

# Navy Personnel Research and Development Center

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## The Development and Implementation of the Budget Obligation Analysis and Tracking System (BOATS)

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**The Development and Implementation of the Budget  
Obligation Analysis and Tracking System (BOATS)**

Susan J. Pinciaro

Reviewed and approved by  
Joe Silverman

Released by  
B. E. Bacon  
Captain, U.S. Navy  
Commanding Officer  
and  
J. S. McMichael  
Technical Director

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<p>→ The pays and allowances components of the Navy's military personnel appropriation (MPN) now exceed \$17 billion/year. To manage and monitor these budget items, large volumes of data must be assembled, analyzed, and tracked monthly. These data are used to estimate the Navy's year-to-date obligations for military pays and allowances, including those which may not yet be reported due to lags in the financial accounting system.</p> <p>Estimated obligations are compared each month to planned monthly obligation levels to monitor MPN budget execution. Significant discrepancies indicate that corrective actions are needed to stay within budget.</p>			
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The Navy has been manually performing the data maintenance and statistical analyses required to manage and monitor MPN budget execution. Problems in MPN budget management have been traced to the limitations of these manual methods.

The Budget Obligation Analysis and Tracking System (BOATS) automates and streamlines MPN budget management processes. Implemented in stages throughout FY84-86, BOATS represents a significant advance in the Navy's MPN budget management capability.



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## FOREWORD

This report describes the development, implementation, and capabilities of a decision support system known as the Budget Obligation Analysis and Tracking System (BOATS). BOATS was designed to support the Military Personnel, Navy (MPN) Budget Department of the Naval Military Personnel Command (NMPC-7) in managing and monitoring the execution of the Navy's manpower appropriation. Specifically, NMPC-7 uses BOATS during budget execution to determine monthly estimates of obligations for military pays and allowances and to track these estimates with respect to planned monthly obligations. BOATS assists NMPC-7 in identifying the source of budget execution problems and in recommending actions to correct these problems.

BOATS was designed and developed by Dennis Schurmeier, Robert Holmes, and the author. Software development support was provided by Richard Butterworth, Robert Stephan, and Marcus Crawford of Systems Exploration, Inc. This effort was conducted under O&M,N project WRH5141. Development of the obligation estimation models was supported by PE63707N project R1770-MP008.

B. E. BACON  
CAPTAIN, U.S. Navy  
Commanding Officer

J. S. MCMICHAEL  
Technical Director

## SUMMARY

The Navy needs more accurate and defensible methods for monitoring the execution of its \$18 billion manpower appropriation. The MPN Budget Department of the Naval Military Personnel Command (NMPC-7) is responsible for managing and monitoring the execution of the manpower appropriation known as Military Personnel, Navy or MPN. Military pays and allowances account for over 96 percent of the MPN budget. Managing and monitoring these budget components entails two broad responsibilities:

1. Determining each month the year-to-date earnings of all Navy members. This process is referred to as "determining obligations." It requires forecasting amounts that will be reported in the future, but which have already been earned during the year.
2. Tracking obligations against the Navy's planned monthly earnings. These planned earnings are reflected in the MPN's "phasing plans." These plans are related directly to planned manpower levels.

An investigation of the methods used by NMPC-7 to determine obligations and monitor budget execution revealed that three functions could be improved via an automated decision support system (DSS):

1. Storing and accessing historical data on all pays and allowances.
2. Forecasting amounts earned during the year which are not yet reported.
3. Comparing estimated obligations with plans for all pays and allowances.

A DSS known as the Budget Obligation Analysis and Tracking System (BOATS) was designed with three subsystems supporting these three functions. BOATS is an interactive, menu-driven system designed for ease of use by budget analysts with no computational experience. A rapid prototyping approach was used to develop BOATS. A small-scale usable version of the system was provided to the user early-on. Then, through iterative rounds of user feedback and system modifications, BOATS was tailored to suit the NMPC-7 analysts. This approach was used on each of BOATS' three subsystems.

By automating previously time-consuming, labor-intensive operations, BOATS enables the Navy's budget analysts to concentrate on the identification of MPN budget execution problems and the prescription of solutions to those problems, rather than on data management issues. For this reason, BOATS represents a significant advance in the Navy's MPN budget management capability.

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## INTRODUCTION

### Problem

This report describes the design, development, and implementation of a computerized decision support system (DSS) to improve the Navy's ability to estimate enlisted and officer pay and allowance obligations, and to monitor the execution of these budgetary components. The Military Personnel, Navy (MPN) appropriation, now over \$18 billion/year, provides the funding to compensate the Navy's 500,000 enlisted members and 70,000 officers for the pays and allowances they earn throughout a fiscal year. In addition to enlisted and officer pays and allowances, the MPN budget also provides for pays and allowances to midshipmen, permanent change of station moving costs, and other military personnel costs.<sup>1</sup> However, enlisted and officer pays and allowances comprise about 96.1 percent of the budget.<sup>2</sup> The MPN budget consists of a total dollar limit (set by Congress) and a monthly "phasing" plan reflecting the anticipated monthly earnings of the Navy members over the fiscal year. The monthly plan is directly related to planned monthly manpower levels.

The MPN Budget Department of the Naval Military Personnel Command (NMPC-7) is responsible for managing and monitoring MPN budget execution. This latter responsibility includes identifying apparent deviations between phasing plans and obligations and notifying the Chief of Naval Personnel when personnel policy changes are needed to correct these deviations.

Because Navy personnel are spread around the world, the amounts earned by members are not all reported in the months they are earned. Consequently, it is not possible for NMPC-7 to know with certainty, the Navy's obligations during budget execution. Portions of pay and allowances are reported in subsequent months and are applied retroactively to the months in which they were earned. These retroactively reported amounts are called "rollback." NMPC-7 must estimate the rollback amounts which will ultimately be reported in order to estimate obligations. Accurate estimates of rollback are needed to identify deviations from plans and to assess the need for corrective actions. Inaccurate estimates can and do result in the failure to take necessary corrective actions or in the implementation of unnecessary policies/actions. Accurate estimation of incurred obligations is difficult given the volume and complexity of data that must be processed and analyzed. A lack of statistical techniques and computerized methods for performing these tasks has increased the likelihood of misestimating obligations.

The following sections will (1) describe the process of determining and monitoring financial obligations; and (2) outline the design and development of a decision support system to improve financial management decisions.

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<sup>1</sup>These other costs include expenses associated with apprehending deserters, survivor's benefits, and unemployment compensation to ex-service members.

<sup>2</sup>This figure is the average from Fiscal Years 85, 86, and 87.

## APPROACH

### Processing of Financial Information

Six (6) steps were identified in the obligation determination and budget execution monitoring processes. These steps helped define the requirements for the DSS. They are shown in Figure 1 and discussed below.

1. The receipt of the monthly Accrued Entitlement Detailed Classification Code Report from the Navy Finance Center (NFC) in Cleveland, Ohio starts the monthly obligation/monitoring cycle. The report is often referred to as the "IM Report." The data in the IM are compiled and formatted by NFC from individual members' Military Master Pay Account records maintained as part of the Joint Uniform Military Pay System (JUMPS). A formatted magnetic tape containing the IM is sent to NMPC where a hardcopy listing is made. The IM report is a 1700+ page computer listing. It contains data for over 400 types of pays and allowances (also called entitlements, or budget categories). A complete list of these entitlements is contained in Appendix A. Examples include enlisted and officer basic pay. The report provides entitlement amounts earned and reported in the current month (current entitlements), as well as entitlement amounts reported in the current month, but which were earned in preceding months of the current fiscal year and previous fiscal year (retroactive entitlements or "rollback"). The two types of data are distinguished in Figure 2a. The IM also reports retroactive entitlements to several preceding fiscal years, but not by month of occurrence--only by year.

