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**A DIGEST OF RETENTION TERMS: DEFINITION
AND HISTORICAL VALUES**

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**NAVY PERSONNEL RESEARCH
AND
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San Diego, California 92152**



**A DIGEST OF RETENTION TERMS: DEFINITION AND
HISTORICAL VALUES**

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The large number of concepts and terms used in retention research leads to apparent contradictions among findings and an inability to corroborate findings. Thus, to aid future researchers in personnel retention, a set of terms has been identified. For these terms, the following were provided: Definition, reference material, mathematical formula (if applicable), and historical values (if available).		

FOREWORD

The effort was performed under exploratory development task area ZF63-521-001-010 (Retention Planning Models) and was sponsored by the Chief of Naval Operations (OP-13). The objective of this task area is to develop a set of quantitative tools to enable planners to estimate retention rates for specific categories of individuals in the Navy's enlisted force. The main effort in FY82 is directed toward (1) identifying various terms used in retention research, and (2) developing suitable data sources. This report concerns the identification of terms, which is prerequisite to the data search. It is intended for use by anyone doing research in military, particularly Navy, personnel retention, providing a handy reference for comparing retention terms.

Acknowledgments are due to Mr. Demsko, Naval Military Personnel Command (165F) for providing information on Navy military personnel statistics; LCDR O'Brien, Chief of Naval Operations (OP-135K), for providing information on various terms; Mr. Brandiewie, Defense Manpower Data Center, for providing data used in some of the series, and the individual authors, for classification of terms used in their research.

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SUMMARY

Problem

A recurring problem in the large body of research on measuring, forecasting, and achieving required retention levels is the imprecise or incomplete definition of associated terminology. This is, in part, due to the large number of terms and procedures being used to compute the various reenlistment or retention rates. As a result, findings appear to be contradictory and difficult or impossible to corroborate or relate.

Objective

The object of this effort was to provide a coherent, cohesive set of definitions for terms used in retention research.

Approach

Researchers reviewed recent research in the area of retention, analyzed official statistics, and interviewed other researchers concerned with retention. For relevant terms, the following were provided: definition, reference material, mathematical formula (if applicable), and historical values (if available).

Results

Data were provided for 41 retention terms (Appendix A). Of these, 11 (27%) pertain to reenlistment rates; and 3, to retention rates. In some cases, retention rates are called reenlistment rates, and vice versa.

Conclusions

1. Reenlistment and retention rates are often used interchangeably. The basic difference between the two rates is the inclusion of those ineligible to reenlist. All of the retention rates examined herein include those ineligible to reenlist in their calculations, while virtually all reenlistment rates exclude them or if they are included they appear only if the individual subsequently reenlists.

2. Among the reenlistment rates, some are uniformly higher than others. Unfortunately, it is possible for some rates to be larger than 100 percent. If the number of ineligible who reenlist is significantly large, their inclusion in the numerator and exclusion in the denominator of these rates will produce a larger than 100 percent reenlistment rate.

3. Analysis of survival rates appears promising. Unlike retention rates, the possibility for arbitrariness in computational procedures is less, and misleading conclusions in the analysis (e.g., pay elasticities) are less likely.

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INTRODUCTION

Problem

A recurring problem in the large body of research on measuring, forecasting, and achieving required retention levels is the imprecise or incomplete definition of associated terminology. This is, in part, due to the large number of concepts and procedures being used to compute the various retention or reenlistment rates. As a result, findings appear to be contradictory and difficult or impossible to corroborate or relate.

Objective

The object of this effort was to provide a coherent, cohesive set of definitions of concepts used in retention research.

APPROACH

Because of the large number of terms used in retention research, this effort was limited to those used in the all-volunteer force (AVF) era. To identify these terms, researchers reviewed relevant research conducted during this era, analyzed publications providing official Navy military statistics, and interviewed other researchers concerned with enlisted personnel retention. For relevant terms identified, the following data were provided:

1. Definitions extracted from relevant publications or provided by cognizant researchers.
2. A listing of reference material.
3. Mathematical formulas were included to facilitate in corroborating findings between studies and provide some idea of the magnitude of the quantities involved in calculating the rate.
4. Where possible, historical values were derived, primarily from official year-end Navy statistics documented in NAVPERS 15658(A), The Annual Report--Navy Military Personnel Statistics, and graphed.

RESULTS AND CONCLUSIONS

A digest of 41 retention terms is provided in the appendix. As shown in Table 1, which lists the terms generically, 11 of the 41 terms (27%) pertain to reenlistment rates; and 3, to retention rates. In some cases, retention rates are called reenlistment rates and vice versa.

The historical values for the various reenlistment rates included in the digest show that those computed using the formula for the Kleinman/Shughart (K/S) first-term reenlistment rate (Kleinman & Shughart, 1974) (#29) are higher than those computed for any other reenlistment rate. Moreover, when compared to the values for the adjusted reenlistment rate (NMPC) (#24), which are the next highest, it appears that those for the K/S rate are considerably higher in the last 5 years. This is because extensions of 24 months or more are included in the denominator of the NMPC rate and not in that of the K/S rate. The increase in extensions of 24 months or more in the last 5 years further

Table 1
Retention Terms

Term	Originating Organization	Reference Material
1. Attrition	Naval Mil. Pers. Com. (NMPC)	NAVPERS 15658(A)
2. Attrition to civilian life	NMPC	NAVPERS 15658(A)
3. Attrition rate, cohort	Department of Defense (DoD)	Foch and King, 1977
4. Attrition rate, first term	Chief of Naval Operations (OP-135)	Personal communication
5. Continuance rate		Elandt-Johnson, 1980
6. Continuation rate, RAM I	NAVPERSRANDCEN	Chipman and Silverman, 1978
7. Count figure of merit	Bureau of Naval Personnel	Grace, 1974
8. Deserter, declared	NMPC	NAVPERS 15560
9. Discharge, bad conduct	NMPC	NAVPERS 15560
10. Discharge, dishonorable	NMPC	NAVPERS 15560
11. Discharge, general	NMPC	NAVPERS 15560
12. Discharge, honorable	NMPC	NAVPERS 15560
13. Discharge, other than honorable	NMPC	NAVPERS 15560
14. End of active obligated service (EAOS)	NMPC	NAVPERS 15642
15. Enlistment, cancellation of illegal	NMPC	NAVPERS 15560
16. Extension	NMPC	NAVPERS 15560
17. Extension, bonus	NMPC	NAVPERS 15560
18. First term	NMPC	NAVPERS 15658(A)
19. Layoff rate	Department of Labor (DoL)	DoL, 1982
20. Quit rate	DoL	DoL, 1982
21. Reenlistment	NMPC	NAVPERS 15658(A)
22. Reenlistment, broken service	NMPC	NAVPERS 15560
23. Reenlistment, continuous service	NMPC	NAVPERS 15560
24. Reenlistment rate, adjusted	NMPC	NAVPERS 15658(A)
25. Reenlistment rate, adjusted (early)	Department of Navy (DoN)	OSN, 1966
26. Reenlistment rate, adjusted for extensions	DoD	Grace, 1974
27. Reenlistment rate, Enns Model I	Rand	Enns, 1977
28. Reenlistment rate, Enns Model II	Rand	Enns, 1977
29. Reenlistment rate, first-term (Kleinman/Shughart)	Center for Naval Analyses (CNA)	Kleinman and Shughart, 1974
30. Reenlistment rate (4YO formula)	Navy (OP-136)	Grace, 1974
31. Reenlistment rate (4YO and 6YO formula)	Navy (OP-136)	Grace, 1974
32. Reenlistment rate, net	DoD	Rueter, 1979
33. Reenlistment (retention) rate, PVCOL, ACOL, and SCOL models	CNA	Warner, 1978, 1979, 1981
34. Reenlistment rate, unadjusted	NMPC	NAVPERS 15658(A)
35. Retention rate, adjusted	NMPC	NAVPERS 15658(A)
36. Retention rate, RAM II and III	NAVPERSRANDCEN	Chipman and Mumm, 1978
37. Retention rate, unadjusted	NMPC	NAVPERS 15658(A)
38. Separation rate, other	DoL	DoL, 1982
39. Separation rate, total	DoL	DoL, 1982
40. Survival rate	--	Gotz and McCall, 1980
41. Survival rate, cumulative	--	Lee, 1980

exacerbated the divergence. NMPC's adjusted and unadjusted reenlistment rates (#24 and 34) are obviously highly correlated and track each other. Also, unlike the previous comparison, these NMPC rates have converged in the last 5 years.

The two earlier Navy reenlistment rates, the 4YO formula and the 4YO and 6YO formula (#30 and 31), when applied to data from FY 72 to FY 81, yield values that are significantly lower than many of the other reenlistment rates. In fact, the overall reenlistment rate from either the 4YO or 4YO/6YO formula is lower than the first-term reenlistment rate of several of the other rates. Comparing the 4YO and 6YO formula to the "modern" PVCOL, ACOL, SCOL reenlistment rate (Warner) (#33) reveals a remarkable similarity in spite of their vastly different definitions and dates of application. One could argue that the Warner rate should mimic the continuous service reenlistments (NMPC) (#23). In fact, in the case of overall numbers and rates, the two are indeed alike, save a constant of proportionality.

The difference between the NMPC retention and reenlistment rates is quite small. The difference is the inclusion of ineligible in the denominator of retention rates. In light of the fact that some reenlistment rates, like the 4YO formula, include ineligible, the adjusted and unadjusted retention rates (#35 and 37) are really reenlistment rates. Moreover, since ineligibles who enlist are included in the numerator of all reenlistment rates, it is possible for reenlistment rates to exceed 100 percent. In the case of the net reenlistment rate (DoD) (#32), values larger than 100 percent have occurred.

The Warner rate, which the Director of the Defense Manpower Data Center (DMDC)¹ chooses to call a retention rate, is possibly the only retention rate in the digest. DMDC defines this rate as the proportion of enlisted personnel in a LOS interval who have less than 13 months to go on their enlistment contracts at the start of the fiscal year who remain in the Navy at the end of the year. Eligibility criteria are largely ignored and rates from LOS 1 to LOS 29 are produced. At the end of LOS 4, then, DMDC's retention rate could also be a reenlistment rate. Of course, not all reenlist, some extend, and extensions for 24 months or more are counted in other reenlistment rates.

There are other measures of retention, such as continuation and survival rates. Chipman and Silverman, for example, use continuation rates in their RAM I model (#6). A problem with continuation rates is the time when the count in the following year is made. If the number of personnel who continue from year t into year $t+1$ is counted and their survivability in year $t+1$ is ignored, the continuation rate will be overestimated. Remedies to this problem, such as the calculation of man-months, ignore the noncomparability between 12 men who stay 1 month each for a total of 12 man-months and 1 man who stays 12 months. Another problem with continuation rates is that the personnel in year $t+1$ are not necessarily the same personnel in year t . Personnel who do not have the required LOS due to time lost in say, disciplinary hold, can suddenly show up in year $t+1$.

Although survival rates have been used for a number of years in biostatistical and medical research, they are relatively new to the social sciences. In estimating the effects of certain variables on survivability, or the survival rate in the military, one must address the issue of heterogeneity vs. state dependence. It is well known that survivability or any other measure, such as retention rates, rise with LOS. In fact, attrition is highest in the first few months of military service, and first-term reenlistments are lower than at subsequent reenlistment points. This rise in survival or retention rates may be the result

¹Personal communication with R. Brandiewie, DMDC, March 1982.

of two processes. First, enlisted personnel may become better able to adapt to Navy life. Second, as time passes, civilian opportunities may deteriorate as firms substitute less costly labor for the high wages commanded by senior enlisted personnel.

Operating simultaneously is a nonbehavioral force that also causes the probability of surviving to rise. If enlisted personnel have different but constant separation probabilities, then those with low probabilities of survival (high probabilities of leaving) will be the first to leave, resulting in a population with progressively higher average probabilities of survival (lower average probabilities of leaving). While each enlisted person in this example would maintain his/her unchanging survival probability, the population would be successively censored to produce the characteristic rising rate.

While these two effects are probably both operating simultaneously, the measurement of their relative contribution is important from an interpretive viewpoint, especially since many personnel variables tend to trend over time as LOS increases. For example, military pay and the number of dependents increase as LOS increases. If the constant-separation probability model is correct, then LOS may simply be a proxy variable for real structural effects (i.e., number of dependents). Its presence in an empirical model of survival rates would then be inappropriate since it is simply a highly collinear correlate of the real structural effect. Alternatively, if heterogeneity is unimportant, then LOS measures the real effect in that the longer each enlisted person remains in the Navy, the more likely that he/she will stay.

Currently, the analysis of survival probabilities is most promising. The probability that a particular enlisted person will survive to time t is not subject to a researcher's choice of which "retention" rate to use but, rather, is based upon standard actuarial procedures. As has been demonstrated, such a choice can have a significant impact on the analysis and its results. In addition, the availability of "better" data lends itself to survival analysis. Finally, the effects of heterogeneity and duration (state dependence) can be quantified.

RECOMMENDATIONS

It is recommended that continuation and survival rates be used in retention research for the following reasons:

1. Since some retention and reenlistment rates include only extensions of 24 months or longer, those who extend for shorter lengths of time, which may be more widespread, are not included in any of the retention or reenlistment rates.
2. Techniques and data are now available to analyze continuation and survival rates over the enlisted person's entire career as opposed to one period in his/her career.
3. The issue of heterogeneity vs. state dependence can only be addressed using models with variables that vary over time.

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APPENDIX
DIGEST OF RETENTION TERMS

April 1983

DIGEST OF RETENTION TERMS

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DIGEST OF RETENTION TERMS

1. Attrition (Naval Military Personnel Command (NMPC)).

a. Definition. Attrition is defined as the quarterly or yearly sum of the number of enlisted personnel lost due to discharge, release from active duty, intra-Navy transfers, other service academies, cancellation of illegal enlistment, declared desertion, and death. This sum is the total of all personnel with 8XX or 9XX loss codes.

b. Reference. Naval Military Personnel Command. Annual report--Navy military personnel statistics (NAVPERS 15658(A)). Washington, DC: Government Printing Office, June 1972-September 1981.

c. Mathematical formula. Attrition = A + B + C + D + E + F + G, where

A = Number of discharges.

B = Number of releases from active duty.

C = Number of intra-Navy transfers.

D = Number of losses to other service academies.

E = Number of cancellations of illegal enlistments.

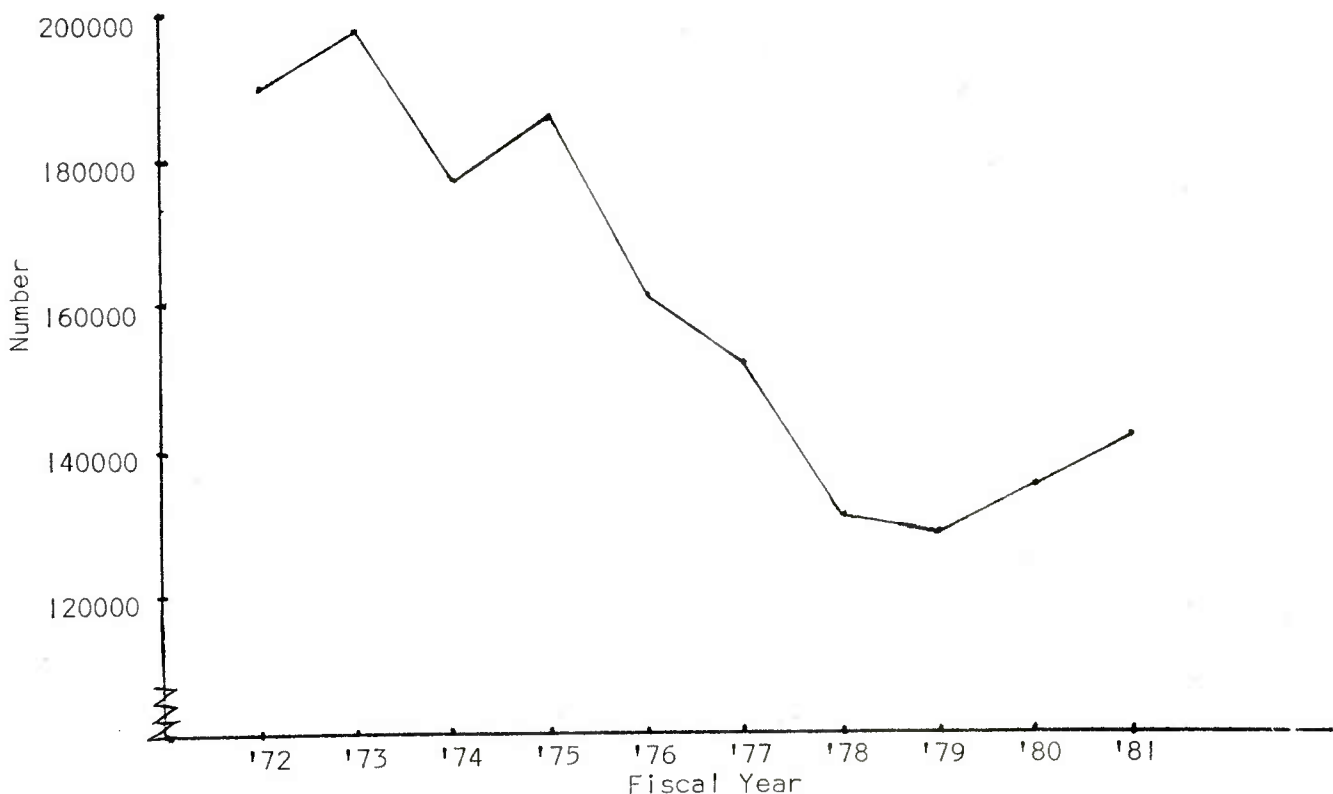
F = Number of declared desertions.

G = Number of deaths.

Thus, if the letters above are substituted for FY80 attrition data (NAVPERS 15658(A)), the following is obtained:

$$\text{FY 1980 attrition} = \underset{(A)}{73,616} + \underset{(B)}{49,230} + \underset{(C)}{1,584} + \underset{(D)}{0} + \underset{(E)}{0} + \underset{(F)}{12,462} + \underset{(G)}{601} = 137,493.$$

d. Historical values. Attrition data for FY72-81 (NAVPERS 15658(A)) are plotted below.



