(MPT) (Op-01B7)
Department of the Navy
Washington, DC 20370

Head, Military Compensation Policy Branch
Office of the DCNO(MPT) (Op-134)
Department of the Navy
Washington, DC 20370

Head, Economics Analysis Branch
Office of the DCNO(MPT) (Op-162)
Department of the Navy
Washington, DC 20370

Head, Workforce Information Section
Office of the DCNO(MPT) (Op-140F)
Department of the Navy
Washington, DC 20350

Head, Family Support Program Branch
Office of the DCNO(MPT) (Op-156)
1300 Wilson Blvd., Rm. 828
Arlington, VA 22209

Headquarters U.S. Marine Corps
Code MPI-20
Washington, DC 20380

Program Manager for Manpower,
Personnel, and Training
Naval Material Command/Office of
Naval Technology (Code 0722)
Arlington, VA 22217

Director, Decision Support Systems Div.
Naval Military Personnel Command (N-164)
Department of the Navy
Washington, DC 20370

Director, Distribution Department
Naval Military Personnel Command (N-4)
Department of the Navy
Washington, DC 20370

Assistant for Evaluation, Analysis, and MIS
Naval Military Personnel Command (N-6C)
Department of the Navy
Washington, DC 20370

Director, Overseas Duty Support Program
Naval Military Personnel Command (N-62)
Department of the Navy
Washington, DC 20370

Head, HRM Operations Branch
Naval Military Personnel Command (N-62F)
Department of the Navy
Washington, DC 20370

Director, Recreational Services Division
Naval Military Personnel Command (N-65)
1300 Wilson Boulevard, Room 998
Arlington, VA 22209

Director, Research and Analysis Division
Navy Recruiting Command (Code 22)
4015 Wilson Boulevard
Arlington, VA 22203

Naval School of Health Sciences
National Naval Medical Center (Bldg. 141)
Washington, DC 20814
Attn: CDR Karen Reider

Leadership Management Education and
Training Project Officer
Naval Medical Command (Code 05C)
Washington, DC 20372

Commanding Officer
Navy Personnel R&D Center
San Diego, CA 92152

Technical Director
NPRDC (Code 01)
San Diego, CA 92152

Deputy Technical Director
NPRDC (Code 01A)
San Diego, CA 92152

Director, Training Laboratory
NPRDC (Code 05)
San Diego, CA 92152

Fleet Support Office
NPRDC (Code 301)
San Diego, CA 92152

Director, Manpower and Personnel Laboratory
NPRDC (Code 06)
San Diego, CA 92152

Director, Human Factors and Organizational
Systems Laboratory
NPRDC (Code 07)
San Diego, CA 92152

Department of Administrative Sciences
Naval Postgraduate School (Code 54Ea)
Monterey, CA 93940

Department of Operations Research
Naval Postgraduate School (Code 55mt)
Monterey, CA 93940

Technical Director
Navy Health Research Center
P. O. Box 85122
San Diego, CA 92138

Principal Civilian Advisor on Education and Training
Naval Education and Training Command
NAS Pensacola, FL 32508

Assistant Chief of Staff for Research,
Development, Test, and Evaluation
Naval Education and Training Command (N-5)
NAS Pensacola, FL 32508

Special Assistant for Research, Experimental Programs, and Academic Programs
Naval Technical Training Command (Code 016)
NAS Memphis (75)
Millington, TN 38054

Program Director
Manpower Research and Advisory Services
Smithsonian Institution
801 North Pitt Street
Alexandria, VA 22314

Military Assistant for Training and Personnel Technology
Office of the Under Secretary of Defense for Research and Engineering
3D129, The Pentagon
Washington, DC 20301

Personnel Analysis Division
AF/MPXA
5C360, The Pentagon
Washington, DC 20330

Technical Director
U.S. Army Research Institute for the Behavioral and Social Sciences
5001 Eisenhower Avenue
Alexandria, VA 22333

Director, Manpower Support and Readiness Program
Center for Naval Analyses
2000 North Beauregard Street
Alexandria, VA 22311

Scientific Advisor to the DCNO(MPT)
Manpower Support and Readiness Program
Center for Naval Analyses
2000 North Beauregard Street
Alexandria, VA 22311

Dr. Irwin Sarason
Department of Psychology, NI-25
University of Washington
Seattle, WA 98195

Dr. Michael Borus
Center for Human Resource Research
The Ohio State University
5701 North High Street
Worthington, OH 43085

Dr. Richard C. Morey
Graduate School of Business Administration
Duke University
Durham, NC 27706

Dr. Eric Flamholtz
Graduate School of Management
UCLA
Los Angeles, CA 90024

Dr. David G. Bowers
Institute for Social Research
University of Michigan
P. O. Box 1248
Ann Arbor, MI 48106

Dr. David Kieras
Department of Psychology
University of Arizona
Tucson, AZ 85721

Dr. R. Darrell Bock
National Opinion Research Center
University of Chicago
6030 South Ellis Avenue
Chicago, IL 60637

Dr. Lawrence R. James
School of Psychology
Georgia Institute of Technology
Atlanta, GA 30332

Dr. John R. Fredericksen
Bolt Beranek & Newman Inc.
50 Moulton Street
Cambridge, MA 02238