2. Monthly, upon receipt of the IM report, each MPN budget analyst manually transcribed data applicable to the budget categories for which he/she was responsible from the IM report. The data were entered onto worksheets maintained for each fiscal year and budget category. Through the transcription process, year-to-date reported totals were maintained for the current year and running totals were maintained for several preceding years by budget category. Figure 2b shows the reported year-to-date total for the current year for a budget category consists of two components--the sum of the amounts reported in the month they were earned and the sum of the amounts reported in subsequent months. The transcription of the relevant data and worksheet updates took each analyst approximately one day each month. These tasks were performed for approximately 120 aggregations of the 400 budget categories. (The time and labor needed to maintain worksheets for all 400 budget categories would have been prohibitive. The 120 aggregations represent groups of related entitlements. All entitlements are included in at least one aggregation.)

3. The updated entitlement data were used by the analysts to forecast "rollback" for each budget category. In effect, they predicted how many more dollars already earned in the expired months of the current fiscal year would be reported in the future.<sup>3</sup> Figure 3 illustrates the known (A & B) and forecasted (C) components of estimated October entitlements, as of December.

Each budget analyst used his/her own method for computing rollback forecasts, but all the methods were, in some way, based on patterns of rollback in previous fiscal years. This process of forecasting rollback required maintaining, via transcription from the IM report, updated worksheets for several prior fiscal years for approximately 120 budget category groups.

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<sup>3</sup>The forecast horizon actually ends at the end of the second year following the current year. At this point, the MPN appropriation corresponding to the current fiscal year is considered "closed."

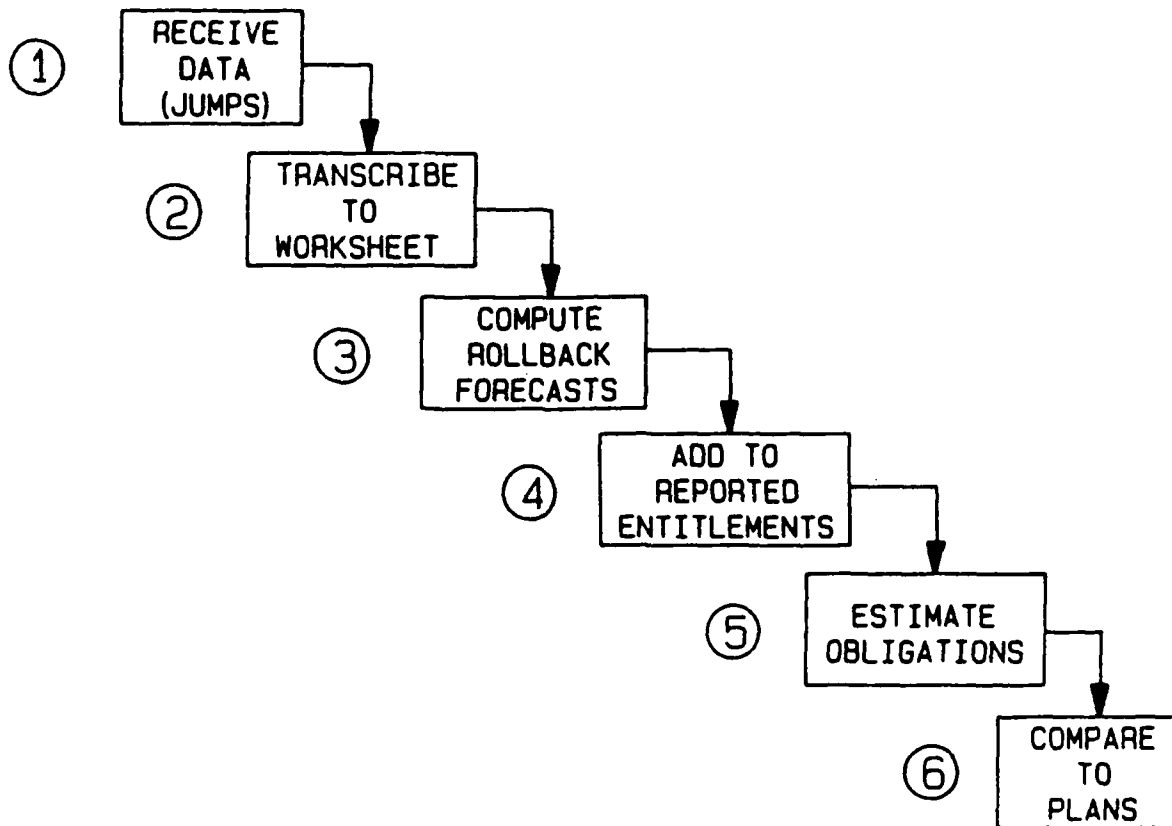


Figure 1. Monthly steps required to estimate MPN obligations and monitor budget execution.

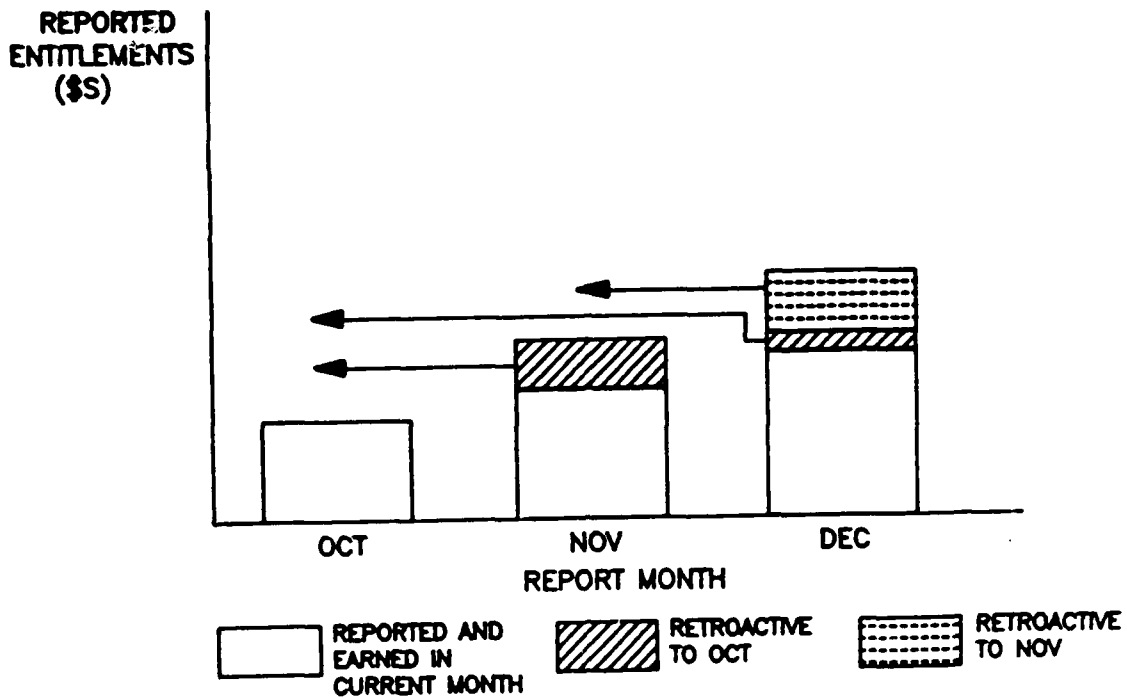


Figure 2a. Current and retroactively reported entitlements through December.