2. Attrition to civilian life (NMPC)

a. Definition. Attrition to civilian life is equal to attrition less those who reenlist within 24 hours of being discharged (gain codes 130 and 131), who are discharged from the Navy reserve because they have enlisted in the regular Navy (loss codes 806 and 846), who receive intra-Navy transfers (loss codes 807, 808, 954, 955, 956, 957, 958, 959, 961), who leave for the other service academies (loss code 960), and who die while on active duty (loss code 952). Extenders (see p. A-12) of 24 months or more are not included.

b. Reference. Naval Military Personnel Command. Annual report--Navy military personnel statistics (NAVPERS 15658(A)). Washington, DC: Government Printing Office, June 1972-September 1981.

c. Mathematical formula. Attrition to civilian life = Attrition - A - B - C - D - E, where

A = Number of reenlistments within 24 hours of discharge.

B = Number of discharges from the Navy reserve for enlistment in the regular Navy.

C = Number of intra-Navy transfers.

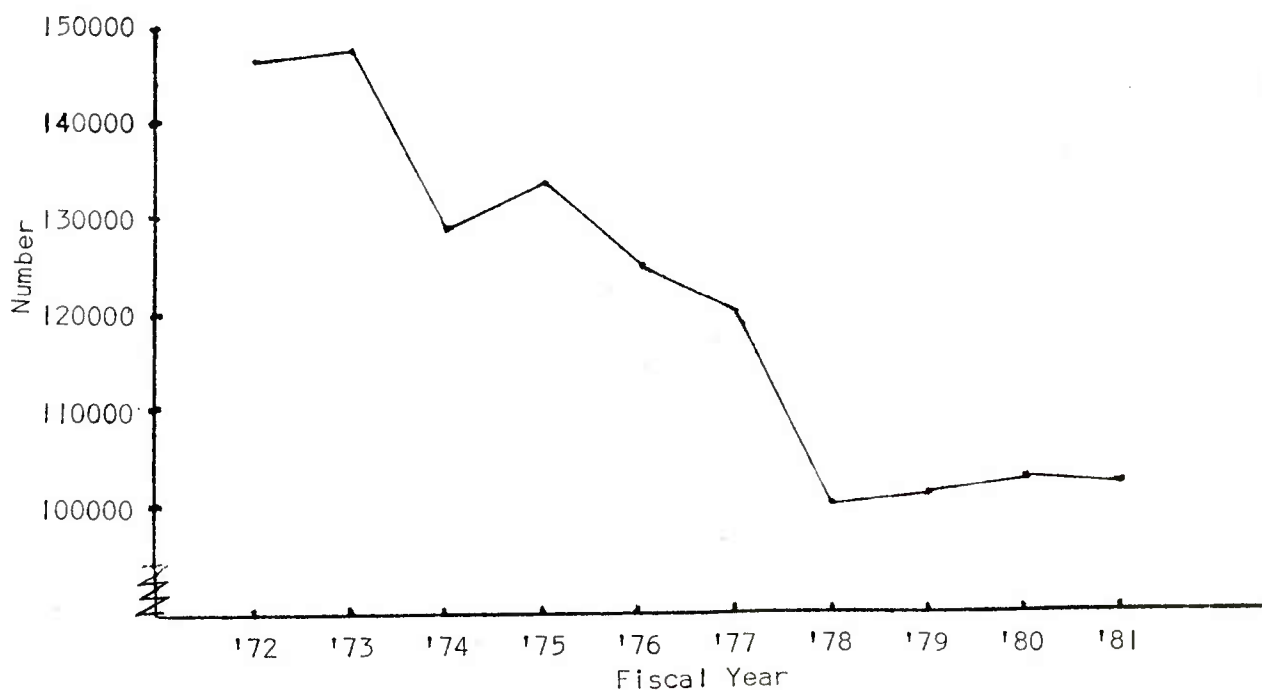
D = Number of losses to the other service academies.

E = Number of deaths.

Thus, if the letters above are substituted with FY80 attrition data (NAVPERS 15658(A)), the following is obtained:

$$\begin{array}{ccccccc} \text{Attrition to civilian life} & = & 137,493 & - & 29,644 & - & 1,220 & - & 1,584 & - & 0 & - & 601 & = & 104,444. \\ & & (\text{FY80} & & (\text{A}) & & (\text{B}) & & (\text{C}) & & (\text{D}) & & (\text{E}) & & \\ & & \text{attrition}) & & & & & & & & & & & & \end{array}$$

d. Historical values. Attrition to civilian life data for FY72-81 (NAVPERS 15658(A)) are plotted below.



3. Attrition rate, cohort (DoD)

a. Definition. The cohort attrition rate is determined by dividing the number of contractual active duty obligations initiated in a given time period who do not satisfy their obligation by the number of contractual active duty obligations initiated in a given time period. The numerator is comprised of enlisted personnel with the following loss codes: 804, 805, 813-815, 817, 818, 824, 825, 830-832, 844, 845, 853-855, 857, 858, 864, 865, 870, 871, 881, 882, 887-889, 901, 902, 911, 944, 952. Individuals are tracked and figures gathered at the 36th month of their enlistment. The denominator is comprised of the number of personnel who are enlisted during the fiscal year. For example, the FY77 accession cohort is comprised of all enlisted personnel who began their active duty obligation during FY77.

In this case, attrition is defined as separation prior to the completion of the contractual active duty obligation due to: (1) clearly unavoidable reasons (e.g., death, disability), (2) attributes for which the member may separate at his/her own initiative (e.g., pregnancy), and (3) poor job performance, unfit social behavior, or unacceptable military standards (e.g., sexual perversion).

b. Reference. Foch, C. and King, N., "The gatekeepers: First-term enlisted attrition policies and practices," First Term Enlisted Attrition, W. Sinaiko (ed.), Office of Naval Research, June 1977.

c. Mathematical formula. Cohort Attrition Rate = A/B, where

A = Number of contractual active duty obligations initiated in a given time period who do not satisfy their obligation.

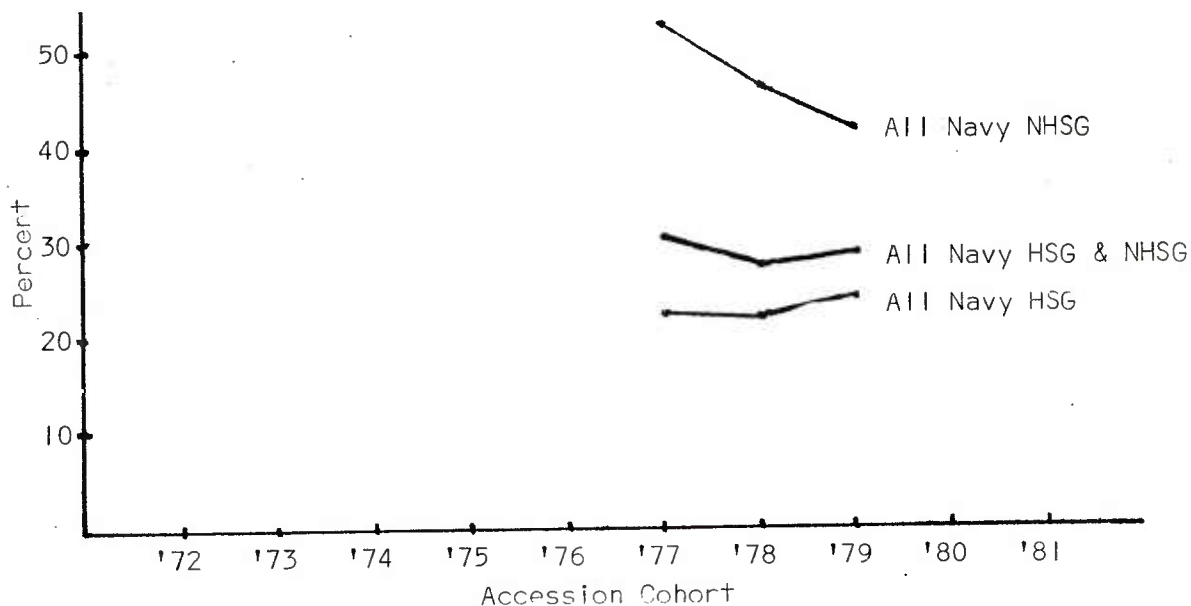
B = Number of contractual active duty obligations initiated in a given time period.

Thus, if the letters above are substituted with FY 1977 data (obtained from OP-135K), the following is obtained:

$$\text{FY77 Cohort Attrition Rate} = \frac{30,801}{101,573} = .30.$$

(A) (B)

d. Historical values. Cohort attrition rates (high school graduates (HSG) and non-high school graduates (NHSG)) for FY77-79 (obtained from OP-135K) are plotted below.



4. Attrition Rate, first-term (Chief of Naval Operations) (OP-135))

a. Definition. The first-term attrition rate is determined by dividing all first-term attrites (those whose loss/gain codes are 804, 805, 807, 808, 813, 814, 815, 817, 818, 824, 825, 830-832, 844, 845, 853-855, 857, 858, 864, 865, 870, 871, 881, 882, 887-889, 901, 902, 911, 933, 944, 952, 954-961) by average Navy first-term strength. That is, for an annual fiscal year end first-term attrition rate, the denominator is the sum of that fiscal year's monthly first-term strengths divided by 12.

b. Reference. LCDR O'Brien at CNO (OP-135) provided this definition.

c. Mathematical formula. The first-term attrition rate = A/B, where

A = Number of first-term attrites.

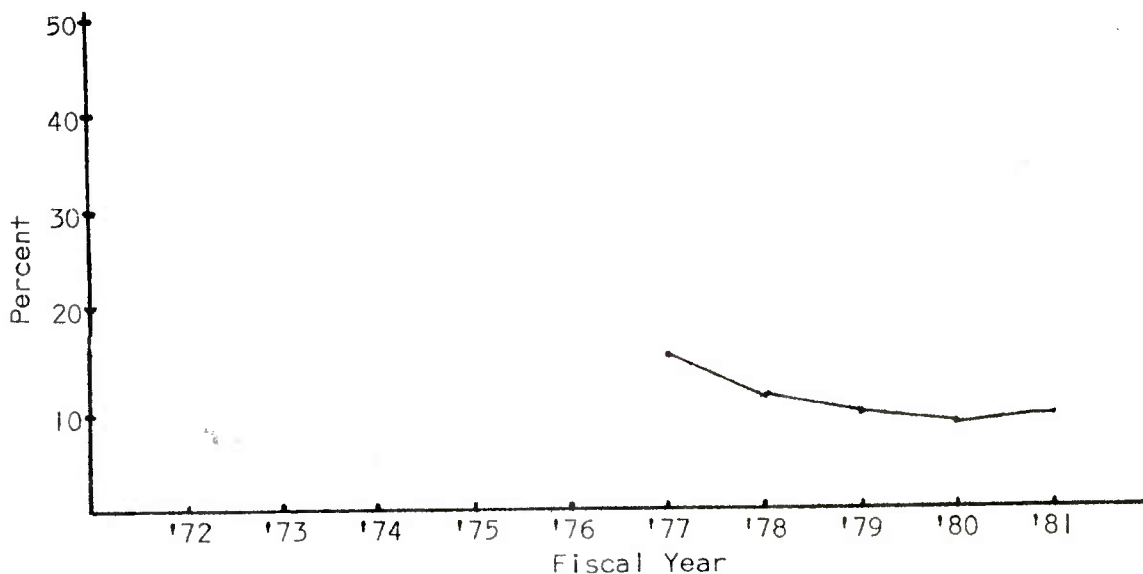
B = Average Navy first-term strength.

Thus, if the above letters are substituted with FY81 data (obtained from OP-135), the following is obtained:

$$\text{FY81 first-term attrition rate} = \frac{27,874}{269,366} = .10.$$

(A) (B)

d. Historical values. First-term attrition rates for FY77-81 (obtained from OP-135) are plotted below.



5. Continuance Rate

a. Definition. The continuance rate is the conditional probability an individual will "die" in an interval of time given he is "alive" at the start of the interval. A number of estimates have been proposed, including the actuarial estimate, and those developed by Chiang, Elveback, Elandt-Johnson, and others.

b. Reference. Elandt-Johnson, R. Survival models and data analysis. New York: John Wiley and Sons, Inc., 1980.

6. Continuation rate, RAM I (Navy Personnel Research and Development Center).

a. Definition. The RAM I continuation rate is determined by dividing the number of personnel in length of service (LOS) $j + 1$ in year $t + 1$ divided by the number of personnel in LOS j in year t . This term, which was defined by Chipman and Silverman (1978) for use in their RAM I model, measures the proportion of personnel in LOS cell j who continue serving 1 year later.

b. Reference. Chipman, M. and Silverman, J. Analysis of alternative military retirement policies: An approach with some results (NPRDC Tech. Note 78-8) San Diego, CA: Navy Personnel Research and Development Center, April 1978.

c. Mathematical formula. RAM I continuation rate = $N_{j+1}(t+1)/N_j(t)$,
where

$N_{j+1}(t+1)$ = Number of personnel in LOS cell $j + 1$ in year $t + 1$.

$N_j(t)$ = Number of personnel in LOS cell j in year t .

7. Count figure of merit (Bureau of Naval Personnel)

a. The count figure of merit is determined by dividing the number of personnel who reenlist (gain codes 130, 131, 140, 141, 150, 151) by the number who are eligible to reenlist. Reenlistees sign a formal and official agreement to serve an additional time period greater than "X" days. Persons are eligible to reenlist if they are recommended by their commanding officer or the review board, and have the proper loss/gain change code. The number of those who are eligible to reenlist is the sum of all enlisted personnel with the following change codes: 801-803, 806, 809, 811, 816, 833, 841-843, 846, 849, 850, 856, 931, 932, 942, 943, 980. This term was used in 1974, but its current status is unknown.

b. Reference. Grace, G.L. "Techniques for increasing retention of Navy enlisted personnel," Defense Manpower Policy (R-2396-ARPA), R. Cooper (ed.), Santa Monica, CA: The Rand Corporation, December 1974.

c. Mathematical formula. Count figure of merit = A/B , where

A = Number reenlisted.

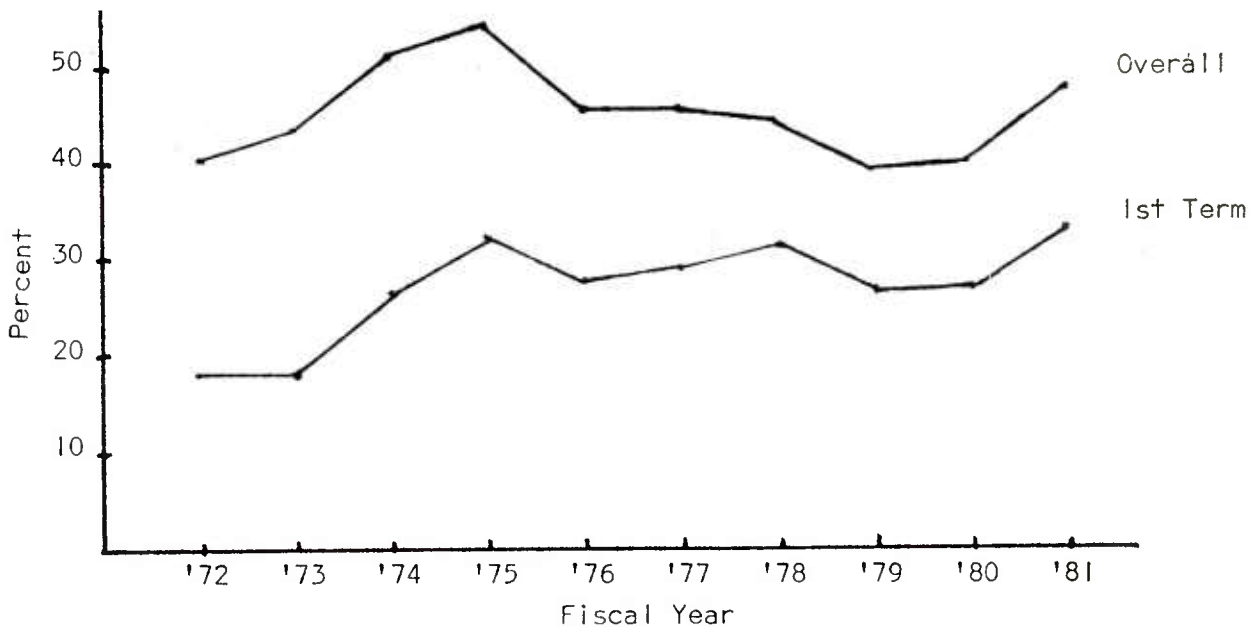
B = Number eligible to reenlist.

Thus, if the letters above are substituted with FY80 data (NAVPERS 15658(A)), the following is obtained:

$$\text{Count figure of merit} = \frac{29,728}{74,423} = .40.$$

(A) (B)

d. Historical values. The count figure of merit data for FY72-81 (NAVPERS 15658(A)) are plotted below.