Dr. Brian K. Waters
Human Resources Research Organization
1100 South Washington Street
Alexandria, VA 22314

Dr. Lee Roy Beach
Department of Psychology (NI-25)
University of Washington
Seattle, WA 98195

Dr. Cynthia D. Fisher
Texas A&M Research Foundation
Texas A&M University
College Park, TX 77843

Dr. Barbara Means
Human Resources Research Organization
1100 South Washington Street
Alexandria, VA 22314

Dr. Lawrence Goldberg
Economic Research Laboratory
1914 Association Drive
Reston, VA 22091

Officer in Charge
Human Resource Management Detachment
NAS Alameda, CA 94501

Director, Human Resource Management
Training Department
Naval Amphibious School
NAB Coronado, CA 92155

Commanding Officer
Human Resource Management Center
Naval Training Center Building 304
San Diego, CA 92133

Officer in Charge
Human Resource Management Detachment
Naval Submarine Base New London
P. O. Box 81
Groton, CT 06340

Officer in Charge
Human Resource Management Detachment
NAS Mayport, FL 32228

Director, Human Resource Management Department
Naval Aviation Schools Command
NAS Pensacola, FL 32508

Commanding Officer
Human Resource Management Center
Pearl Harbor, HI 96860

CINCPACFLT
Human Resource Management Division
Code 71
Pearl Harbor, HI 96860

Officer in Charge
Human Resource Management Detachment
Naval Base
Charleston, SC 29408

Commanding Officer
Human Resource Management School
NAS Memphis (96)
Millington, TN 38054

Commanding Officer
Human Resource Management Center
1300 Wilson Boulevard, CWB Rm 1148
Arlington, VA 22209

Commanding Officer
Human Resource Management Center
5621-23 Tidewater Drive
Norfolk, VA 23509

Commander in Chief, U.S. Atlantic Fleet
Human Resource Management Division
Code 15
Norfolk, VA 23511

Director, Human Resource Training Department
Naval Amphibious School
NAB Little Creek
Norfolk, VA 23521

Officer in Charge
Human Resource Management Detachment
NAS Whidbey Island
Oak Harbor, WA 98278

Officer in Charge
Human Resource Management Detachment
U.S. Naval Station Rota, Box 41
FPO New York 09540

Officer in Charge
Human Resource Management Detachment
Box 3
FPO New York 09521

Commanding Officer
Human Resource Management Center London
Box 23
FPO New York 09510

Commander in Chief U.S. Naval Force Europe
Human Resource Management Division
FPO New York 09510

Officer in Charge
Human Resource Management Detachment Subic
Box 60
San Francisco, CA 96651

Officer in Charge
Human Resource Management Detachment Yokosuka
P. O. Box 4
Seattle, WA 98762

Dr. H. Wallace Sinaiko
Manpower Research and Advisory Services
Smithsonian Institution
801 N. Pitt Street
Alexandria, VA 22314

Dr. Frank Landy
Department of Psychology
450 Moore Building, PSU
University Park, PA 16802

Dr. James Lester
Organizational Effectiveness Research Group
Office of Naval Research
800 N. Quincy Street
Arlington, VA 22217

Professor George Thomas
Department of Administrative Justice (Code 54TE)
Naval Post Graduate School
Monterey, CA 93940

Technical Director
Office of Naval Research (Code 102)
Arlington, VA 22317

Assistant Secretary of Defense (Manpower,
Reserve Affairs, and Logistics)
U.S. Department of Defense
Washington, DC 20301

Principal Deputy Assistant Secretary of
the Navy (Manpower & Reserve Affairs)
4E780, The Pentagon
Washington, DC 20350

Deputy Assistant Secretary of the Navy
(Manpower)
4E789, The Pentagon
Washington, DC 20350

Deputy Assistant Secretary of the Navy
Civilian Personnel Policy and Equal
Employment Opportunity)
4E77, The Pentagon
Washington, DC 20350

Director, Human Resource Management Division (OP-15)
Office of the Deputy Chief of Naval Operations
(Manpower, Personnel and Training)
Department of the Navy
Washington, DC 20350

Director
Training Analysis & Evaluation Group
Department of the Navy
Orlando, FL 32813

Commanding Officer
Naval Training Equipment Center
Orlando, FL 32813

Library
Naval War College
Newport, RI 02940

Mr. Philip Bernard
B-K Dynamics, Inc.
15825 Shady Grove Road
Rockville, MD 20850

Dr. Bruce M. Meglino
College of Business Administration
University of South Carolina
Columbia, SC 29208

Defense Manpower Data Center
Market Research Branch
300 North Washington Street
Alexandria, VA 22314

Dr. Gerald Thompson
Graduate School of Industrial Administration
Carnegie-Mellon University
Pittsburgh, PA 15213

Dr. Richard Hatch
Decision Systems Associates, Inc.
350 Fortune Terrace
Rockville, MD 20854

Mr. Ladd Greeno
A. D. Little, Inc.
Acorn Park, Building 35
Cambridge, MA 02140

Dr. Friedrich W. Steege
Deputy Chief, Psychological Services
of the Federal Armed Forces
Ministry of Defense/P II 4
Postfach 13 28
D-5300 Bonn 1, FRG