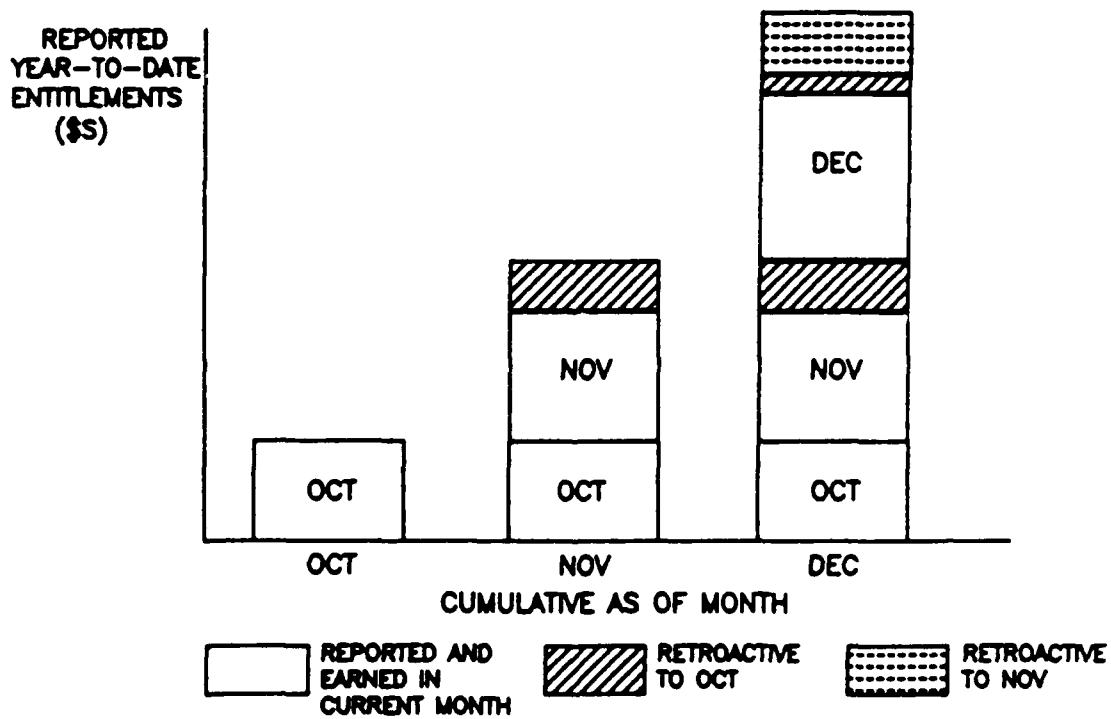


Figure 2b. Cumulative year-to-date reported entitlements.

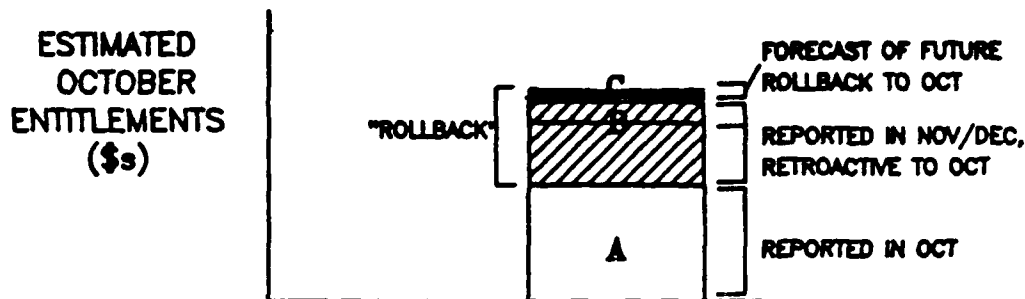


Figure 3. Components of estimated October entitlements as of December.

4. The forecasts of outstanding rollback were added to the year-to-date reported entitlements for each budget category group (see Figure 4). This yielded estimates of the Navy's year-to-date obligations for each budget category group.

5. Each month, the Navy formally set aside a portion of the MPN appropriation to cover year-to-date obligations estimated to have been incurred. Funds were obligated for three broad, mutually exclusive and exhaustive groupings of pays and allowances:

- Pays and Allowances for Officers
- Pays and Allowances for Enlisted Personnel
- Subsistence of Enlisted Personnel

The estimates derived in Step 4 for the 120 budget category groups were summed to produce aggregate obligation estimates for the three groups. The Navy then obligated funds to cover these amounts.

6. Budget execution is monitored at finer levels of detail than the actual obligation of funds. This explains the need to forecast rollback for 120 budget category groups, and then sum them to estimate obligations, rather than forecasting at the highest level of aggregation (the three obligation categories). Monitoring must be performed at lower levels of aggregation to identify the source of execution problems so that corrective actions can be targeted accurately. (Monitoring would have been performed at still finer levels, but the manual computational requirements were prohibitive). Monitoring involves the comparison of the estimated year-to-date obligations for each budget category group with planned year-to-date entitlements (the phasing plan). Significant discrepancies are noted and reported to the Chief of Naval Personnel so that corrective actions, in the form of personnel actions, can be designed and implemented.<sup>4</sup> Figure 5 illustrates the comparison of cumulative estimated obligations through December to a hypothetical plan to obligate equal amounts in each month of the year. The budget analysts performed these comparisons manually, without automated graphic capability.

<sup>4</sup>Not all discrepancies require corrective personnel actions. Sometimes discrepancies can be resolved by making off-setting adjustments between phasing plans of different budget categories. This is possible when obligations exceed the plan in one or more budget categories and fall short of plan in others by off-setting amounts.

System Requirements

Based on an evaluation of the six steps described above, three functions associated with the processes of estimating obligations and monitoring budget execution were identified for improvement. These three functions were:

1. Storage and access to historical JUMPS data for all budget categories.

An automated JUMPS database could be updated each month with the same raw data used to produce the IM report. Data retrieval capability in various graphic and numeric formats would speed and simplify the comparison of rollback patterns between months, years, and budget categories. This capability would eliminate the need to transcribe data from the IM report and to store hundreds of paper worksheets.