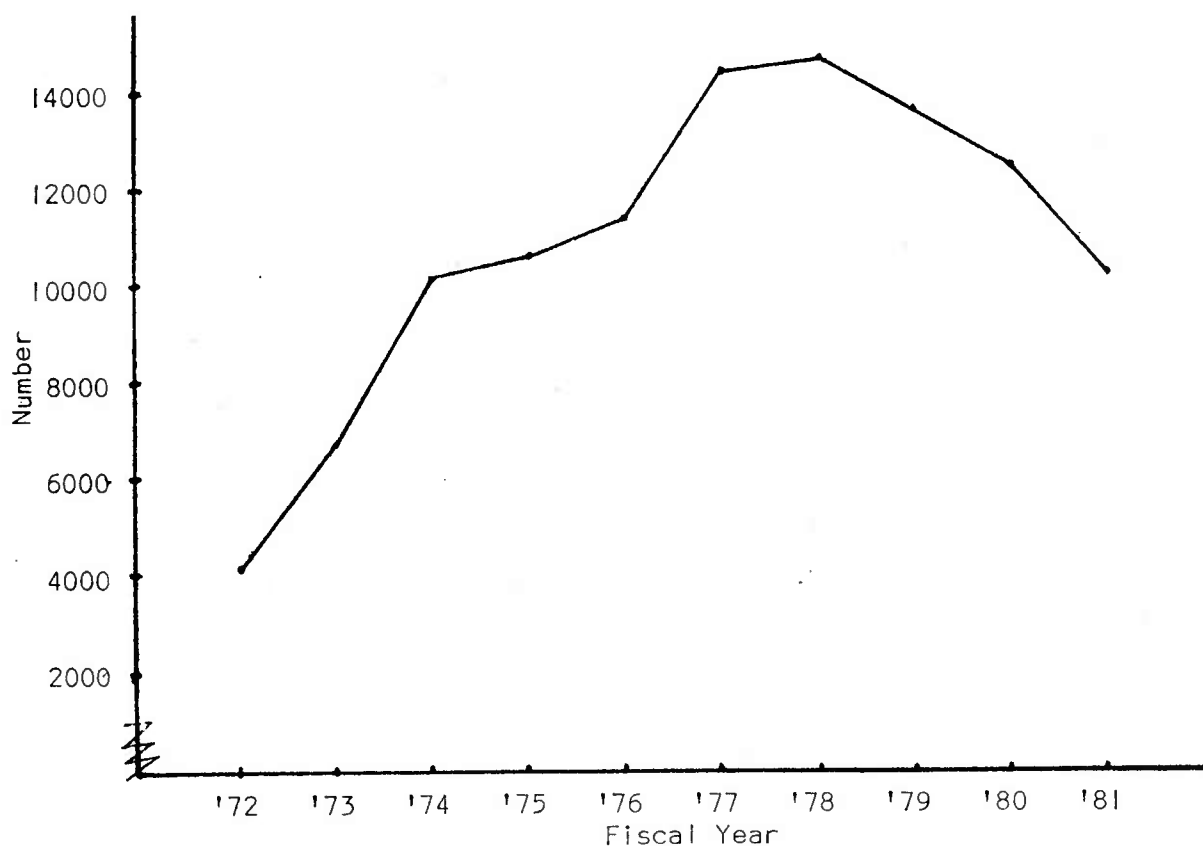


8. Deserter, declared (NMPC).

a. Definition. A declared deserter is one who is absent without leave (AWOL) for 30 days or more, has gone to or has shown intention of going to a foreign country and seeking asylum, or has committed the offense of desertion, as defined by Article 85 of the Uniform Code of Military Service. A declared deserter has a 951 loss code.

b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981.

c. Historical values. The numbers of declared deserters for FY72-81 (NAVPERS 15658(A)) are plotted below.

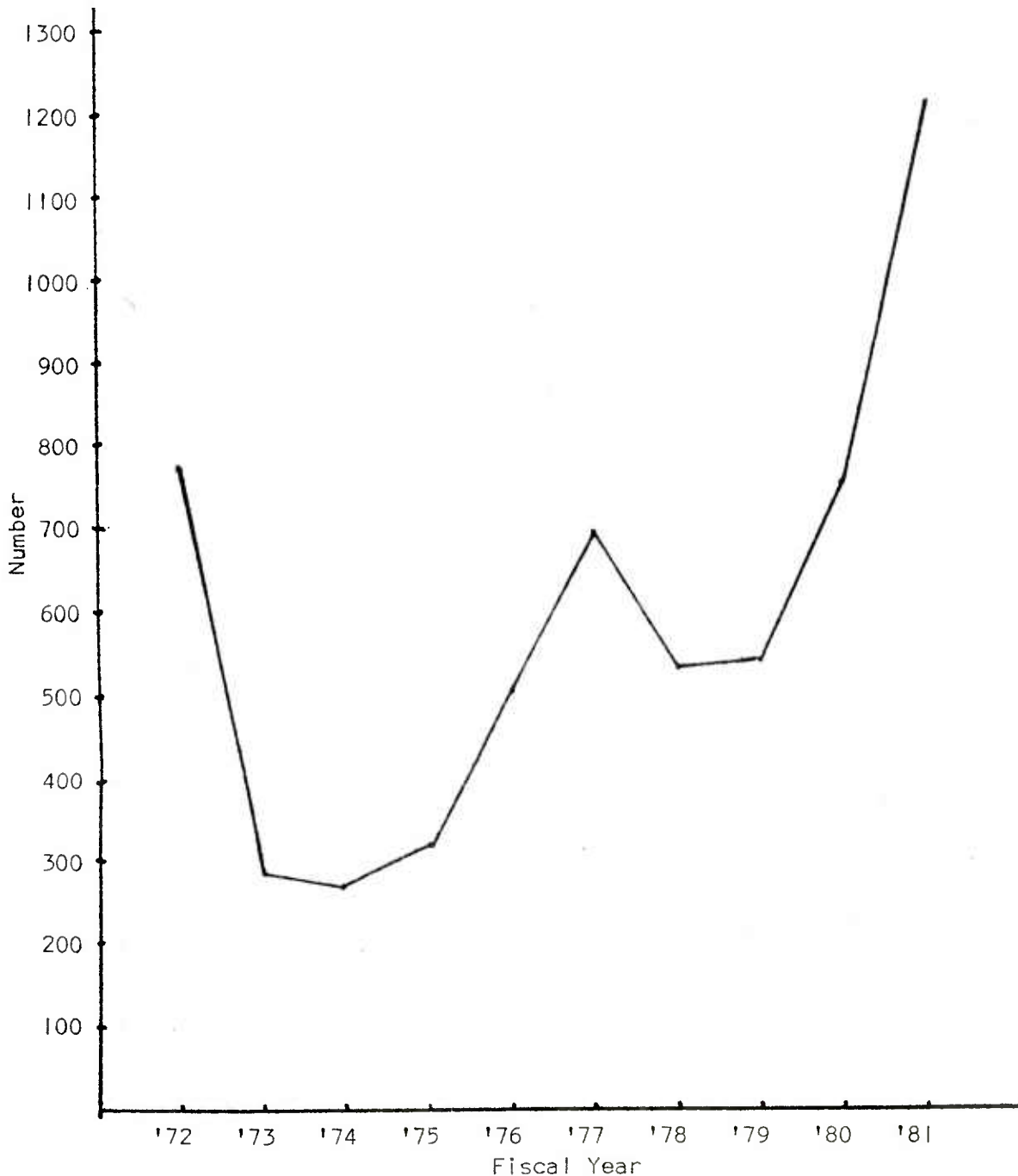


9. Discharge, bad conduct (NMPC).

a. Definition. A bad conduct discharge is one resulting from an unfavorable sentence at a special or general court martial. Individuals with 901 or 902 loss codes are bad conduct discharges.

b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981.

c. Historical values. The number of bad conduct discharges for FY72-81 (NAVPERS 15658(A)) are plotted below.

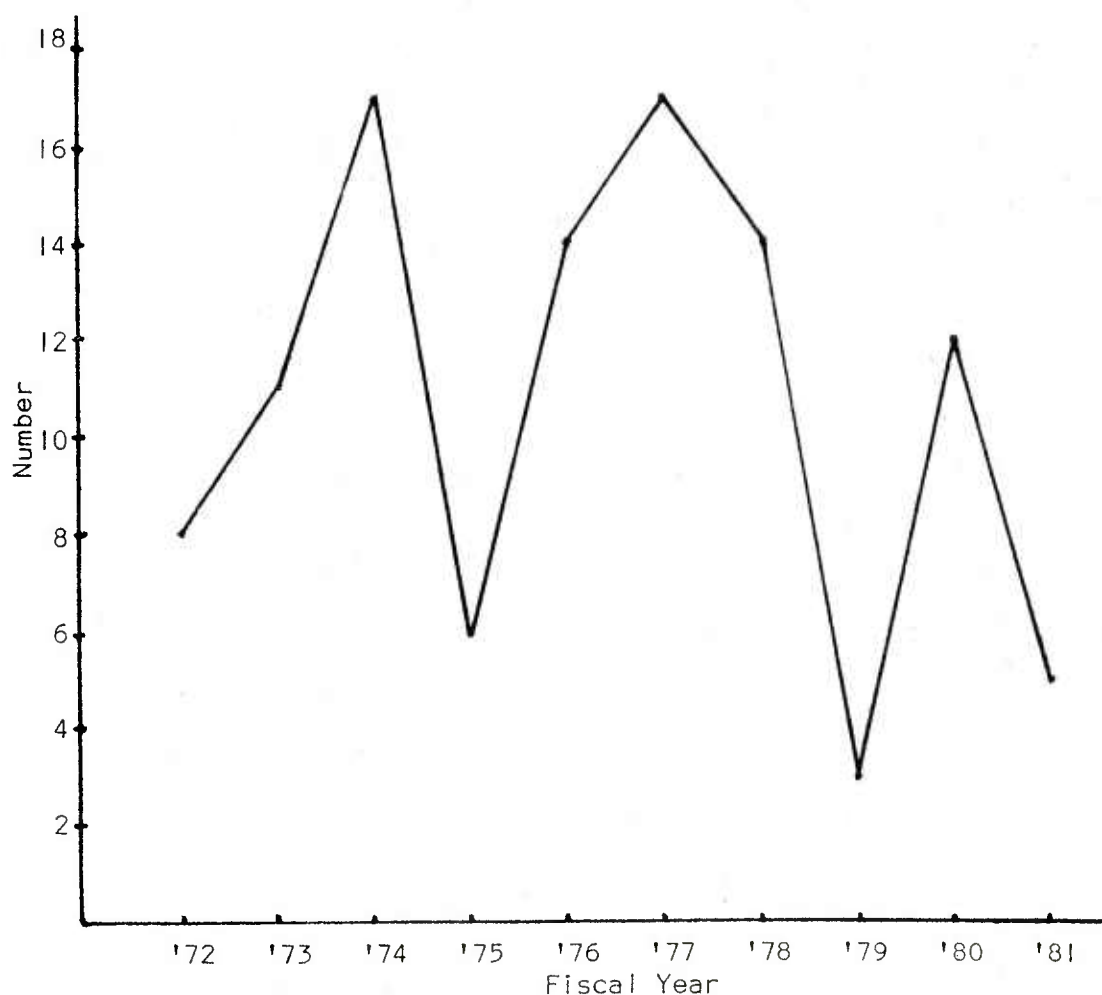


10. Discharge, dishonorable (NMPC).

a. Definition. A dishonorable discharge results from an unfavorable sentence in a general court martial. Dishonorable discharges are the worst kind of discharges and have a 911 loss code.

b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981.

c. Historical values. The numbers of dishonorable discharges for FY72-81 (NAVPERS 15658(A)) are plotted below.

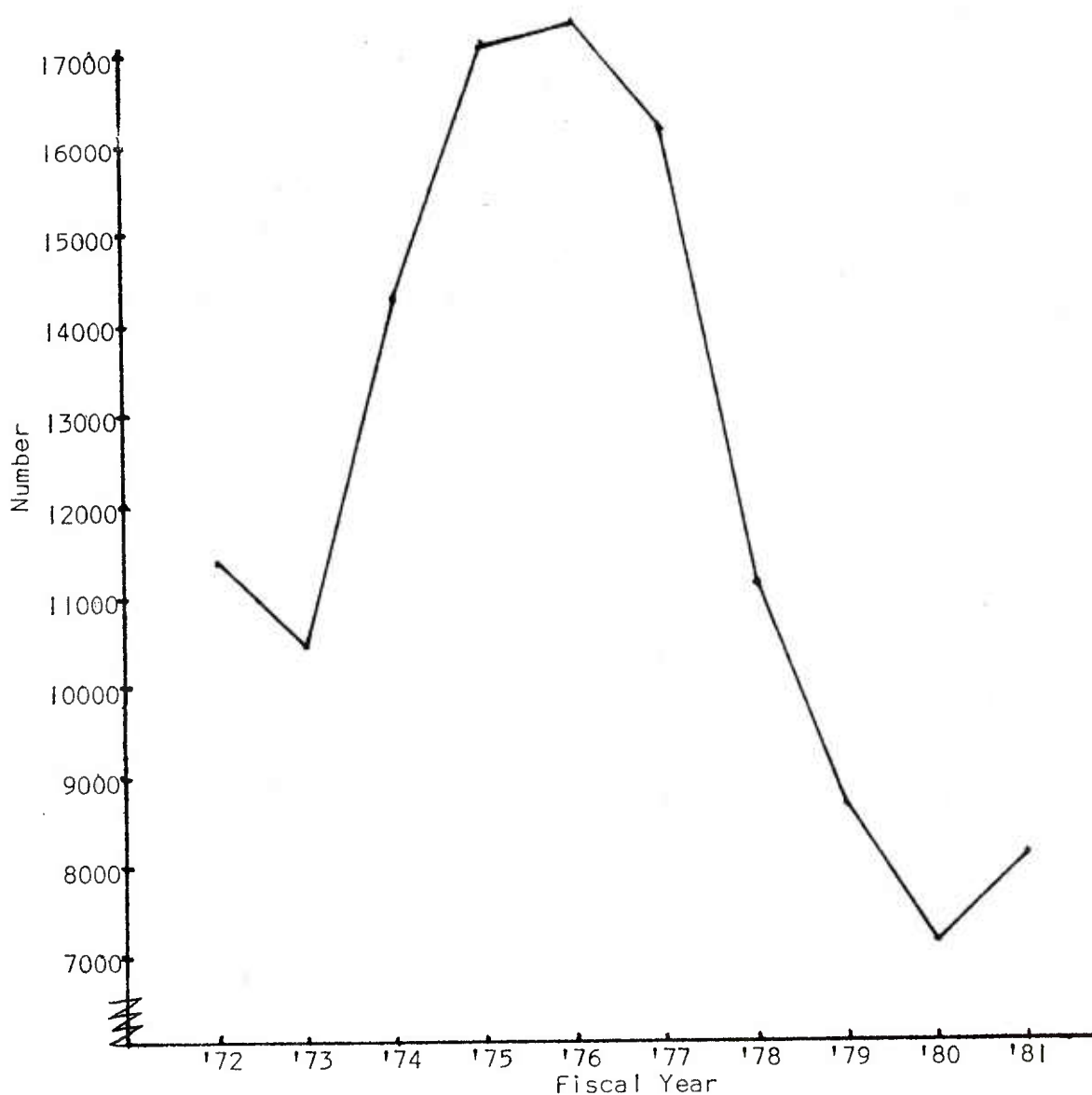


11. Discharge, general (NMPC).

a. Definition. A general discharge is one issued under honorable conditions for any of the reasons listed in the article on the policy sufficiently meritorious to warrant an honorable discharge. It can be authorized by Commander, NMPC, for misconduct, and can be given to those who do not finish their enlistment, for example. Not satisfying condition (2) under honorable discharge (proper military behavior) is usually cited. General discharges are enlisted personnel with loss codes between 841-871 inclusive.

b. Reference. Naval Military Personnel Command. Navy military personnel manual. (NAVPERS 15560). Washington, DC: Author, 1981.

c. Historical values. The number of general discharges for FY72-81 (NAVPERS 15658(A)) are plotted below.

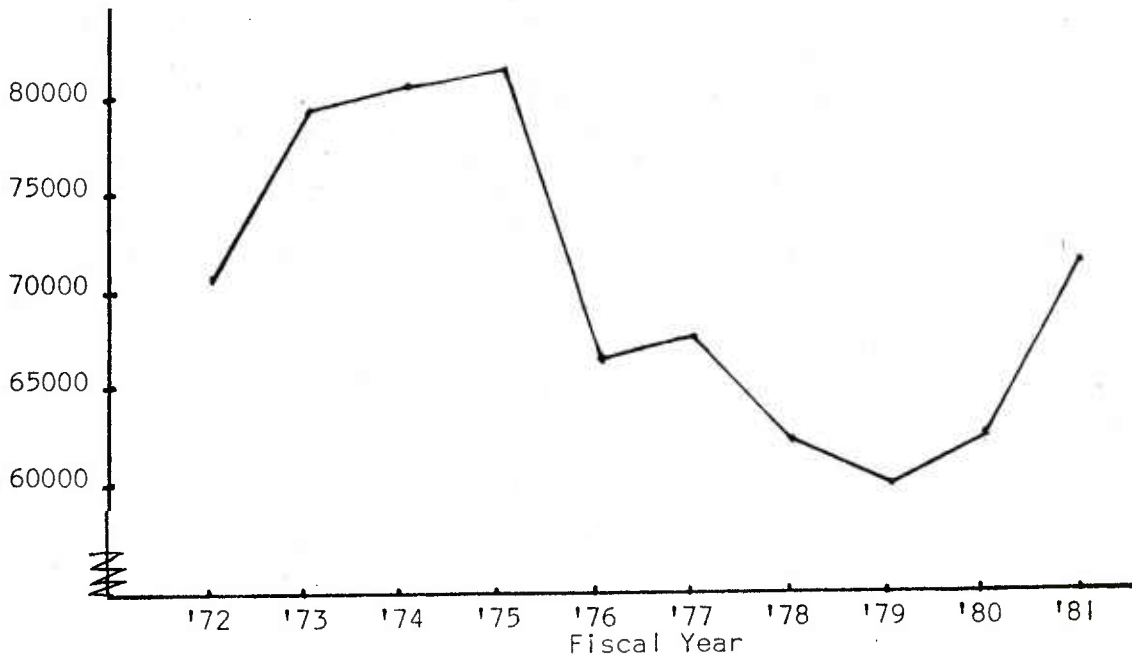


12. Discharge, honorable (NMPC).

a. Definition. An honorable discharge is defined as any separation from the service with honor, conditional upon (1) eligibility, and (2) proper military behavior with proficient and industrious performance of duty having due regard to the rate held and the capabilities of the members around. Eligible criteria are: (1) convenience of the government, (2) dependency or hardship, (3) disability, (4) expiration of enlistment, (5) fulfillment of service obligation, (6) minority, (7) security, (8) unsuitability, and (9) when honorable discharge is directed by the Commander, Navy Military Personnel Command. Honorable discharges are enlisted personnel with loss codes between 801-833 inclusive.

b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981.

c. Historical values. The numbers of honorable discharges for FY72-81 (NAVPERS 15658(A)) are plotted below.