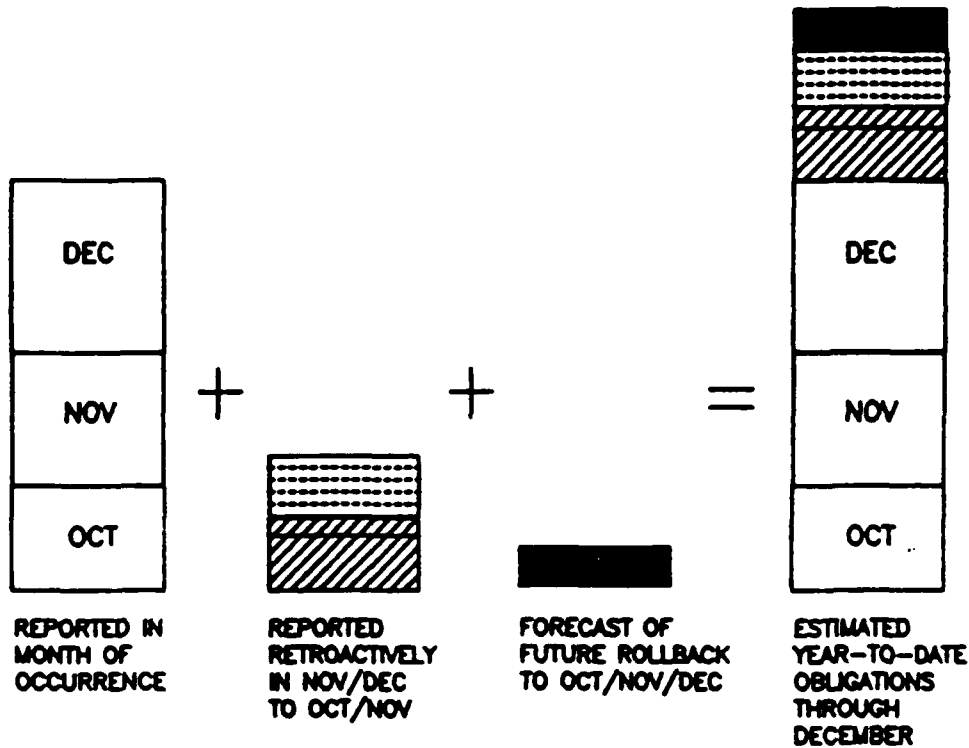


Figure 4. Estimated year-to-date obligations through December.

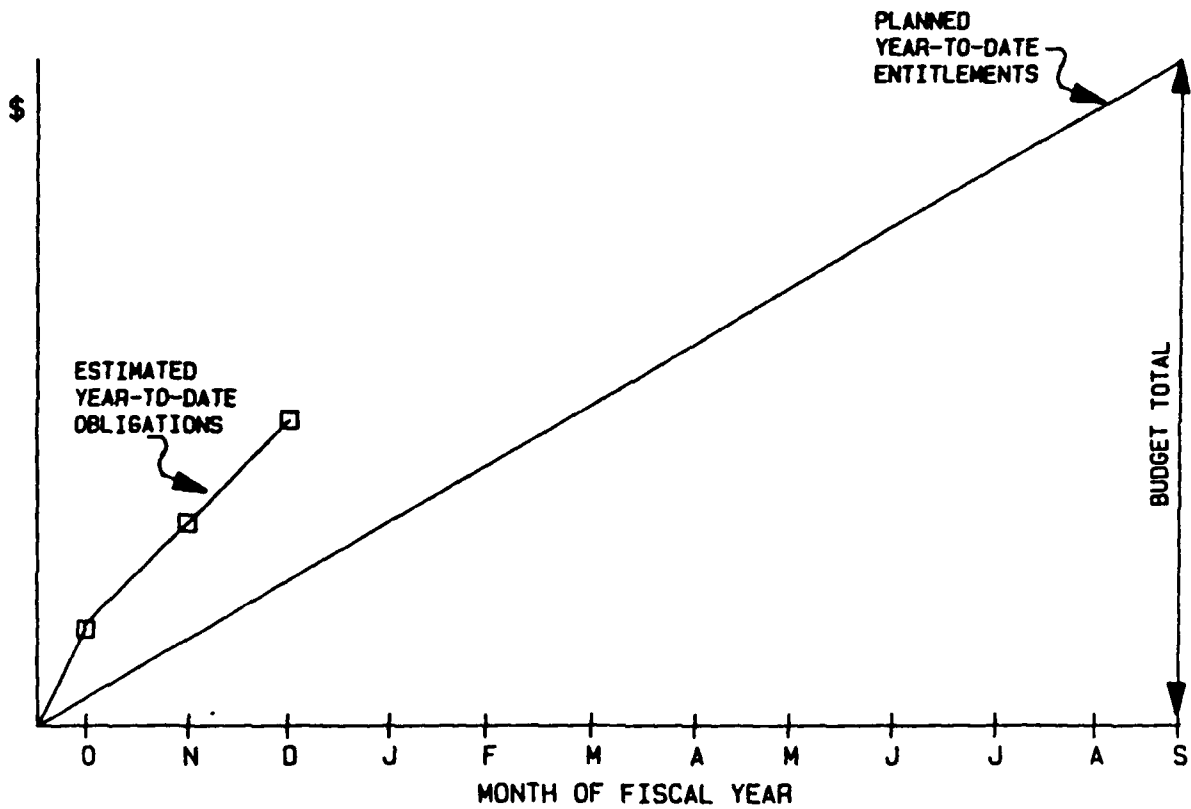


Figure 5. Monitoring MPN budget execution.

**2. Generation of rollback forecasts for all budget categories, based on the historical JUMPS data stored in the database.**

This capability would eliminate the tedious manual computations needed to produce rollback forecasts. It would provide a baseline forecast for the analyst to accept or override (based on the analyses made possible by the on-line databases). It would also provide a standard forecasting methodology shared by all the budget analysts, rather than numerous, undocumented forecasting methods. Moreover, the generation of forecasts for all budget categories (by paygrade and length of service, when appropriate) would permit improved budget execution monitoring by enabling more specific targeting of corrective policies.

**3. Comparison of estimated obligations with plans for all budget categories.**

Automated graphic and numeric comparison capabilities would produce more effective monitoring of budget execution than is possible with manual methods. It also would result in the storage of multiple plans for any or all budget categories, so that changes to plans made to correct problems during budget execution could be retained and retrieved rapidly for subsequent study.

DSS Design

The requirements definition phase revealed several characteristics of the MPN Budget Department (NMPC-7) and its functions which became important system design considerations. These characteristics and the design considerations they raised are described below:

1. The estimation of obligations is data-intensive. Entitlement data are reported each month for over 400 budget categories. For many of the budget categories, data are also reported by paygrade and/or length of service (LOS). Estimating obligations each month involves tracking large volumes of historical data for approximately 120 aggregations of these budget categories. Hence, the system developed to support obligation estimation must be capable of storing, manipulating, and retrieving large amounts of data efficiently.

2. There is a brief (one week) "window" during a month, after the IM data becomes available and before the Navy must officially obligate funds for the month. This implies that the system developed to support these functions must respond rapidly to user requests for data.

3. The 120 budget category groups are divided among six budget analysts. This, coupled with the brief obligation window, suggests that the DSS must be capable of servicing multiple users simultaneously.

4. The MPN budget analysts typically have limited or no computational experience. To ensure user-acceptance of the end-products of this effort, all software must be easy to use.

The obligation estimation and budget execution monitoring tools were designed as a single system containing modules supporting the three (3) functions of JUMPS data retrieval, rollback forecasting, and estimated vs. planned obligations comparisons. The system was named the Budget Obligation Analysis and Tracking System (BOATS). The three (3) functions to be supported suggested natural boundaries for subsystems within

BOATS. These were named the JUMPS DATA subsystem, the DETERMINE OBLIGATIONS subsystem, and the MONITOR OBLIGATIONS subsystem. After logging onto BOATS, the user selects the desired subsystem from a menu.

Each of the three subsystems was also designed as a modular system. The components of each subsystem are organized in a nested fashion and are accessed through interactive dialogue using menus. The subsystem components are called "modules", and the module components are called "functions." This BOATS organization is illustrated in Figure 6. (Due to space limitations, the individual functions are not shown. The number of functions in each module is indicated in the boxes representing the modules.) The user accesses the desired function by making the appropriate selections from the successive subsystem, module, and function menus. Within each function, the system queries the user for the specific characteristics of the array or graph desired (e.g., budget category(ies), paygrade(s), year(s), months(s)).

The ease of use afforded by the BOATS' design is best illustrated by an example. Figure 7 displays the dialogue with BOATS that would be used to retrieve monthly FY87 data on officer basic pay, as of June 1987. Figure 8 is a replica of the data array that BOATS would provide in response to these user inputs.

### DSS Development

A rapid-prototyping approach was used to develop BOATS. This approach is characterized by the development of a small-scale prototype to demonstrate an automated application to a potential user. After having the new capability demonstrated, the user is given access to the application for testing, experimentation and, when possible, operational use. Feedback from the user is then used to expand the capabilities of the prototype and to modify its operating characteristics. After incorporating the new features, the expanded prototype is once again demonstrated and delivered, and another iteration of user feedback is initiated. This iterative development process tailors the system to the users and maximizes the likelihood of acceptance. Given the limited computer experience of the targeted users of BOATS, a rapid prototyping approach helped engage them in the design/development process and minimized their resistance to using computers in their jobs.

This approach was applied successively to each of the three BOATS subsystems. First, a small-scale version of the JUMPS DATA Subsystem was developed and delivered. User feedback was used to modify the subsystem to accommodate the budget analysts. While the JUMPS DATA Subsystem was being refined during several iterations of user feedback, a prototype of the DETERMINE OBLIGATIONS Subsystem was developed and delivered. This prototype included a statistical model for forecasting rollback for each budget category.<sup>5</sup> Like the JUMPS DATA Subsystem, iterative refinements of the DETERMINE OBLIGATIONS Subsystem were based on user feedback. Finally, while these refinements were in progress, a prototype of the MONITOR Subsystem was developed. It too was later enhanced based on user input. The capabilities of the three subsystems are summarized in Figure 9.

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<sup>5</sup>The model is based on historical rollback patterns. The analysis of these patterns was made possible by the creation of the historical JUMPS database developed for the JUMPS DATA Subsystem. The model is described, and its equations are provided, in Appendix B.

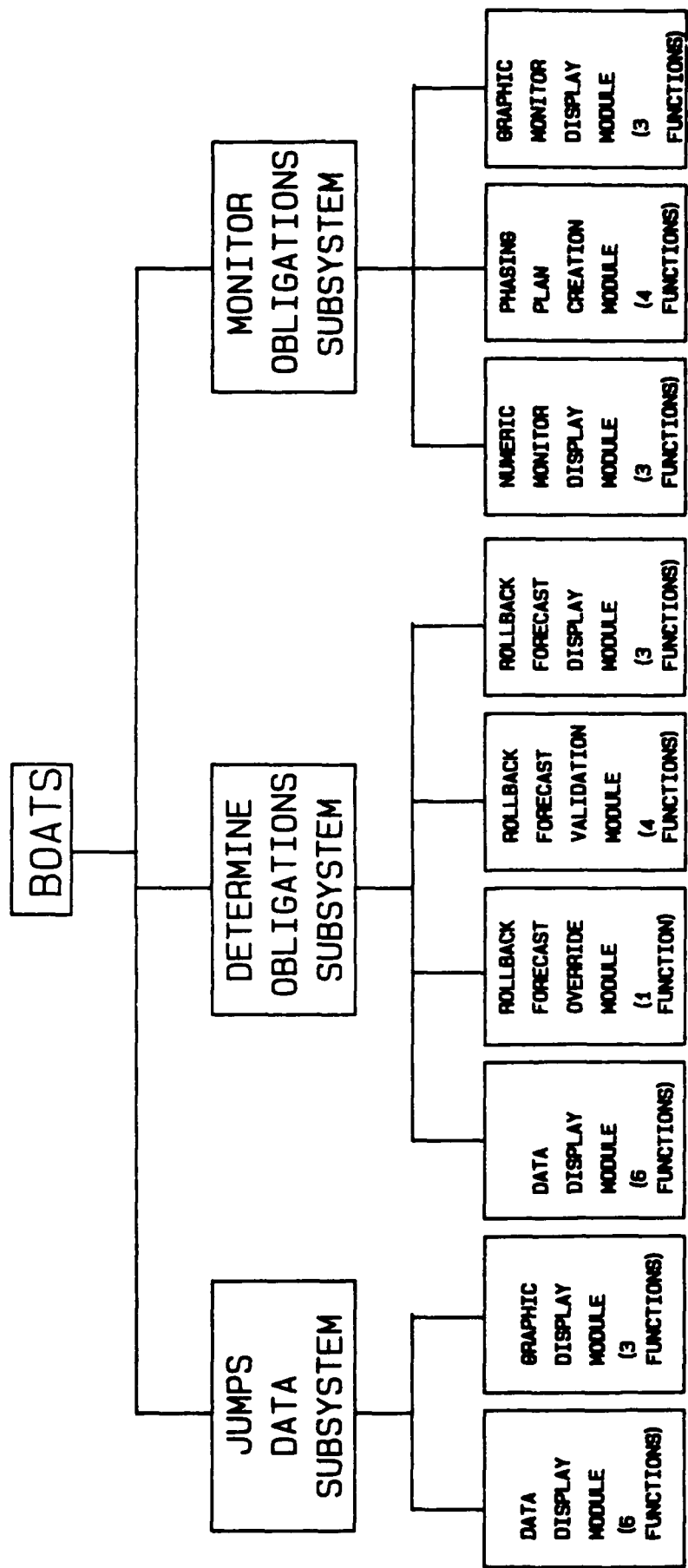


Figure 6. The structure of BOATS' components.

BOATS SYSTEM CONTROL - VERSION 610

- 1 JUMPS DATA DISPLAY SUBSYSTEM
- 2 DETERMINATION OF OBLIGATIONS
- 3 MONITOR OBLIGATIONS SUBSYSTEM
- 4 STOP

SUBSYSTEM MENU  
(underlining denotes  
user input)

SELECT BY NUMBER: 1

MODULE CONTROL FOR JUMPS SUB-SYSTEM

- 1 DATA DISPLAY MODULE
- 2 GRAPHICS SHOWING ROLLBACK TIME-TRENDS
- 3 SYSTEM CONTROL

MODULE MENU

SELECT BY NUMBER? 1

DATA DISPLAY MODULE

- | NAME   | FUNCTION                                  |
|--------|---|
| A TOMY | ROLLBACK TO A GIVEN MONTH (YEAR)          |
| B TOFY | ROLLBACK TO A FISCAL YEAR (BY MONTH)      |
| C FRMY | ROLLBACK FROM A GIVEN MONTH (YEAR)        |
| D COMP | ROLLBACK COMPARING SEVERAL MONTHS         |
| E CUPG | CUMULATIVE ROLLBACK TO A GIVEN PG (MONTH) |
| F TOAN | ANNUAL ROLLBACK TO A GIVEN PG (MONTH)     |
| M MC   | MODULE CONTROL                            |

FUNCTION MENU

SELECT A FUNCTION BY LETTER OR NAME

E

EXECUTING CUPG

CUMULATIVE ROLLBACK TO A GIVEN PG (MONTH)  
ENTITLEMENT? 1A00 (OFFICER BASIC PAY)

QUERIES

YEAR? 87

TYPE? 1 (DOLLARS)

TRANSFORMATION? 1 (NO TRANSFORMATION OF THE RAW DATA)

Figure 7. Using BOATS to retrieve monthly FY87 data on officer basic pay as of June.