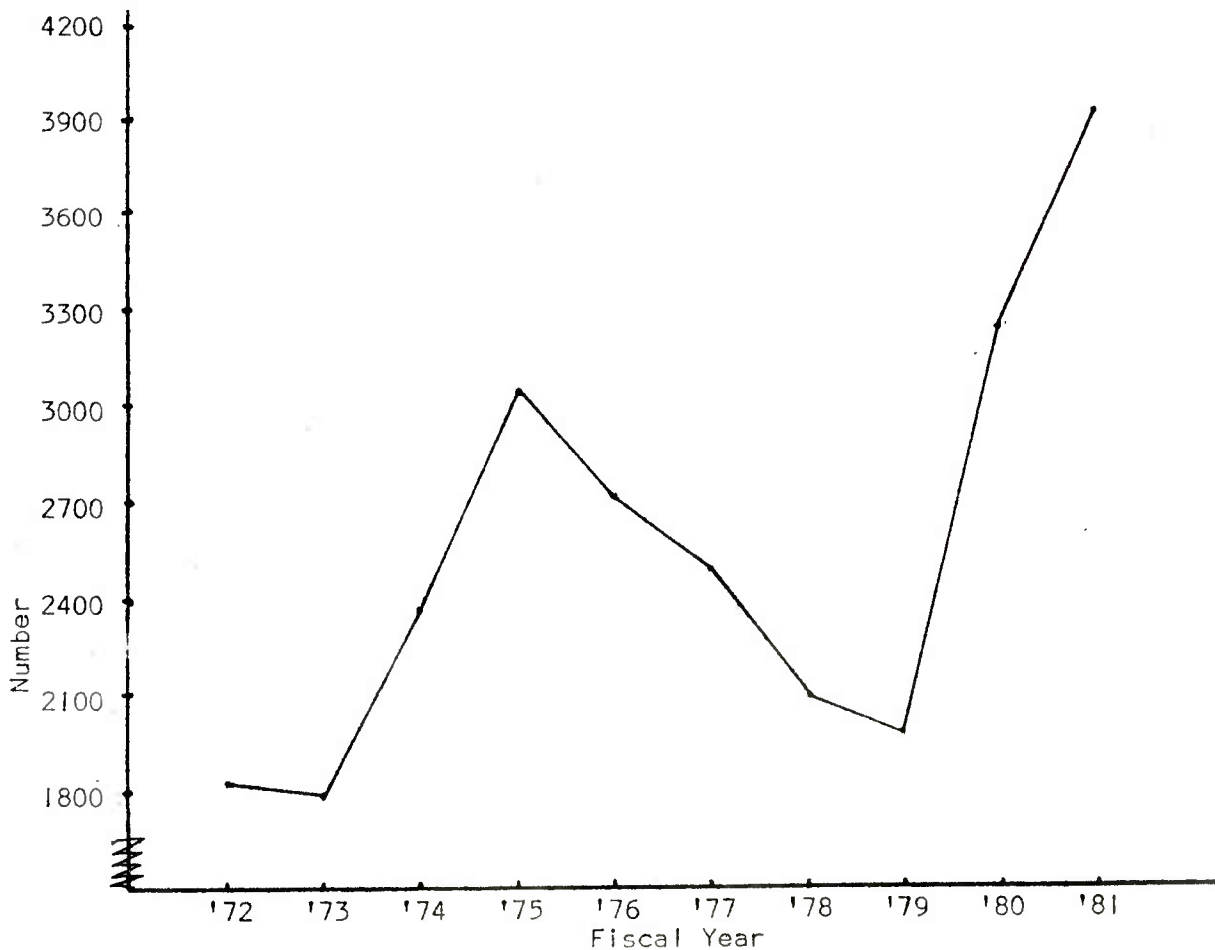


13. Discharge, other than honorable (NMPC).

a. Definition. An other than honorable discharge is necessitated when persons fail to meet the conditions stipulated under honorable discharge. It may be issued, for example, for misconduct or security reasons. Other than honorable discharges are enlisted personnel with loss codes between 881-889 inclusive.

b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981.

c. Historical values. The numbers of other than honorable discharges for FY72-81 (NAVPERS 15658(A)) are plotted below.



14. End of active obligated service (EAOS) (NMPC).

a. Definition. EAOS is the year, month, and day when a member is eligible for separation from active duty. It is adjusted by adding operative extensions and deleting lost time.

b. Reference. Naval Military Personnel Command. MAPMIS system documentation manual (NAVPERS 15642). Washington, DC: Author, 1976.

c. Mathematical formula. $EAOS = CED + TERMENL$ or $CADD + TERMACDU$, where

CED = Year, month, and day a member of the regular Navy or Naval Reserve commenced his/her current enlistment.

CADD = Year, month, and day a member commenced his/her current active duty. This applies to naval recruits, fleet reservists, retired members called or recalled to active duty, and members who are administratively transferred to the fleet reserve or the retired list but remain on active duty.

TERMENL = Term or length of enlistment.

TERMACDU = Term or length of active duty.

Thus, if a 4-year enlistee commenced his/her current enlistment on 12 June 1973, the following would be obtained:

$$EAOS = 730612 + 40000 = 770612.$$

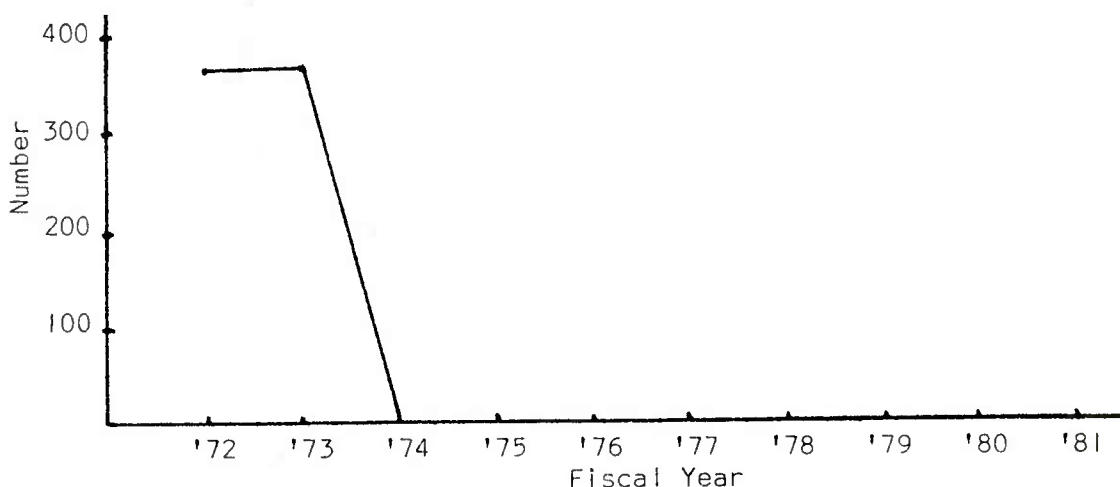
(CED) (TERMENL)

15. Enlistment, cancellation of illegal (NMPC).

a. Definition. An enlistment is illegal and subject to cancellation when an enlistee knowingly holds back or falsifies information upon entering into the enlistment contract. For example, an enlistee may provide false information as to age (i.e., too young), citizenship, or criminal record or drug usage. Illegal enlistments have a 953 loss code.

b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981

c. Historical values. The numbers of illegal enlistments cancelled for FY72-81 (NAVPERS 15658(A)) are plotted below.



16. Extension (NMPC).

a. Definition. Extension refers to the lengthening or prolonging of one's current obligation beyond the normal date of expiration of enlistment. Extensions can be on a month-to-month basis with an aggregate maximum of 48 months on any single enlistment and have the following loss codes: 383, 384, 385, 386, 387, and 388.

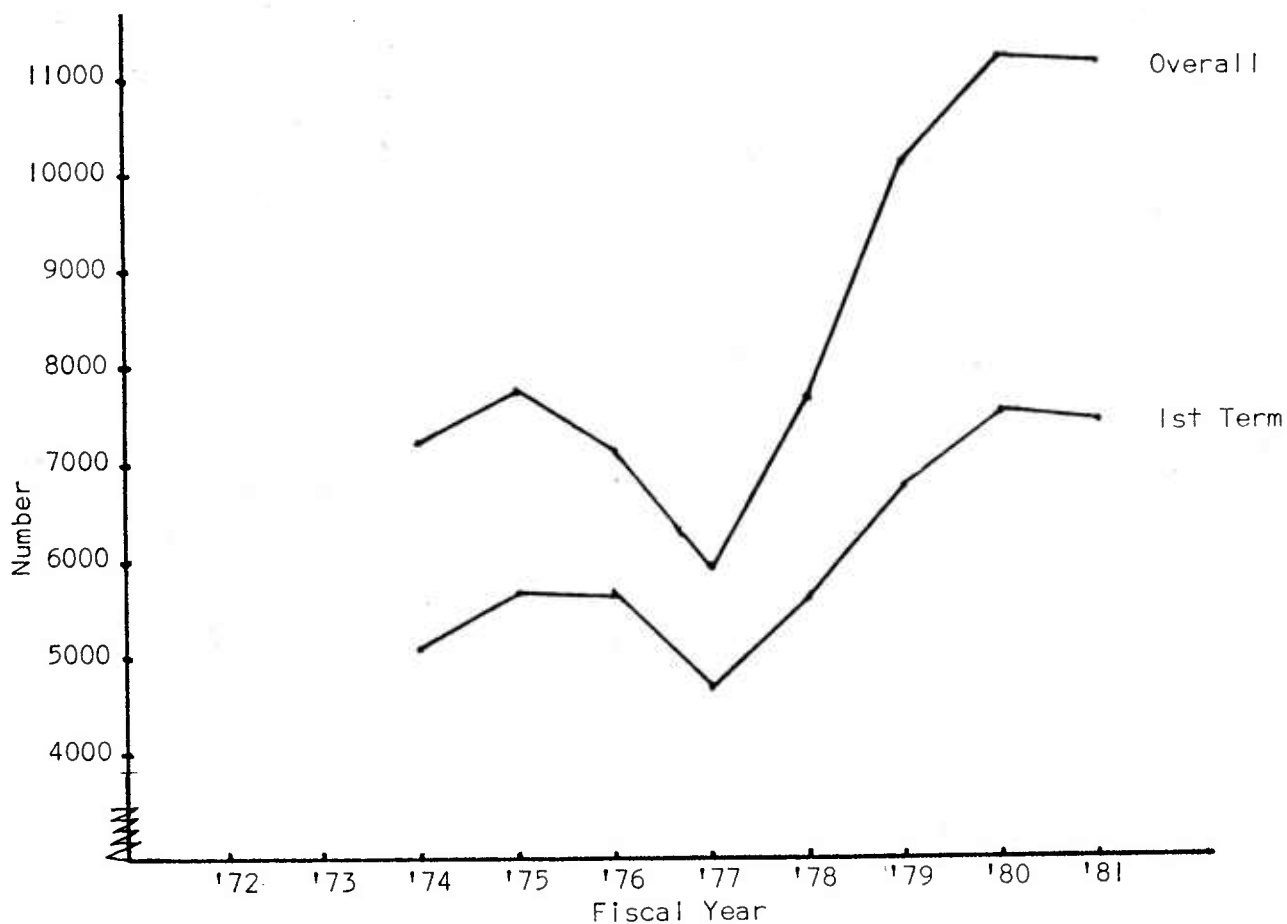
b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981.

17. Extension, bonus (NMPC).

a. Bonus extensions are extensions for which bonuses are paid and have change codes 384, 386, or 388. Many bonus extensions are for extensions of 24 months or more.

b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981.

c. Historical values. The numbers of extensions for 24 months or more¹ for FY74-81 (NAVPERS 15658(A)) are plotted below.



¹This is roughly equivalent to the number of bonus extensions.

18. First termers (NMPC).

a. Definition. A first termers is an individual who is serving on an initial enlistment contract in the regular Navy. First termers include personnel who have had prior service in other services, in the naval reserve, or as a USN-selectee and have 110 or 111 gain codes. This differs from a careerist, who is an individual serving on a second or subsequent term of service in the regular Navy.

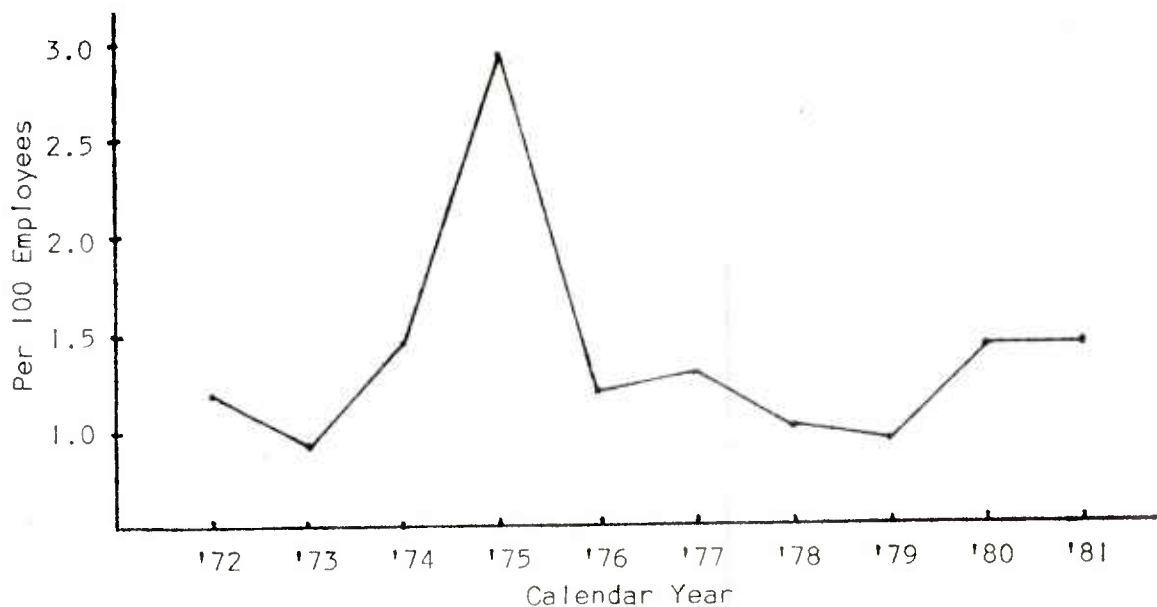
b. Reference. Naval Military Personnel Command. Annual report--Navy military personnel statistics (NAVPERS 15658(A)). Washington, DC: Government Printing Office, June 1972-September 1981.

19. Layoff rate (Department of Labor (DoL)).

a. Definition. The layoff rate is defined as the number of suspensions without pay that (1) last or are expected to last more than 7 consecutive calendar days and (2) are initiated by the employer without prejudice to the worker. The rates are calculated per 100 employees.

b. Reference. Department of Labor, Bureau of Labor Statistics, Employment and earnings, 29(2), Washington, DC: U.S. Government Printing Office, February 1982.

c. Historical values. The DoL layoff rates for CY72-82 (DoL, 1982) are plotted below.

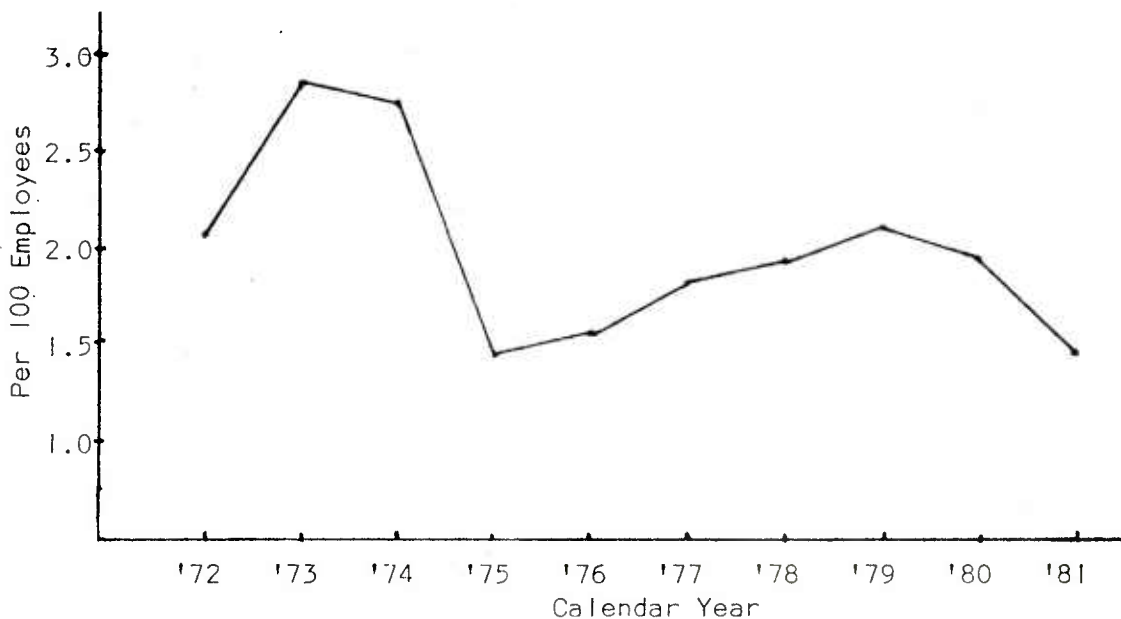


20. Quit rate (DoL).

a. Definition. The quit rate is defined as the number of terminations of employment initiated by employees, failures to report after being hired (if counted as new hires previously), and unauthorized absences, if, on the last day of the month, the person has been absent more than 7 consecutive calendar days. Like the DoL layoff rate, this rate is calculated per 100 employees.

b. Reference. Department of Labor, Bureau of Labor Statistics, Employment and earnings, 29(2), Washington, D.C.: U.S. Government Printing Office, February 1982.

c. Historical values. The DoL quit rates for CY72-81 (DoL, 1982) are plotted below.