ROLLBACK REPORT FOR OFF-BASIC PAY (IA00)  
DATA DISPLAYED IS DOLLARS IN 000's FOR YEAR=FY87/AS OF MONTH=JUN

MTH RPTD PAYGRADE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOT
O1	15,122	15,017	15,087	15,597	15,604	15,454	15,279	15,324	14,416	136,900
O2	17,690	17,910	17,634	18,168	18,406	18,145	17,893	18,860	18,426	163,132
O3	51,851	51,818	51,776	53,141	52,876	53,246	53,431	53,195	55,779	477,113
O4	37,460	37,354	37,318	38,420	38,531	38,586	38,661	38,759	38,937	344,026
O5	26,347	26,245	26,234	27,078	27,084	27,140	27,205	27,297	27,751	242,382
O6	15,716	15,650	15,681	16,215	16,250	16,266	16,327	16,390	16,859	145,355
O7	648	645	646	669	669	669	669	664	659	5,938
O8	488	493	485	490	490	502	511	511	511	4,481
O9	166	166	187	201	201	196	181	182	181	1,661
O10	52	52	47	47	47	48	54	54	54	456
W1	0	0	0	0	0	0	0	0	0	0
W2	2,113	2,05	2,005	2,065	2,066	2,080	2,124	2,127	2,111	18,746
W3	1,992	2,043	2,067	2,141	2,123	2,061	1,752	1,802	1,849	17,830
W4	3,020	2,962	2,934	2,983	2,932	2,886	3,128	3,059	3,000	26,904
TOTAL	172,665	172,410	172,102	177,213	177,281	177,280	177,217	178,225	180,534	1,584,926
RLBACK	641	731	591	403	524	282	219	738	0	4,129

SOURCE: JOINT UNIFORM MILITARY PAY SYSTEM: JUN 87--NPRDC

Figure 8. An example of a BOATS output data array for FY87 officer basic pay as of June 1987.

**BOATS  
SUBSYSTEMS**

**JUMPS DATA**

**CAPABILITIES**

- Displays historical and current JUMPS data in graphic and array type formats.
- Data is available for over 400 budget categories at the paygrade and length of service levels (where appropriate).
- Data for all budget categories is available from July 1981 to the present.
- JUMPS database is updated monthly with data supplied by NFC.
- Data displays may be specified to compare budget categories, paygrades, length of service categories, fiscal years and/or months.

**DETERMINE OBLIGATIONS**

- JUMPS data retrieval.
- Forecasts rollback for each month for all budget categories, paygrades and length of service categories.
- Allows user to override system-generated forecasts. Stores system's forecasts and user overrides for three years. Allows user retrieval of all forecasts.
- Validates rollback forecasts against actual rollback amounts as they are reported.
- Flags extreme rollback forecasts for user referral.
- Produces summary reports of estimated obligations.

**MONITOR OBLIGATIONS**

- Displays estimated obligations, phasing plans, or both, in graphic and array type formats.
- Allows user to enter phasing plans, modify existing plans or delete previously stored plans.
- Allows storage of multiple phasing plans for each budget category.

Figure 9. BOATS' capabilities.

BOATS' software is written in the APL programming language. The system resides on an IBM mainframe computer at the Argonne National Laboratory in Chicago, IL. The Navy's budget analysts in Washington, DC access BOATS via leased phone lines.

### CONCLUSION

Components of BOATS have been operational since early FY84. Additional capabilities, based on user feedback, were added throughout FY85 and FY86. BOATS is now fully operational and integrated into the MPN obligation determination and budget execution monitoring processes.

The development and implementation of BOATS provides the MPN Budget Department with computer-based methods for managing the MPN budget. By automating previously time-consuming, labor intensive operations, BOATS enables the Navy's budget analysts to concentrate on the identification of MPN budget execution problems and the assessment of alternative solutions to those problems, rather than on data management issues. For this reason, BOATS represents a significant advance in the Navy's MPN budget management capability.

**APPENDIX A**  
**JOINT UNIFORM MILITARY PAY SYSTEM (JUMPS)**  
**ENTITLEMENTS REPORTED BY BOATS**

BOATS  
 CODE PG\* TITLE (JUMPS CODES)

OFFICER

IA	N	BASIC PAY(TOTAL) (IAXX)
IAENT	N	BASIC PAY (ENTITLEMENT ADJUSTMENT) (IATO-TT)
IARPA	N	RETIRED PAY ACCRUAL (ZZZZ)
IATOT	N	BASIC PAY (TOT + ENT ADJ.) (IATO)
IA00	Y	BASIC PAY (IA00)
IB	Y	INCENTIVE PAY - HAZARDOUS DUTY (IBXX)
IBAV	N	AVIATION CN PAY (IB14 IB15 IB16 IB17 IB18 IB19)
IBAVA	N	AVIATION CN PAY (ANNIVERSARY) (IB16 IB19)
IBAVN	N	AVIATION CN PAY (NEW) (IB14 IB15 IB17 IB18)
IBCR	N	FLY PAY CREW (IB11 IB12)
IBENT	N	INCEN/HAZ. DUTY ENTITLEMENT ADJ. (IBTO-TT)
IBFCS	N	FLY PAY CREW (SAVED) (IB12)
IBFCT	Y	FLY PAY (ACIP -- CREW) LOS TOT (IB11)
IBF01	Y	FLY PAY-ACIP CREW-2 OR LESS YRS (AS) (IB11-01)
IBF02	Y	FLY PAY-ACIP CREW-OVER 2 YRS (AS) (IB11-02)
IBF03	Y	FLY PAY-ACIP CREW-OVER 3 YRS (AS) (IB11-03)
IBF04	Y	FLY PAY-ACIP CREW-OVER 4 YRS (AS) (IB11-04)
IBF06	Y	FLY PAY-ACIP CREW-OVER 6 YRS (AS) (IB11-06)
IBF18	Y	FLY PAY-ACIP CREW-OVER 18 YRS (CS) (IB11-18)
IBF20	Y	FLY PAY-ACIP CREW-OVER 20 YRS (CS) (IB11-20)
IBF22	Y	FLY PAY-ACIP CREW-OVER 22 YRS (CS) (IB11-22)
IBF24	Y	FLY PAY-ACIP CREW-OVER 24 YRS (CS) (IB11-24)
IBF25	Y	FLY PAY-ACIP CREW-OVER 25 YRS (CS) (IB11-25)
IBHD	N	MISC. HAZARDOUS DUTY PAY (IB30 IB50 IB60 IB70 IB80 IB95 IB97)
IBNCR	N	FLY PAY NON-CREW (IB13)
IBPAT	N	PRESS. CHAMBER,ACL/DCL,THERMAL PAY (IB50 IB60 IB70)
IBTOT	N	INCENTIVE PAY - HAZ. DUTY(W/ENT ADJ) (IBTO)
IBTOX	N	TOXIC FUEL, TOXIC VIRUS PAY (IB95 IB97)
IB1	Y	FLY PAY (ALL) (IBIX)
IB2	Y	SUBMARINE PAY - LOS TOT (IB21)
IB201	Y	SUBMARINE PAY-2 OR LESS YRS (IB21-01)
IB202	Y	SUBMARINE PAY-OVER 2 YRS (IB21-02)
IB203	Y	SUBMARINE PAY-OVER 3 YRS (IB21-03)
IB204	Y	SUBMARINE PAY-OVER 4 YRS (IB21-04)
IB206	Y	SUBMARINE PAY-OVER 6 YRS (IB21-06)
IB208	Y	SUBMARINE PAY-OVER 8 YRS ((IB21-08)
IB210	Y	SUBMARINE PAY-OVER 10 YRS (IB21-10)
IB212	Y	SUBMARINE PAY-OVER 12 YRS (IB21-12)
IB214	Y	SUBMARINE PAY-OVER 14 YRS (IB21-14)
IB216	Y	SUBMARINE PAY-OVER 16 YRS (IB21-16)
IB218	Y	SUBMARINE PAY-OVER 18 YRS (IB21-18)
IB222	Y	SUBMARINE PAY-OVER 22 YRS (IB21-22)
IB226	Y	SUBMARINE PAY-OVER 26 YRS (IB21-26)

\*Y indicates that data is reported for each paygrade.  
 N indicates that data is not reported for each paygrade.

1B3	N	PARACHUTE PAY (TOTAL) (1B30 1B31)
1B30	N	PARACHUTE PAY (1B30)
1B31	N	PARACHUTE PAY HI ALT (1B31)
1B8	N	DEMOLITION PAY (1B80)
1B9	N	FLIGHT DECK PAY (1B90)
1C	Y	SPECIAL PAY (1CXX)
1CADD	Y	DENTAL ADDITIONAL PAY (1C12 1C63)
1CASD	Y	DENTAL - ADD SPEC PAY - LOS TOTAL (1C09)
1CA03	Y	DENTAL - ADD SPEC PAY - OVER 3 YCS (1C09-03)
1CA14	Y	DENTAL - ADD SPEC PAY - OVER 14 YCS (1C09-14)
1CA18	Y	DENTAL - ADD SPEC PAY - OVER 18 YCS (1C09-18)
1CBCD	Y	DENTAL - BD CERT - LOS TOTAL (1C08)
1CB11	Y	DENTAL - BD CERT - LESS THAN 12 YCS (1C08-11)
1CB12	Y	DENTAL - BD CERT - OVER 12 YCS (1C08-12)
1CB14	Y	DENTAL - BD CERT - OVER 14 YCS (1C08-14)
1CDP	N	DENTAL PAY (TOTAL) (1C07 1C08 1C09 1C12 1C63)
1CDVS	Y	DENTAL - VSP - LOS TOTAL (1C07)
1CD02	Y	DENTAL - VSP - LESS THAN 3 YCS (1C07-02)
1CD03	Y	DENTAL - VSP - OVER 3 YCS (1C07-03)
1CD06	Y	DENTAL - VSP - OVER 6 YCS (1C07-06)
1CD10	Y	DENTAL - VSP - OVER 10 YCS (1C07-10)
1CD14	Y	DENTAL - VSP - OVER 14 YCS (1C07-14)
1CD18	Y	DENTAL - VSP - OER 18 YCS (1C07-18)
1CENT	N	SPECIAL PAY ENTITLEMENT ADJ. (1CTO-TT)
1CLLP	Y	LINGUIST LEVEL PAY TOTAL (1C53 1C54 1C55)
1CLP	Y	LINGUIST PAY TOTAL (1C53 1C54 1C55 1C57 1C58 1C59)
1CLPP	Y	LINGUIST PARTIAL PAY TOTAL (1C57 1C58 1C59)
1CMP	N	MEDICAL PAY (VSP,MDS,RET,INCEN) (1C11 1C14 1C15 1C16 1C17)
1CMPV	N	VSP - MEDICAL - LOS TOT (1C14)
1CPBC	N	MDS PAY -- BD CERT - LOS TOT (1C15)
1CPMA	N	RESPONSIBILITY PAY/FLAG OFFICER PMA (1C20 1C31 1C32 1C33 1C34)
1CPSP	Y	PREMIUM SEA PAY (1C81)
1CP09	N	MDS PAY -- BD CERT - UNDER 10 YCS (1C15-09)
1CP10	N	MDS PAY -- BD CERT - OVER 10 YCS (1C15-10)
1CP12	N	MDS PAY -- BD CERT - OVER 12 YCS (1C15-12)
1CP14	N	MDS PAY -- BD CERT - OVER 14 YCS (1C15-14)
1CP18	N	MDS PAY -- BD CERT - OVER 18 YCS (1C15-18)
1CSA	N	SPECIAL ALLOWANCES (ZZZZ)
1CSP	Y	SEA PAY LOS TOT (1C80)
1CSPD	Y	DENTAL ADDITIONAL, SAVE PAY (1C12 1C18 1C63)
1CS00	Y	SEA PAY 1 OR LESS YRS (1C80-00)
1CS01	Y	SEA PAY OVER 01 YRS (1C80-01)
1CS02	Y	SEA PAY OVER 02 YRS (1C80-02)
1CS03	Y	SEA PAY OVER 03 YRS (1C80-03)
1CS04	Y	SEA PAY OVER 04 YRS (1C80-04)
1CS05	Y	SEA PAY OVER 05 YRS (1C80-05)
1CS06	Y	SEA PAY OVER 06 YRS (1C80-06)
1CS07	Y	SEA PAY OVER 07 YRS (1C80-07)
1CS08	Y	SEA PAY OVER 08 YRS (1C80-08)
1CS09	Y	SEA PAY OVER 09 YRS (1C80-09)