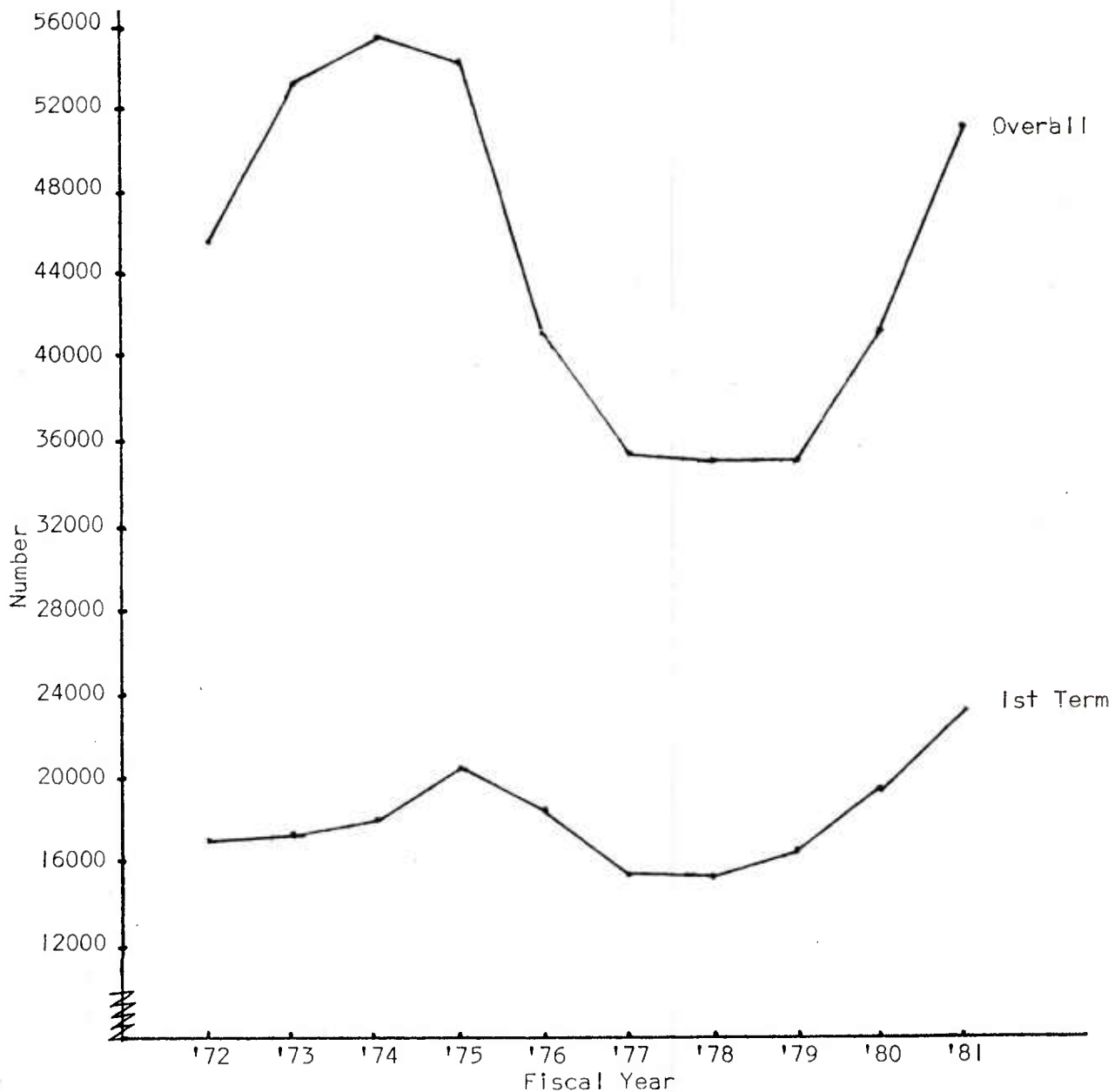


21. Reenlistment (NMPC).

a. Definition. A reenlistment occurs when an individual enlists in the regular Navy for a second or subsequent time, subject to eligibility for reenlistment and bonuses in effect. Individuals enlisting for a first, second, or subsequent time are identified by gain codes 130, 131, 140, 141, 150, or 151. Personnel discharged early for purposes of immediate reenlistment are also included.

b. Reference. Naval Military Personnel Command. Annual report--Navy military personnel statistics (NAVPERS 15658(A)). Washington, DC: Government Printing Office, June 1972-September 1981.

c. Historical values. The numbers of reenlistments for FY72-81 (NAVPERS 15658(A)) are plotted below.

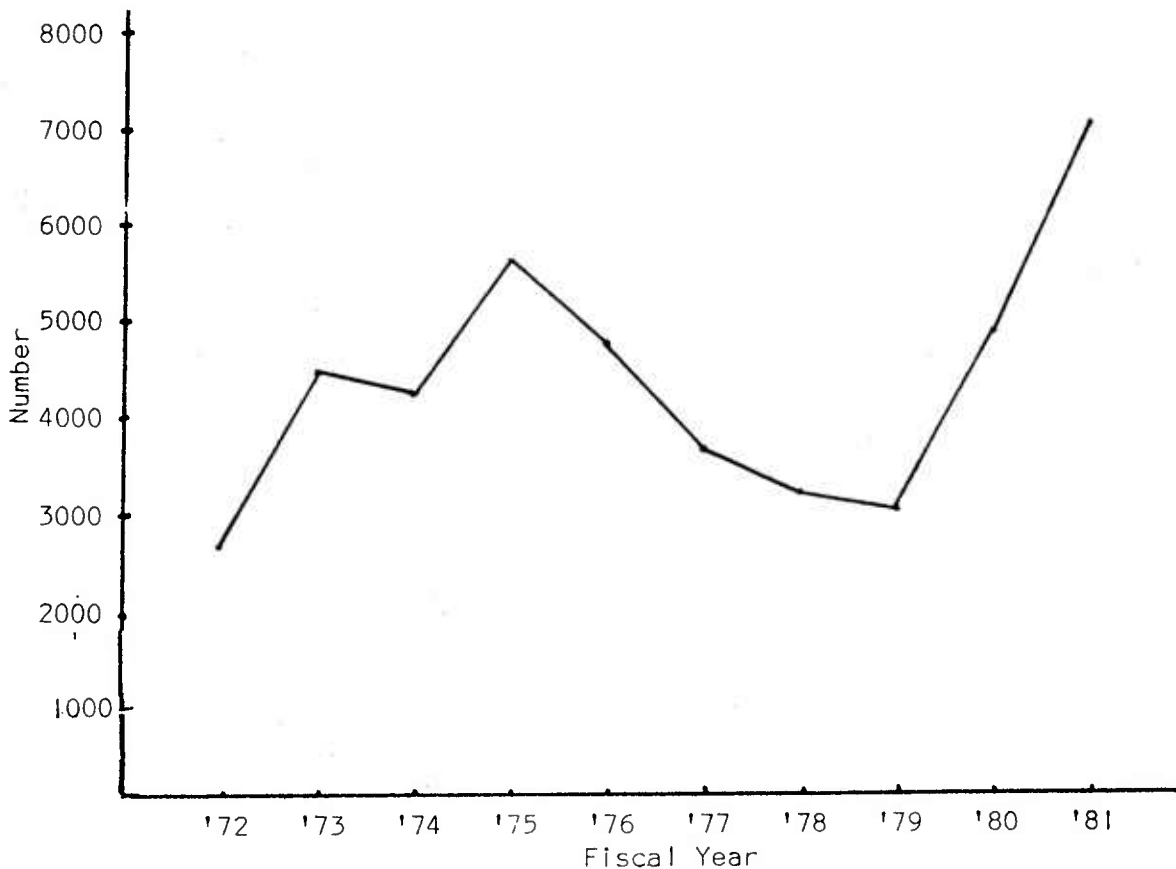


22. Reenlistment, broken service (NMPC).

a. Definition. Broken-service reenlistments are those that occur 90 or more days after discharge or release from active duty. Figures are collected and processing initiated by the Navy Recruiting Command.

b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981.

c. Historical values. The number of broken service reenlistments for FY72-81 (NAVPERS 15658(A)) are plotted below.

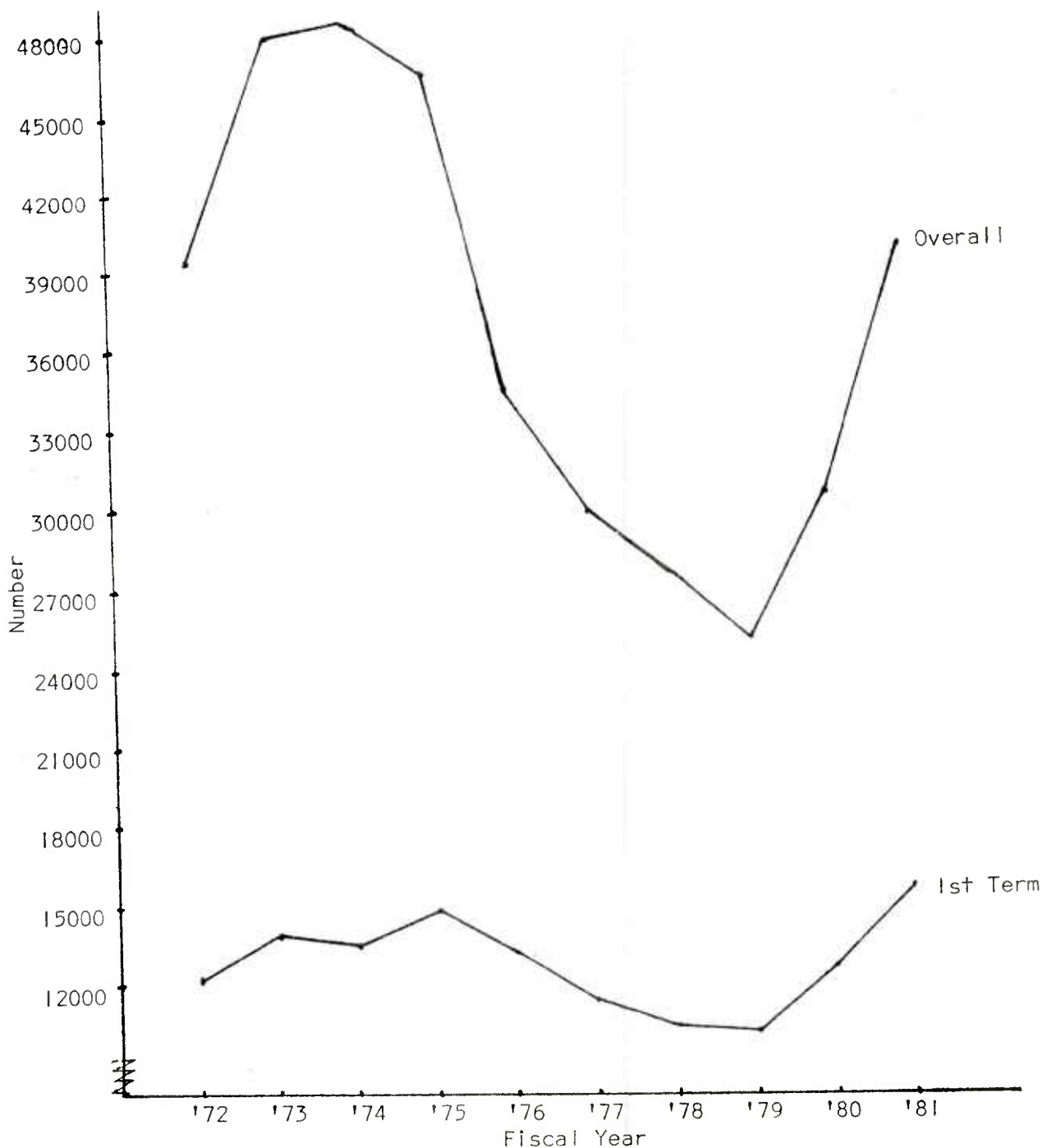


23. Reenlistment, continuous service (NMPC).

a. Definition. Continuous service reenlistments are defined as those that occur (1) within 3 months following discharge or release from active duty or (2) within 6 months following discharge or release from active duty provided the individual is classified RE-R1 (i.e., is eligible to reenlist) and holds a rating listed on the current open rates/skills list. In NAVPERS 15658(A), continuous service reenlistment is defined as the sum of reenlistments (1) within 90 days prior to EAOS (this includes immediate reenlistments--those who reenlist within 24 hours after EAOS), (2) over 90 days prior to EAOS, and (3) 2-90 days after EAOS.

b. Reference. Naval Military Personnel Command. Navy military personnel manual (NAVPERS 15560). Washington, DC: Author, 1981.

c. Historical values. The number of continuous service reenlistments for FY72-81 (NAVPERS 15658(A)) are plotted below.



24. Reenlistment rate, adjusted (NMPC).

a. Definition. This rate, which applies to individuals reenlisting for a first, second, or subsequent time in the regular Navy, is the sum of the number of (1) extensions of 24 months or more, (2) continuous service reenlistments within 90 days prior to EAOS, (3) continuous service reenlistments within 2-90 days after EAOS, and (4) separations over 90 days prior to EAOS to reenlistment divided by the sum of (1) the number of extensions of 24 months or more, (2) separations over 90 days prior to EAOS to reenlistment, (3) eligible separations over 90 days prior to EAOS, and (4) involuntary extensions (loss codes 385 and 386), minus the number of separations of involuntary extenders. The number of eligibles is the sum of all enlisted personnel whose loss codes are: 801-803, 806, 809, 811, 816, 833, 841, 843, 846, 849, 850, 856, 931, 932, 942, 943, 980.

b. Reference. Naval Military Personnel Command. Annual report--Navy military personnel statistics (NAVPERS 15658 (A)). Washington, DC: Government Printing Office, June 1972-September 1981.

c. Mathematical formula. Adjusted reenlistment rate = $(A + B + C + D) / (A + D + E + F + G + H + I - J)$, where

A = Number of extensions of 24 months or more.

B = Number of continuous service reenlistments within 90 days prior to EAOS.

C = Number of continuous service reenlistments 2-90 days after EAOS.

D = Number of separations over 90 days prior to EAOS to reenlistment.

E = Number of separations at EAOS who are eligible to reenlist.

F = Number of eligible separations over 90 days prior to EAOS (other than D).

G = Number of involuntary extensions.

H = Number of separations of involuntary extenders.

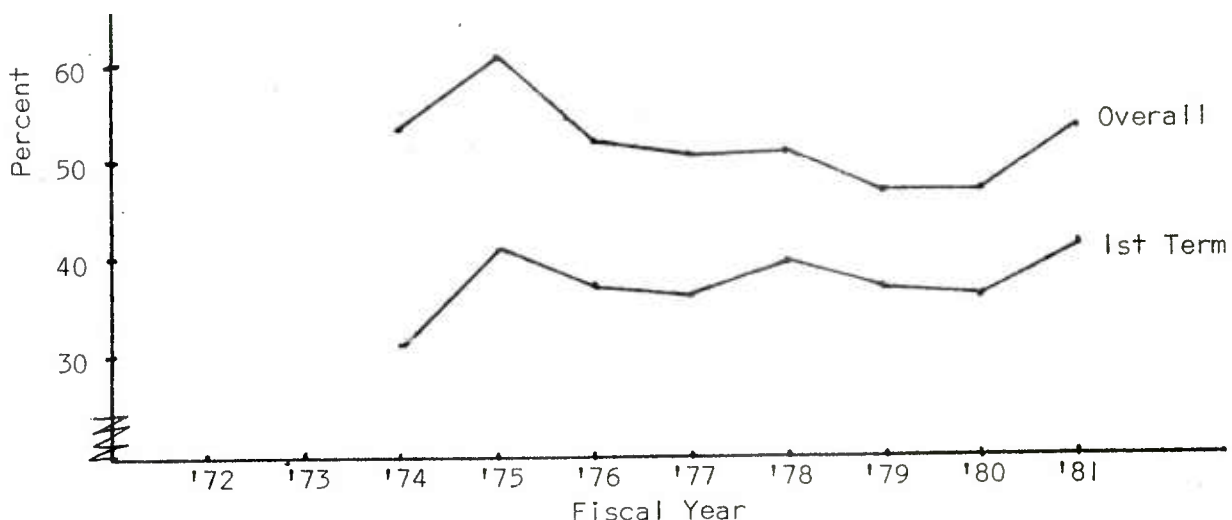
Thus, if the above letters are substituted with FY80 adjusted reenlistment data (NAVPERS 15658(A)), the following is obtained.

Adjusted Reenlistment Rate =

$$\frac{(11,828 + 19,037 + 1,040 + 8,595)}{(11,828 + 8,595 + 61,389 + 1,769 + 0 - 0)} = .48.$$

(A) (B) (C) (D) (A) (D) (E) (F) (G) (H)

d. Historical values. The adjusted reenlistment rates for FY74-81 (NAVPERS 15658(A)) are plotted below.



25. Reenlistment rate, adjusted (early) Navy.

a. Definition. The adjustment reenlistment rate (early) is determined by dividing the sum of the number of (1) immediate reenlistments at expiration of term of service (ETS), (2) extensions for which reenlistment bonuses are paid, (3) reenlistments 2-90 days after separation, and (4) early separation for reenlistment whose original ETS is the current month by the sum of (1) the number of extensions for which reenlistment bonuses are paid, (2) early separations for early enlistments whose original ETS is the current month, (3) separations (not early discharge separations) who are eligible to reenlist, (4) early separations for reenlistment whose original ETS is the current month, and (5) involuntary extensions of tour eligibles whose original ETS is the current month minus the number of (1) immediate reenlistments prior to their ETS and (2) separations in the current month of involuntary extension whose original ETS was in a prior month. This rate is the DoD net reenlistment rate adjusted by transferring the number of men who reenlisted early into the year they would have completed their current obligation and reenlisted.

b. Reference. Office of the Secretary of the Navy. Report to the Secretary of the Navy's task force on Navy/Marine Corps personnel retention. Washington, D.C.: Department of the Navy, 1966.

c. Mathematical formula. Adjusted reenlistment rate (early) = $(A + B + C + D)/(B + D + E + F + G - H - I)$, where

A = Number of immediate reenlistments at ETS.

B = Number of extensions for which reenlistment bonuses are paid.

C = Number of reenlistments 2-90 days after separation.

D = Number of early separations for reenlistment whose original ETS is the current month.

E = Number of separations (not early discharge separation) who are eligible to reenlist.

F = Number of early separations for reenlistment whose original ETS is the current month.

G = Number of involuntary extensions of tour eligibles whose original ETS is the current month.

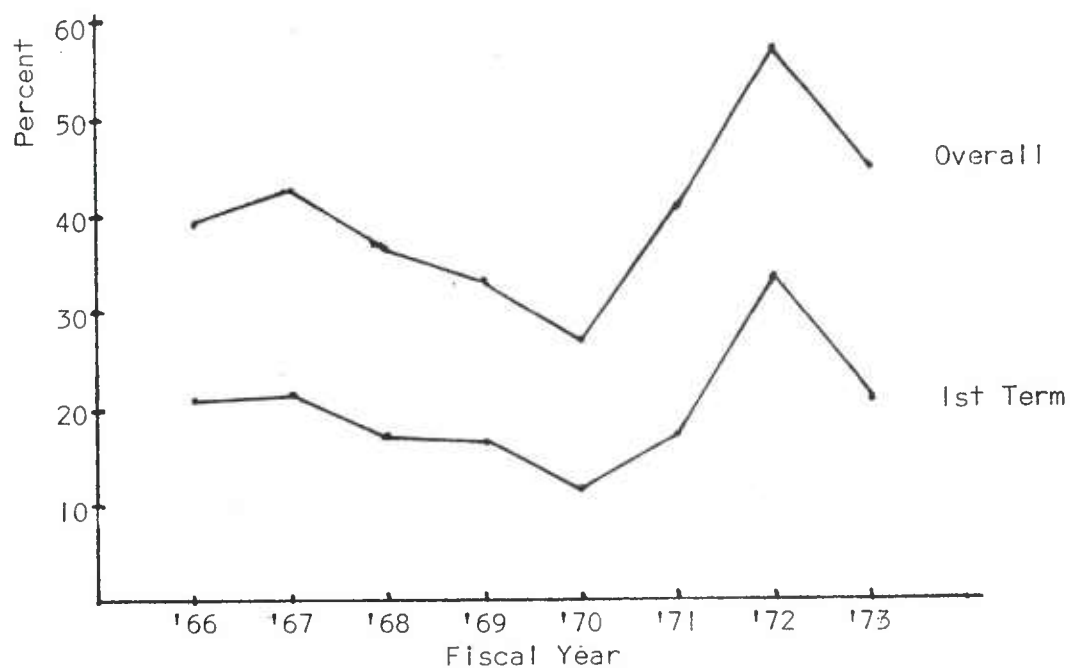
H = Number of immediate reenlistments prior to their ETS.

I = Number of separations in the current month of involuntary extensions whose original ETS was in a prior month.

Thus, if the above letters are substituted with FY73 adjusted reenlistment rate (early) data (NAVPERS 15658 (A)), the following is obtained:

$$\begin{array}{cccccccccc} \text{FY73 adjusted reenlistment rate (early) =} & & & & & & & & & & \\ (41,005 + 5,382 + 698 + 3,429)/(5,382 + 3,429 + 95,419 + 14,421 + 0 - 6,229 - 0) = .45. \\ \text{(A)} \quad \text{(B)} \quad \text{(C)} \quad \text{(D)} \quad \text{(B)} \quad \text{(D)} \quad \text{(E)} \quad \text{(F)} \quad \text{(G)} \quad \text{(H)} \quad \text{(I)} \end{array}$$

d. Historical values. The adjusted reenlistment rates (early) for FY66-73 (NAVPERS 15658(A)) are plotted below.



26. Reenlistment rate adjusted for extensions (DoD).

a. Definition. The reenlistment rate adjusted for extensions is determined by dividing the sum of the number of (1) reenlistments and (2) bonus extensions (gain codes 384 and 388) by the sum of the (1) number of bonus extensions and (2) number eligible to reenlist. The number eligible to reenlist is the sum of all enlisted personnel with the following loss codes: 801-803, 806, 809, 811, 816, 833, 841-843, 846, 849, 850, 856, 931, 932, 942, 943, 980. If ineligibles who reenlist are included in the numerator, this rate can be greater than one.

b. Reference. Grace, G.L., "Techniques for increasing retention of Navy enlisted personnel," Defense Manpower Policy, R-2396-ARPA, R. Cooper (ed.) Santa Monica, CA: The Rand Corporation, December 1974.

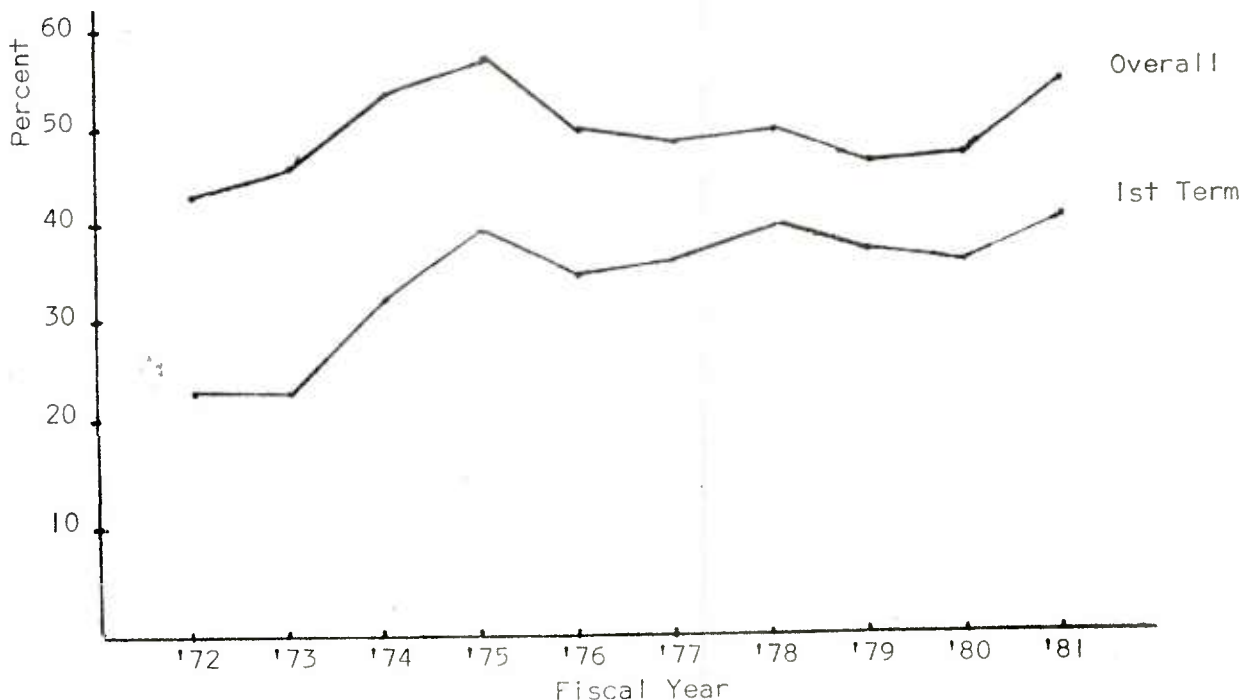
c. Mathematical formula. Reenlistment rate adjusted for extensions = $(A + B)/(B + C)$, where

- A = Number of reenlistments.
- B = Number of bonus extensions.
- C = Number eligible to reenlist.

Thus, if the above letters are substituted with pertinent FY80 data (NAVPERS 15658(A)), the following is obtained:

$$\begin{array}{cccc} \text{FY80 reenlistment rate adjusted for extension} = & & & \\ (29,728 + 11,828)/(11,828 + 74,423) = .48. & & & \\ \text{(A)} & \text{(B)} & \text{(B)} & \text{(C)} \end{array}$$

d. Historical values. Reenlistment rates adjusted for extensions for FY72-81 (NAVPERS 15658(A)) are plotted below:



27. Reenlistment rate, Enns Model I (Rand Corporation).

a. Definition. The Enns Model I reenlistment rate is determined by dividing the sum of the number of (1) reenlistments from an accession cohort and (2) extensions of 2 years or more from that cohort (excluding 6YOs) by the sum of reenlistments and separations from the accession cohort. Separations exclude those personnel whose SPD separation code indicates misbehavior or otherwise unsatisfactory service: GFN, JFM, FJN, KFN, JFL, RFS, SFJ, VFJ, RFK, SFK, VFK, WFK, JFR, LFR, GFT, GEN, HFT, HFV, JFT, JFV, KFT, KFU, KFV, LFT, MFT, XFT, GMB, GMK, HMB, JMB, JMK, KMB, GMJ, HMJ, JMJ, GMC, HMC, JMC, GMD, HMD, JMD, GMG, HMG, JMG, GKA, GLB, HKA, HLB, JKA, JLB, GKJ, GLJ, HJK, HLJ, JKJ, JLJ, BLF, GKK, GLF, GMM, GPB, HKK, HLF, HMM, JKK, JLF, JMM, JPB, GKE, GLG, GMH, HKE, HLG, HMM, JKE, JLG, JMH, KLG, GKH, GLH, HKH, HLH, JKH, JLH, GLK, GMP, HLK, HMP, JKV, JLK, JMP, GKB, HKB, JKB, BDK, GDK, HDK, JKD, LDK, GJB, HJB, JJB, JJC, JJD, GKG, HKG, JKG, YKG, JKF, BLC, BML, DLC, GKC, GLC, GML, HKC, HLC, HML, JKC, JLC, JML, GKL, GLL, GMF, HKL, HLL, HMF, JKL, JLL, JMF, BFS, DFS, JFS, KFS, KNL, JFE, BNC, GNC, HNC, FJP, JHM, JNC, BLM, JNG, KLM, KMN, LEM, JEM, JET, JGH, JHJ. SPD separation codes can be found in the MAPMIS system documentation manual (NAVPERS 15642).

b. Reference. Enns, J. Reenlistment bonuses and first-term retention (R-1935-ARPA). Santa Monica, CA: The Rand Corporation, September 1977.

c. Mathematical formula. Enns Model I reenlistment rate = $(A + B)/(C - D)$, where

A = Number of reenlistments from an accession cohort.

B = Number of extensions of 2 years or more from that accession cohort.

C = Total number of that accession cohort.

D = Number from that accession cohort whose separation code indicates misbehavior or physical disability.

28. Reenlistment rate, Enns Model II (Rand Corporation).

a. Description. The Enns Model II reenlistment rate is determined by dividing the sum of the number of (1) extensions of 24 months or more and (2) continuous service reenlistments by the sum of the number of (1) extensions of 24 months or more and (2) separations at or prior to EAOS who are eligible to reenlist. Eligible separations are those whose loss codes are: 801-803, 806, 809, 811, 816, 833, 841-843, 846, 849, 850, 856, 931, 932, 942, 943, 980. This rate is the same as the NMPC unadjusted reenlistment rate (see p. 27). Unlike the Enns Model I reenlistment rate, this rate is not strictly associated with an accession cohort.

b. Reference. Enns, J. Reenlistment bonuses and first term retention (R-1935-ARPA). Santa Monica, CA: The Rand Corporation, September 1977.

c. Mathematical formula. Enns Model II Reenlistment Rate = $(A+B)/(A+C+D)$
where

A = Number of extensions of 24 months or more.

B = Number of continuous service reenlistments within 90 days prior to EAOS, over 90 days prior to EAOS, and 2-90 days after EAOS.

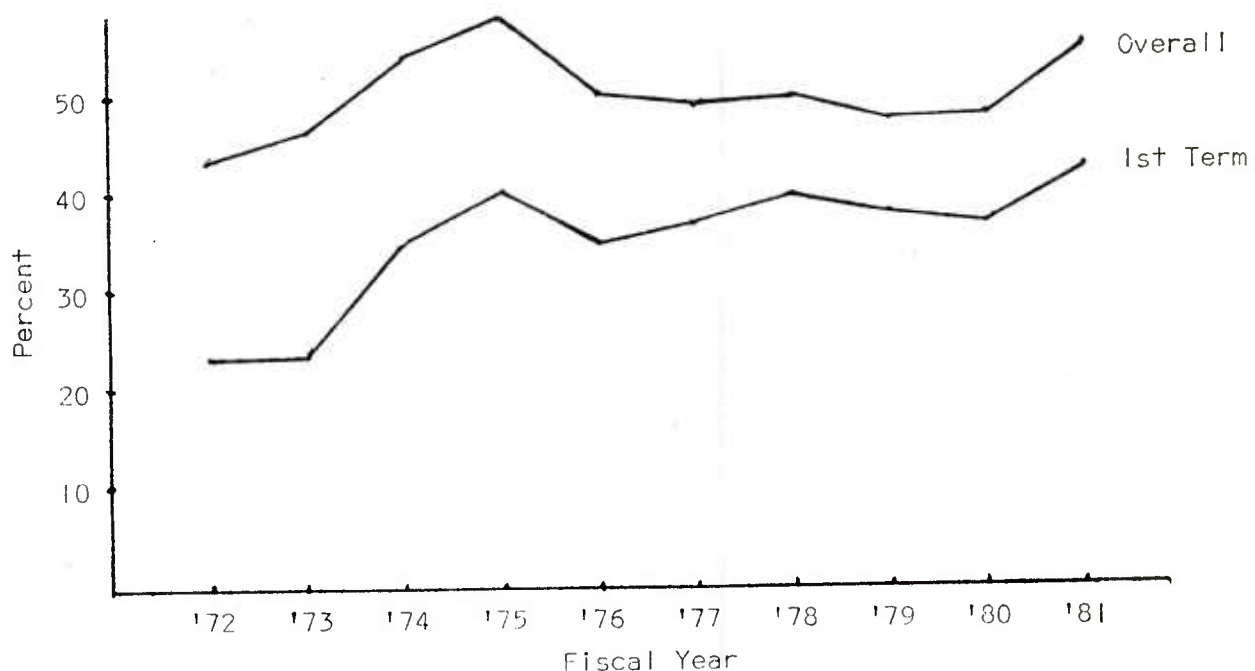
C = Number of separations prior to EAOS who are eligible to reenlist.

D = Number of separations at EAOS who are eligible to reenlist.

Thus, if the above numbers are substituted with pertinent FY80 data (NAVPERS 15658(A)), the following is obtained:

$$\begin{array}{ccccccc} \text{FY80 Enns Model II reenlistment rate} = & & & & & & \\ (11,828 + 29,728) / (11,828 + 13,034 + 61,389) = .48. & & & & & & \\ \text{(A)} & \text{(B)} & \text{(A)} & \text{(C)} & \text{(D)} & & \end{array}$$

d. Historical values. The Enns Model II reenlistment rates for FY72-81 are plotted below.



29. Reenlistment rate, first-term (Kleinman/Shughart) (Center for Naval Analyses (CNA)).

a. Definition. This rate is determined by dividing the sum of the number of reenlistments and the number of extensions of 2 years or more by the number eligible for first-term reenlistment. Those eligible for reenlistment are those whose loss codes are 801-803, 806, 809, 811, 816, 833, 841-843, 846, 849, 850, 856, 931, 932, 942, 943, 980. Nondesignated enlisted personnel and 6-year obligors are excluded in determining this rate.

b. Reference. Kleinman, S. and Shughart, W. The effects of reenlistment bonuses (CRC 269). Alexandria, VA: The Center for Naval Analyses, September 1974.

c. Mathematical formula. First-term reenlistment rate $(K/S) = (A + B)/C$, where

A = Number of reenlistments.

B = Number of extensions of 2 years or more.

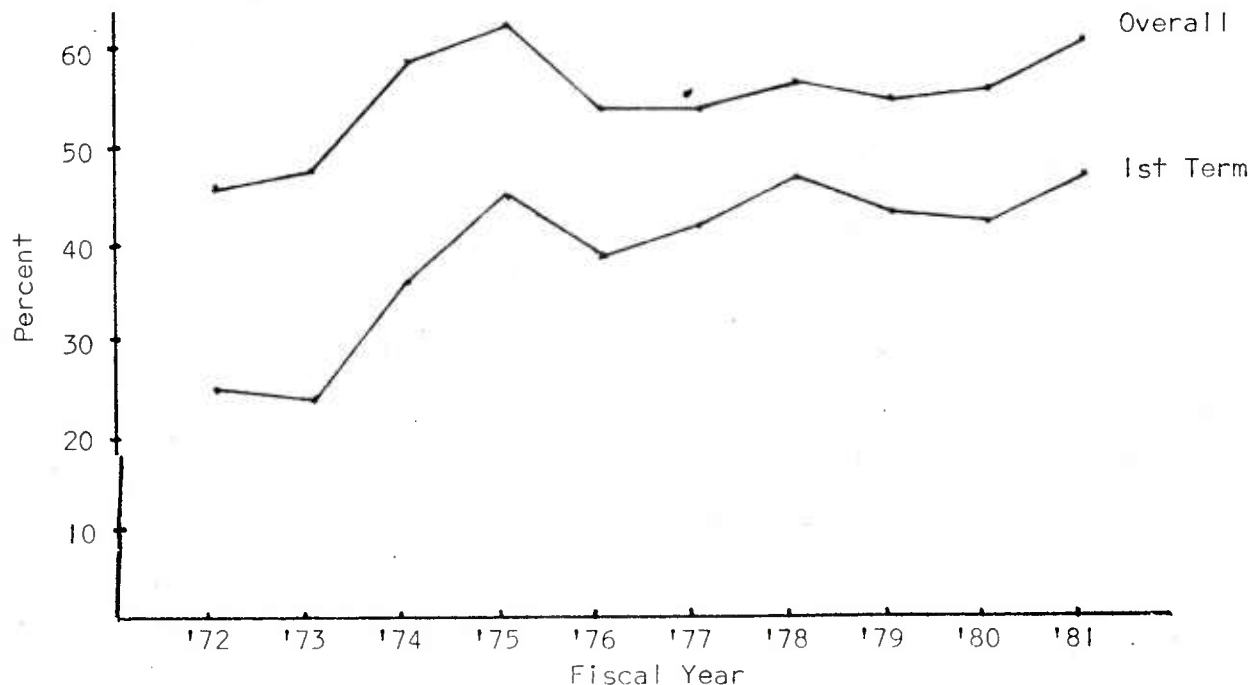
C = Number eligible for first-term reenlistments.

Thus, if the above numbers are substituted with pertinent FY80 data (NAVPERS 15658(A)), the following is obtained.

$$\text{FY80 first-term reenlistment rate } (K/S) = \frac{(12,191 + 7,530)}{46,140} = .43.$$

(A) (B) (C)

d. Historical values. The first-term reenlistment rates (K/S) for FY72-81 (NAVPERS 15658(A)) are plotted below.



30. Reenlistment rate (4YO formula) (Navy (OP-136)).

a. Definition. The reenlistment rate (4YO formula), sometimes called the gross reenlistment rate, is determined by dividing the number of reenlistments (gain codes 130, 131, 140, 141, 150, 151) by the sum of the number eligible and ineligible to reenlist (all separations). Sometimes this term is mistakenly called a "retention rate." Its initial use by the Navy is unknown, but it is still used today.

b. Reference. Grace, G.L., "Techniques of increasing retention of Navy enlisted personnel," Defense Manpower Policy, R-2396-ARPA, R. Cooper (ed.). Santa Monica, CA: The Rand Corporation, December 1974.

c. Mathematical formula. Reenlistment Rate (4YO Formula) = $A/(B+C)$, where

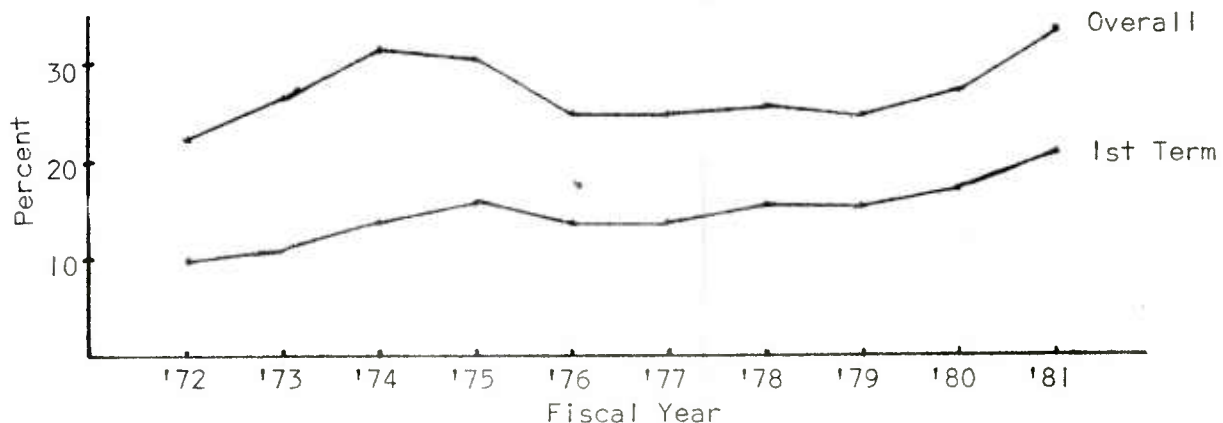
A = Number of reenlistments.
B = Number eligible to reenlist.
C = Number ineligible to reenlist.

Thus, if the above letters are substituted with pertinent FY80 data (NAVPERS 15658(A)), the following is obtained.

$$\text{FY80 reenlistment rate (4YO Formula)} = \frac{29,728}{(74,423 + 32,845)} = .28.$$

(A) (B) (C)

d. Historical values. The reenlistment rates (4YO formula) for FY72-81 (NAVPERS 15658(A)) are plotted below.



31. Reenlistment rate (4YO and 6YO formula) (Navy (OP-136)).

a. Definition. The reenlistment rate (4YO and 6YO formula) is determined by dividing the sum of the number of reenlistments and the number of bonus extensions by the sum of the number of (1) bonus extensions, (2) those eligible to reenlist, and (3) those ineligible to reenlist. The number of those eligible to reenlist is the sum of all enlisted personnel whose loss codes are: 801-803, 806, 809, 811, 816, 833, 841-843, 846, 849, 850, 856, 931, 932, 942, 943, 980. It includes bonus extensions (gain codes 384 and 388). This formula is different from the 4YO formula because 6-year obligors automatically make a 2-year extension upon completion of their fourth year.

b. Reference. Grace, G.L., "Techniques for increasing retention of Navy enlisted personnel," Defense Manpower Policy, R-2396-ARPA, R. Cooper (ed.). Santa Monica, CA: The Rand Corporation, December 1974.

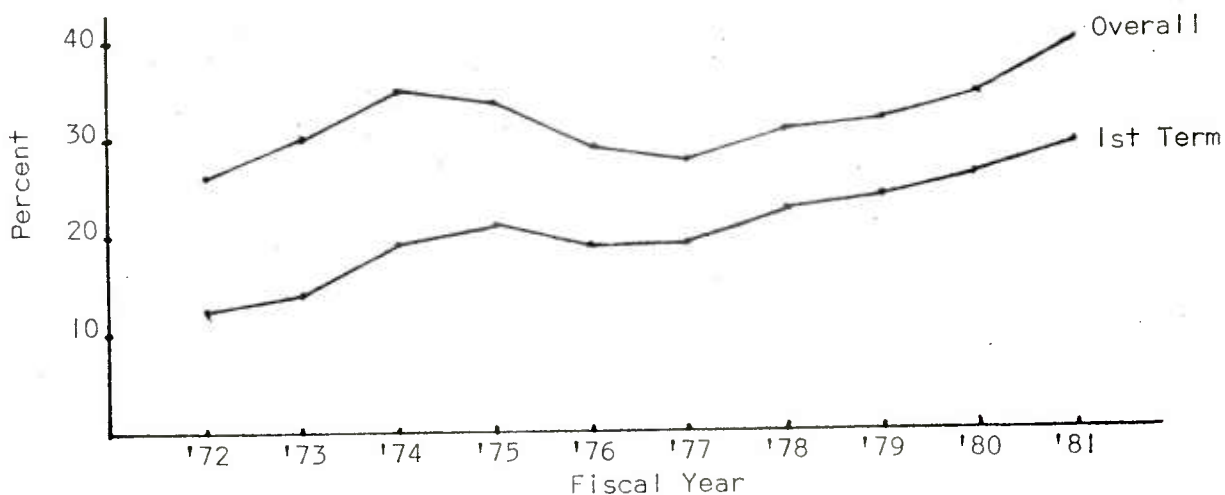
c. Mathematical formula. Reenlistment rate (4YO and 6YO Formula) = $(A+B)/(B+C+D)$, where

- A = Number of reenlistments.
- B = Number of bonus extensions.
- C = Number eligible to reenlist.
- D = Number ineligible to reenlist.

Thus, if the above numbers are substituted with pertinent FY80 data (NAVPERS 15658(A)), the following is obtained:

$$\begin{array}{ccccccc} \text{Reenlistment rate (4YO and 6YO Formula)} & = & & & & & \\ (29,728 + 11,828) / (11,828 + 74,423 + 32,845) & = & .35. & & & & \\ (A) \quad (B) \quad (B) \quad (C) \quad (D) & & & & & & \end{array}$$

d. Historical values. Reenlistment rates (4YO and 6YO formula) for FY72-81 (NAVPERS 15658(A)) are plotted below.



32. Reenlistment rate, net (DoD).

a. Definition. The net reenlistment rate is determined by dividing the number who reenlist (gain codes 130, 131, 140, 141, 150, 151) by the number eligible to reenlist. The denominator is the sum of all enlisted personnel with the following loss codes: 801-803, 806, 809, 811, 816, 833, 841, 842, 843, 846, 849, 850, 856, 931, 932, 942, 943, 980. A review of some 32 studies revealed use of this rate. It is also called the BUPERS Count Figure of Merit (see p. A-5).

b. Reference. Rueter, F. H., Williams, R. G., & Bell, T. R. Design of a National Skills Market Model for Air Force Personnel (AFHRL-TR-79-32). Brooks Air Force Base, TX: Air Force Human Resources Laboratory, September 1979.

c. Mathematical formula. Net reenlistment rate = A/B , where

A = Number of reenlistments.

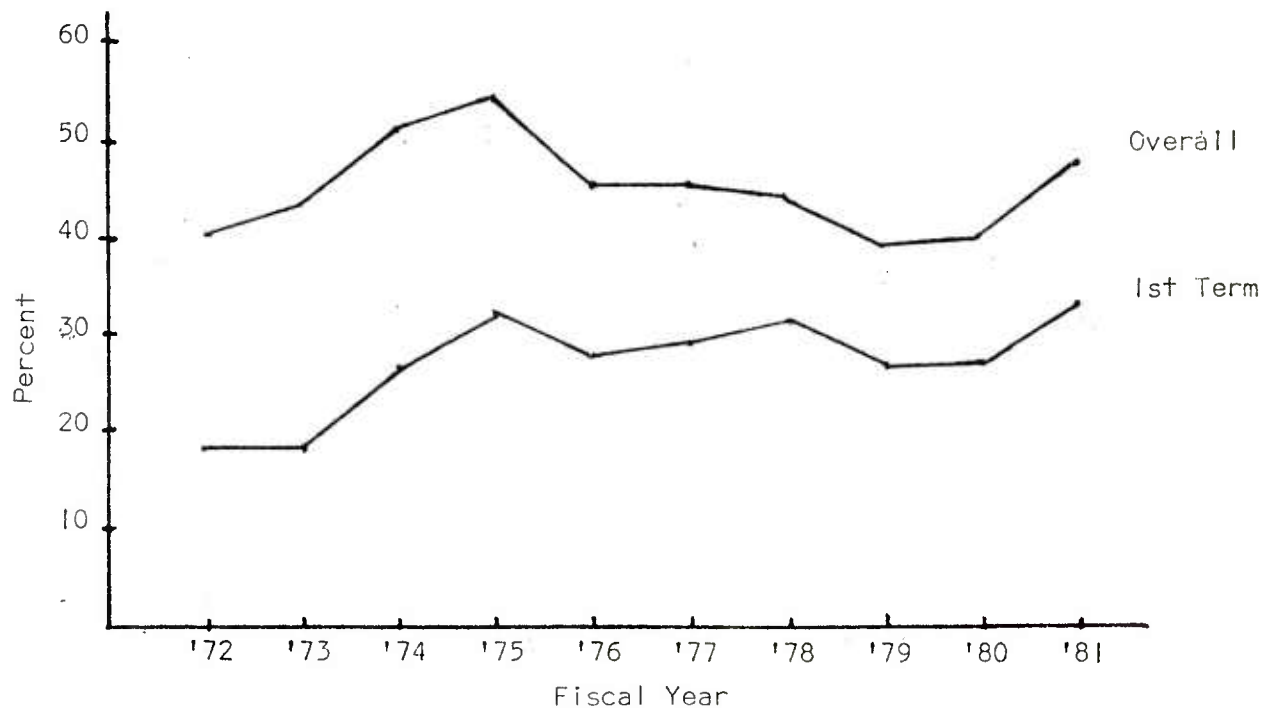
B = Number eligible to reenlist.

Thus, if the above letters are substituted with pertinent FY80 data (NAVPERS 15658(A)), the following is obtained.

$$\text{FY80 net reenlistment rate} = \frac{29,728}{74,423} = .40.$$

(A) (B)

c. Historical values. The net reenlistment rates for FY72-81 (NAVPERS 15658(A)) are plotted below.



33. Reenlistment (retention) rate, PVCOL, ACOL, and SCOL models (CNA).

a. Definition. The reenlistment (retention) rate is the dependent variable in Warner's (1978, 1979, 1981) PVCOL, ACOL, and SCOL (for present value, annualized, and stochastic cost of leaving) models. It is the proportion of people in a LOS interval who have less than 13 months to go on their enlistment contracts at the start of the fiscal year who remained in the Navy at the end of the year. Note that eligibility criteria are largely ignored. A social security number match of beginning and end year personnel tapes generates the values. Moreover, DMDC prefer to call this rate a retention rate.

b. References.

(1) Warner, J. The estimation of the effect of a new retirement system on retention (CNA memo 78-1561). Alexandria, VA: The Center for Naval Analyses, September 1978.

(2) Warner, J. Alternative military retirement systems: Their effects on enlisted retention (CRC 376). Alexandria, VA: The Center for Naval Analyses, September 1979.

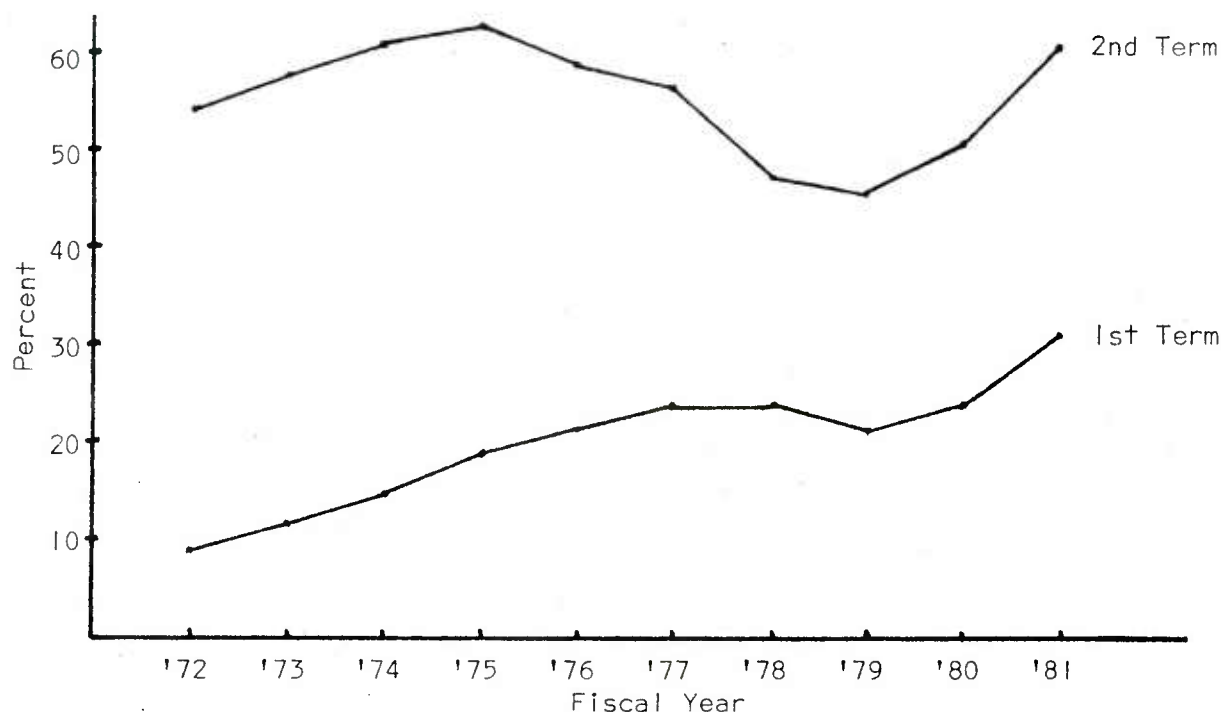
(3) Warner, J. Military compensation and retention: An analyses of alternative models and a simulation of a new model (CRC 346). Alexandria, VA: The Center for Naval Analyses, August 1981.

c. Mathematical formula. Reenlistment (retention) rate, PVCOL, ACOL, SCOL models = A/B , where

A = Number of personnel from beginning population still in the Navy at the end of the fiscal year.

B = Beginning population; number of personnel in LOS interval who have less than 13 months to go on their enlistment contracts at the start of the fiscal year.

d. Historical values. The reenlistment (retention) rates for FY72-81 (NAV-PERS 15658(A)) are plotted below.



34. Reenlistment rate, unadjusted (NMPC).

a. Definition. The unadjusted reenlistment rate, which applies to individuals enlisting for a first, second, or subsequent time in the regular Navy, is determined by dividing the sum of the number of (1) extensions of 24 months or more and (2) continuous service reenlistments by the sum of the number of (1) extensions of 24 months or more, and (2) separations at or prior to EAOS who are eligible to reenlist. Those eligible for reenlistment have the following loss codes: 801-803, 806, 809, 811, 816, 833, 841, 843, 846, 849, 850, 856, 931, 932, 942, 943, 980.

b. Reference. Naval Military Personnel Command. Annual report--Navy military personnel statistics (NAVPERS 15658(A)). Washington, DC: Government Printing Office, June 1971-September 1981.

c. Mathematical formula. Unadjusted reenlistment rate = $(A+B)/(A+C+D)$, where

A = Number of extensions of 24 months or more.

B = Number of continuous service reenlistments within 90 days prior to EAOS, over 90 days prior to EAOS, and 2-90 days after EAOS.

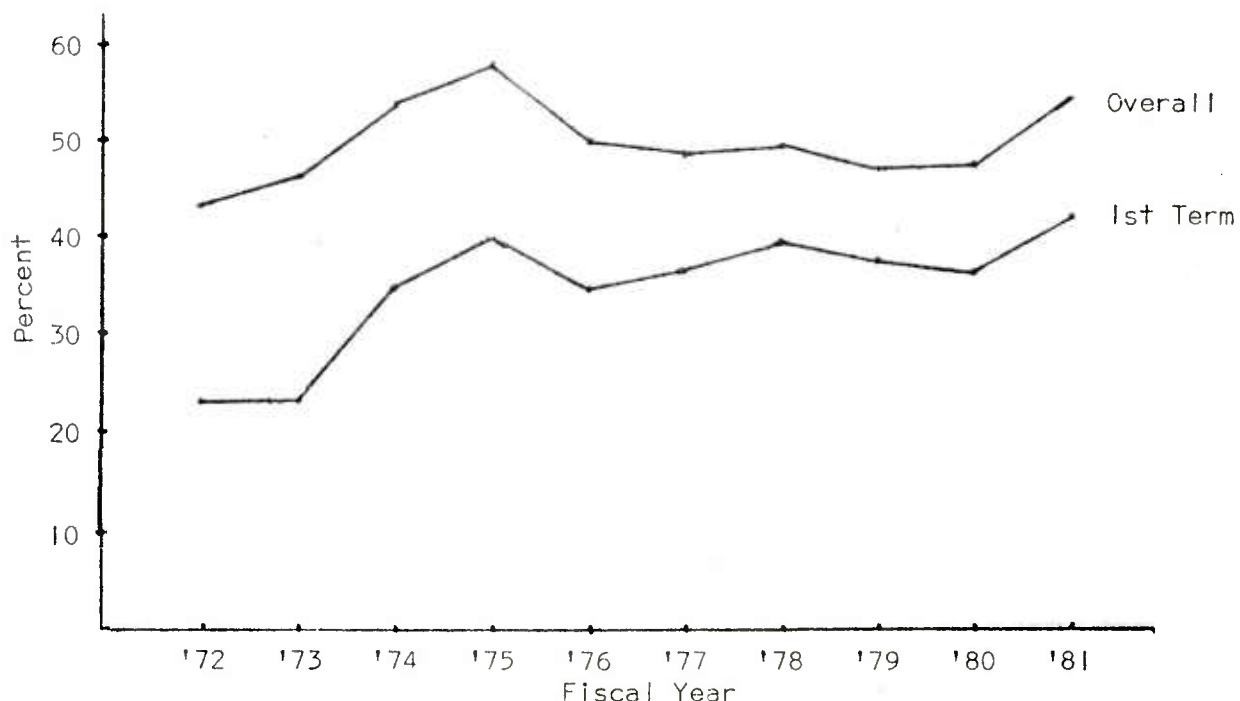
C = Number of separations prior to EAOS who are eligible to reenlist.

D = Number of separations at EAOS who are eligible to reenlist.

Thus, if the above letters are substituted with pertinent FY80 data (NAVPERS 15658(A)), the following is obtained:

$$\begin{array}{ccccccc} \text{FY80 unadjusted reenlistment rate} = & & & & & & \\ (11,828 + 29,728) / (11,828 + 13,034 + 61,389) = 48. & & & & & & \\ \text{(A)} & \text{(B)} & \text{(A)} & \text{(C)} & \text{(D)} & & \end{array}$$

d. Historical values. Unadjusted reenlistment rates for FY72-81 (NAVPERS 15658(A)) are plotted below.



35. Retention rate, adjusted (NMPC).

a. Definition. The adjusted retention rate is determined by dividing the sum of the number of (1) extensions of 24 months or more, (2) continuous service reenlistments within 90 days of EAOS and 2-90 days after EAOS, and (3) separations over 90 days prior to EAOS for reenlistment by the sum of the number of (1) extensions of 24 months or more, (2) separations over 90 days prior to EAOS for reenlistment, (3) separations at EAOS, (4) eligible separations over 90 days prior to EAOS, (5) involuntary extensions (loss codes 385 and 386), and (6) ineligible separations over 90 days prior to EAOS, less the number of separations of involuntary extenders. This rate can be calculated as a first-term, second-term, or any subsequent reenlistment. The number of eligibles is the sum of all enlisted personnel whose loss codes are: 801-803, 806, 809, 811, 816, 833, 841-843, 846, 849, 850, 856, 931, 932, 942, 943, 980.

b. Reference. Naval Military Personnel Command. Annual report--Navy military personnel statistics." (NAVPERS 15658 (A)). Washington, DC: Government Printing Office, June 1972-September 1981.

c. Mathematical formula. Adjusted reenlistment rate $= (A+B+C+D)/(A+D+E+F+G+H+I-J)$, where

A = Number of extensions of 24 months or more.

B = Number of continuous service reenlistments within 90 days prior to EAOS.

C = Number of continuous service reenlistments 2-90 days after EAOS.

D = Number of separations over 90 days prior to EAOS for reenlistment.

E = Number of separations at EAOS not eligible to reenlist.

F = Number of separations at EAOS eligible to reenlist.

G = Number of eligible separations over 90 days prior to EAOS (other than those in D).

H = Number of involuntary extensions.

I = Number of ineligible separations over 90 days prior to EAOS.

J = Number of separations of involuntary extenders.

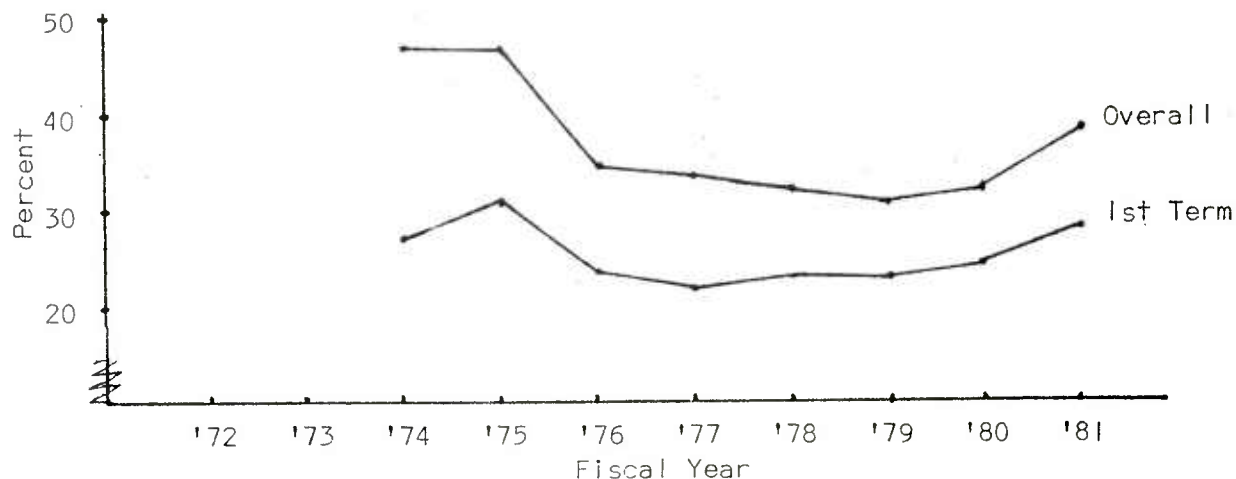
Thus, if the above letters are substituted with pertinent FY80 data (NAVPERS 15658(A)), the following is obtained:

FT80 adjusted retention rate =

$$\frac{(11,828 + 19,037 + 1,040 + 8,595)}{(11,828 + 8,595 + 7,676 + 61,389 + 1,769 + 0 + 32,407 - 0)} = .33.$$

(A) (B) (C) (D) (A) (D) (E) (F) (G) (H) (I) (J)

d. Historical values. Adjusted retention rates for FY74-81 (NAVPERS 15658(A)) are plotted below.



36. Retention rate, RAM II and RAM III (NAVPERSRANDCEN)

a. Definition. The RAM II and RAM III retention rate, also referred to as the voluntary retention rate, is determined by dividing the number of personnel who continue by the number of personnel eligible to make a decision to continue. The numerator is the sum of all individuals with the following loss codes: 383, 804, 805, 807, 808, 810, 814, 815, 817-833, 844, 845, 850, 854, 855, 857-873, 881-890, 898, 901-913, 933, 944, 945, 951, 952-961, and 998. The denominator is the sum of all individuals with the following loss codes: 383, 801-803, 806, 809, 811, 813, 816, 841-843, 846, 849, 853, 856, 931, 932, 942, 943, 948, 980. The data used in this model comes from the enlisted personnel planning data base.

While the RAM I model (see p. A-6) analyzed continuation rates, the RAM II and RAM III models focus on retention rates. In actuality though, these retention rates are reenlistment rates, which are the proportion of "deciders" who reenlist.

b. References.

(1) Chipman, M., & Mumm, R.H. Forecasting naval enlisted retention under alternative retirement systems (NPRDC Tech Rep. 79-4). San Diego, CA: Navy Personnel Research and Development Center, November 1978. (AD-A062 106)

(2) Chipman, M., & Mumm, R.H. Forecasting naval occupational retention behavior under alternative retirement systems (NPRDC Tech. Rep. 80-3). San Diego, CA: Navy Personnel Research and Development Center, November 1979. (AD-A078 028)

c. Mathematical formula. RAM II and RAM III retention rate = $A/(B+C)$, where

A = All Navy combined retention.

B = All Navy retirement.

C = All Navy total eligible expiration/separation--extended.

37. Retention rate, unadjusted (NMPC).

a. Definition. The unadjusted retention rate is determined by dividing the sum of the number of (1) extensions of 24 months or more and (2) continuous service reenlistments by the sum of the number of (1) extensions of 24 months or more and (2) separations prior to or at EAOS. This rate, which is very much like the Navy reenlistment rate (4YO and 6YO formula), can be computed for first termers, second termers, etc.

b. Reference. Naval Military Personnel Command. Annual report--Navy military personnel statistics (NAVPERS 15658(A)). Washington, DC: Government Printing Office, June 1972-September 1981.

c. Mathematical formula. Unadjusted retention rate = $(A+B)/(A+C)$ where

A = Number of extensions of 24 months or more.

B = Number of continuous service reenlistments (within 90 days prior to EAOS, over 90 days prior to EAOS, and 2-90 days after EAOS).

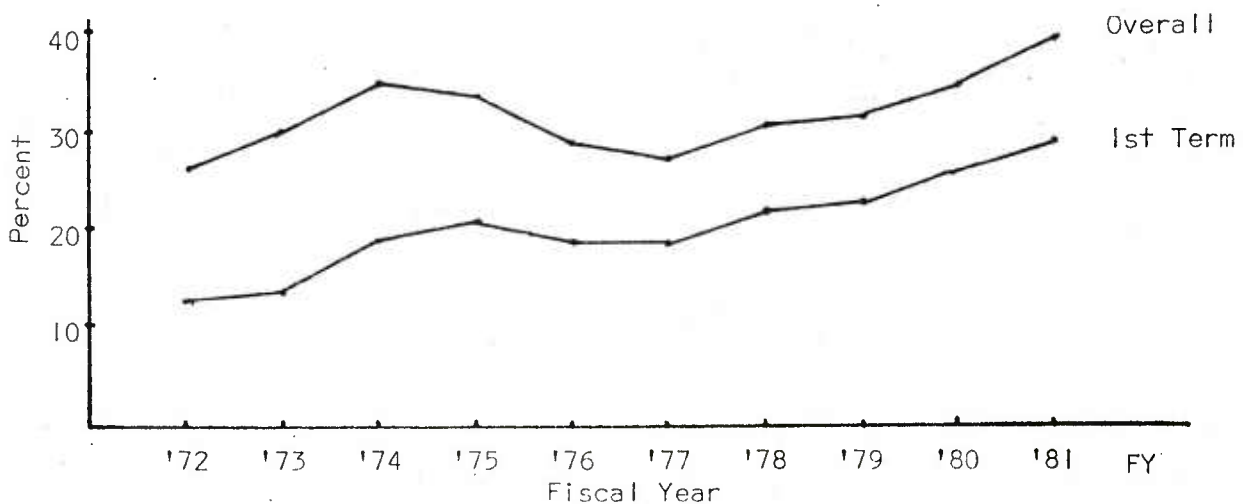
C = Number of eligible and ineligible separations prior to and at EAOS.

Thus, if pertinent FY80 data (NAVPERS 15656(A)) are substituted for the above, the following is obtained:

$$\text{FY80 unadjusted retention rate} = \frac{(11,828 + 29,728)}{(11,828 + 107,268)} = .35.$$

(A) (B) (A) (C)

d. Historical values. The unadjusted retention rates for FY72-81 (NAVPERS 15658(A)) are plotted below.



38. Separation rate, other (DoL).

a. Definition. The DoL other separation rate is the number of terminations of employment because of discharge, permanent disability, death, retirement, transfer to another establishment of the company, and entrance into the armed forces for a period expected to last more than 30 consecutive calendar days. It is calculated per 100 employees, and is determined by subtracting the sum of the DoL quit and layoff rates from the DoL total separation rate.

b. Reference. Department of Labor, Bureau of Labor Statistics, "Employment and earnings," 29(2), Washington, DC: Government Printing Office, February 1982.

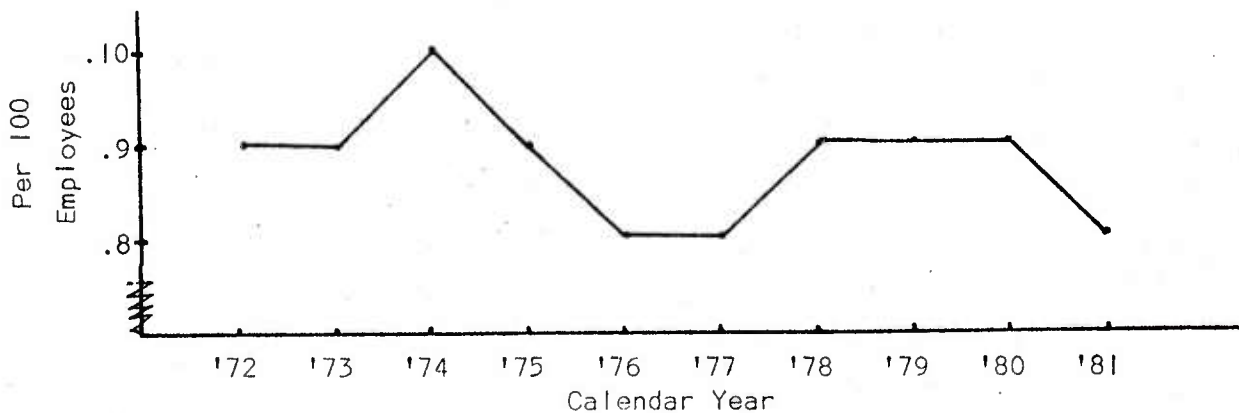
c. Mathematical formula. DoL separation rate = A-B-C, where

A = DoL total separation rate.

B = DoL quit rate.

C = DoL layoff rate.

d. Historical values. The DoL other separation rates for CY72-81 (DoL, 1982) are plotted below.

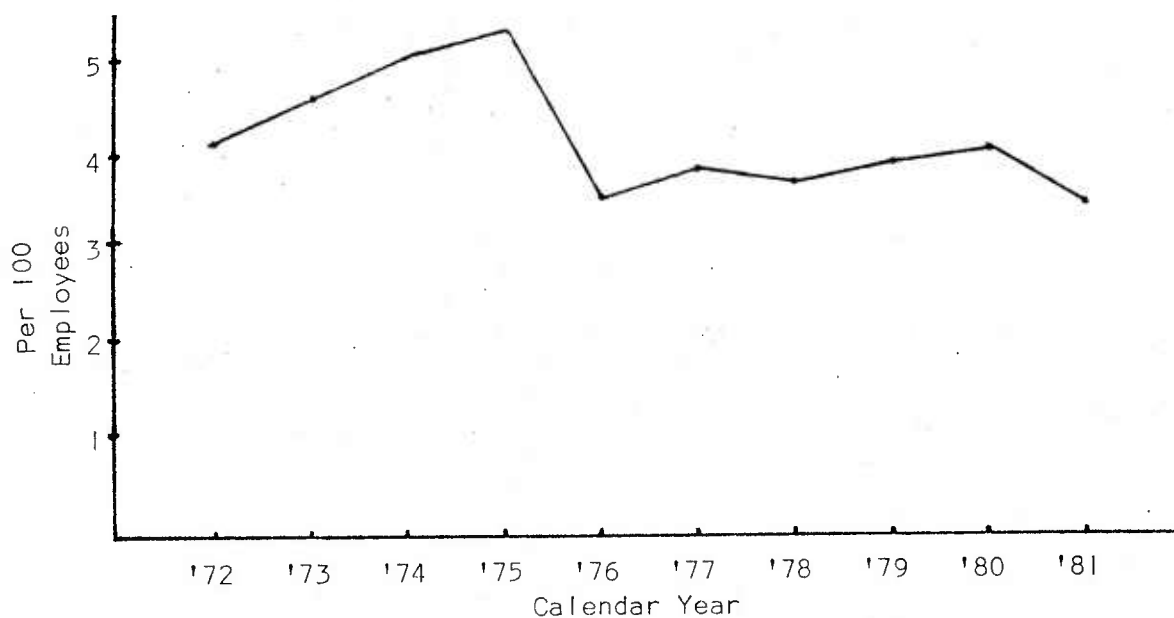


39. Separation rate, total (DoL).

a. Definition. The DoL total separation rate is the number of terminations of employment per 100 employees during the calendar month classified according to cause--quits, layoffs, and other separations.

b. Reference. Department of Labor, Bureau of Labor Statistics, "Employment and earnings," 29(2), Washington, DC: Government Printing Office, February 1982.

c. Historical values. The DoL total separation rates for CY72-81 (DoL, 1982) are plotted below.



40. Survival rate.

a. Definition. This survival rate is defined as the unconditional probability that an individual from an accession cohort will survive to LOS t. Although derived from a seemingly formidable intergrand, the survival rate at LOS t can simply be calculated as the product of the continuance rate at LOS t and the survival rate at LOS (t - 1). Focusing on the LOS 1, the survival rate equals the continuance rate. Hence, survival rates at other LOS cells can be calculated by multiplying the appropriate continuance and survival rates.

b. Reference. Gotz, G. & McCall, J. Estimating military personnel retention rates (R-2541-AF). Santa Monica, CA: The Rand Corporation, June 1980.

c. Mathematical formula. Survival rate (t) = AxB, where

A = Continuance rate at LOS t.

B = Survival rate at LOS t - 1.

EXAMPLE

LOS	A	B
1	.241	.241
2	.510	.241 x .510 = .123
3	.806	.123 x .806 = .099
4	.939	.099 x .939 = .093
5	.331	.093 x .331 = .031

FY 79 DMDC All Navy Retention Rates.

41. Survival rate, cumulative.

a. Definition. Survival rates are used in the field of biostatistics to estimate the probability that a patient will survive or will respond favorably to treatment over a period of time. Survival times are data that measure the time to response, failure, death, relapse, or the development of a given disease. These times are subject to random variations and, like any random variables, form a distribution. The distribution of survival times is usually described or characterized by three functions: (1) the survival function, (2) the probability density function, and (3) the hazard function. These three functions are mathematically equivalent--if one of them is given, the other two can be derived.

b. Reference. Lee, E. T. Statistical methods for survival. Belmont, CA: Lifetime Learning Publications, 1980.

Mathematical Formula

$$\begin{aligned}\text{Cumulative survival rate} = S(t) &= P(\text{an individual survives longer than } t) \\ &= P(T > t) \\ &= 1 - P(\text{an individual fails before time } t) \\ &= 1 - F(t)\end{aligned}$$

where $F(t)$ = cumulative distribution function.

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