ICS10	Y	SEA PAY OVER 10 YRS (IC80-10)
ICS11	Y	SEA PAY OVER 11 YRS (IC80-11)
ICS12	Y	SEA PAY OVER 12 YRS (IC80-12)
ICS13	Y	SEA PAY OVER 13 YRS (IC80-13)
ICS14	Y	SEA PAY OVER 14 YRS (IC80-14)
ICS15	Y	SEA PAY OVER 15 YRS (IC80-15)
ICS16	Y	SEA PAY OVER 16 YRS (IC80-16)
ICS17	Y	SEA PAY OVER 17 YRS (IC80-17)
ICS18	Y	SEA PAY OVER 18 YRS (IC80-18)
ICS19	Y	SEA PAY OVER 19 YRS (IC80-19)
ICS20	Y	SEA PAY OVER 20 YRS (IC80-20)
ICTOT	N	SPECIAL PAY(W/ENT ADJ) (ICTO)
ICV00	N	VSP - MEDICAL - UNDER GOING INTERN (IC14-00)
ICV05	N	VSP - MEDICAL - LESS THAN 6 YCS (IC14-05)
ICV06	N	VSP - MEDICAL - OVER 6 YCS (IC14-06)
ICV08	N	VSP - MEDICAL - OVER 8 YCS (IC14-08)
ICV10	N	VSP - MEDICAL - OVER 10 YCS (IC14-10)
ICV12	N	VSP - MEDICAL - OVER 12 YCS (IC14-12)
ICV14	N	VSP - MEDICAL - OVER 14 YCS (IC14-14)
ICV18	N	VSP - MEDICAL - OVER 18 YCS (IC14-18)
ICV22	N	VSP - MEDICAL - OVER 22 YCS (IC14-22)
IC11	N	MEDICAL PAY (IC11)
IC12	Y	DENTAL PAY (IC12)
IC13	N	OPTOMETRISTS PAY (IC13)
IC16	N	RETENTION PAY MEDICAL - LOS TOT (IC16)
IC160	N	RETENTION PAY MEDICAL - OVER 10 YCS (IC16-10)
IC16U	N	RETENTION PAY MEDICAL - UNDER 10 YCS (IC16-09)
IC17	N	INCENTIVE SPECIAL PAY (IC17)
IC18	Y	DENTAL SAVE PAY (IC18)
IC2	Y	RESPONSIBILITY PAY (IC20)
IC3	N	FLAG OFFICER PMA (IC31 IC32 IC33 IC34)
IC4L0	N	DIVING PAY (TOTAL) (IC40)
IC4L1	N	DIVING PAY (LEVEL 01) (IC40-01)
IC4L2	N	DIVING PAY (LEVEL 02) (IC40-02)
IC51	N	HOSTILE FIRE PAY (IC51)
IC53	Y	LINGUIST LEVEL III PAY (IC53)
IC54	Y	LINGUIST LEVEL II PAY (IC54)
IC55	Y	LINGUIST LEVEL I PAY (IC55)
IC57	Y	LINGUIST PARTIAL III PAY (IC57)
IC58	Y	LINGUIST PARTIAL II PAY (IC58)
IC59	Y	LINGUIST PARTIAL I PAY (IC59)
IC63	Y	CONTINUATION PAY DENTAL (IC63)
IC7	N	NUCLEAR (BONUS,COPAY,LDO/WO) (IC7X)
IC70	N	NUCLEAR BONUS - \$4,000 (IC70)
IC71	N	NUCLEAR COPAY - \$3,750 (IC71)
IC72	N	NUCLEAR COPAY - \$3,000 (IC72)
IC73	N	NUCLEAR COPAY - \$7,000 (IC73)
IC74	N	NUCLEAR COPAY - \$5,600 (IC74)
IC75	N	NUCLEAR TRAINING COMP. BONUS - 2,0000 (IC75)
IC76	N	NUCLEAR ANNUAL BONUS REG (IC76)

1C77	N	NUCLEAR ANNUAL BONUS LDO/WO (1C77)
1C78	N	NUCLEAR BONUS PRORATED REG (1C78)
1C79	N	NUCLEAR BONUS PRORATED LDS/WO (1C79)
1D	Y	TOTAL BAQ/VHA (1DXX)
1DBAQ	Y	BASIC ALLOWANCE QUARTERS (BAQ) (1D10 1D20 1D21 1D30)
1DBND	Y	BAQ NO DEPENDENTS (1D20)
1DBPL	Y	BAQ REBATE (1D21)
1DBSH	Y	BAQ SUBSTANDARD HOUSING (1D30)
1DBWD	Y	BAQ WITH DEPENDENTS (1D10)
1DENT	N	TOTAL BAQ/VHA ENTITLEMENT ADJ. (1DTO-TT)
1DTOT	N	TOTAL BAQ/VHA+ ENTITLEMENT ADJ. (1DTO)
1DVD	Y	VHA WITH DEPENDENTS (1D40)
1DVDO	Y	VHA WITH DEPENDENTS OVERSEAS (1D42)
1DVF	Y	VHA FAMILY (1D43)
1DVHA	Y	VARIABLE HOUSING ALLOWANCE (VHA) (1D40 1D41 1D42 1D43)
1DVND	Y	VHA WITHOUT DEPENDENTS (1D41)
1DVWD	Y	VHA WITH DEPENDENTS (1D40 1D42 1D43)
1E	Y	BASIC ALLOWANCE SUBS (TOTAL) (1EXX)
1EENT	N	BASIC ALLOW SUBS ENTITLEMENT ADJ. (1ETO-TT)
1ETOT	N	BASIC ALLOW. SUBS + ENTL. ADJ. (1ETO)
1E01	N	BASIC ALLOWANCE SUBS (1E01)
1F	Y	STATION ALLOWANCES - OVERSEAS (SAO) (1FXX)
1FCDF	Y	SAO COLA (MEMBER ONLY,FRACTIONAL) (1F12 1F13)
1FCWD	Y	SAO COST OF LIVING ALLOWANCE W/DEP. (1F11)
1FENT	N	STATION ALLOW OVERSEAS ENTL. ADJ. (1FTO-TT)
1FHDI	Y	SAO HOUSING NO DEPS. AND INTERIM (1F22 1F23)
1FHWD	Y	SAO HOUSING WITH DEPENDENTS (1F21)
1FTOT	N	STATION ALLOW OVERSEAS + ENTL. ADJ (1FTO)
1F1	Y	SAO COST OF LIVING ALLOWANCE (1F11 1F12 1F13)
1F2	Y	SAO TOTAL HOUSING (1F21 1F22 1F23)
1F3	Y	SAO TEMPORARY LODGING (1F31 1F32 1F33)
1G	Y	UNIFORM ALLOWANCES (TOTAL) (1GXX)
1GENT	N	UNIFORM ALLOWANCES ENTITLEMENT ADJ. (1GTO-TT)
1GIN	N	UNIFORM ALLOWANCE INITIAL (1G11 1G12 1G13 1G15)
1GTOT	N	UNIFORM ALLOWANCES (TOTAL W/ENT ADJ) (1GTO)
1GUR	N	UAI OTHER RESERVISTS (1G12 1G13)
1G11	N	UNIFORM INITIAL(UAI) (1G11)
1G15	N	UAI ENL. TEMP. APP. (1G15)
1G20	N	UNIFORM ALLOWANCE ADDITIONAL (1G20)
1H	Y	FAMILY SEPARATION ALLOWANCE (1HXX)
1HENT	N	FAMILY SEP. ALLOW ENTL. ADJ. (1HTO-TT)
1HST	N	PCS + O/B +ON TEMP DUTY (1H20 1H30 1H40)
1HTOT	N	FAMILY SEP. ALLOW+ENTL. ADJ. (1HTO)
1H10	Y	PCS DEP QTRS NOT AUTH (1H10)
1H20	N	PCS QTRS NOT AUTH (1H20)
1H30	N	O/B SHIP + 30 DAYS (1H30)
1H40	N	ON TEMP DUTY + 30 DAYS (1H40)
1I	Y	SEPARATION PAYMENTS (1IXX)
1IDOP	N	SEPARATION PAY (DOPMA) (1I21 1I25 1I30 1I60)
1IENT	N	SEPARATION PAYMENTS ENTL. ADJ. (1ITO-TT)
1ILSL	Y	LUMP SUM LEAVE (BP) (1I10)

11LSP	Y	LUMP SUM LEAVE (PMA) (1113)
11LSQ	Y	LUMP SUM LEAVE (QTRS) (1111)
11LSR	N	LSL (LS RESERVE) (1130)
11LSS	Y	LUMP SUM LEAVE (SUBS) (1112)
11LST	Y	LUMP SUM LEAVE (BP,QTRS,SUBS,PMA) (1110 1111 1112 1113)
11MIA	N	MIA LEAVE (ZZZZ)
11IRC	N	LSL (READJUST,CONTR CNCLN) (1121 1125)
11RCL	N	LSL (READJUST,CONTR CNCLN,LS RESERVE) (1121 1125 1130)
11SEP	N	MISC. SEPARATION (1121 1125 1130 1140 1160)
11TOT	N	SEPARATION PAYMENTS + ENTL. ADJ. (11TO)
1140	N	SEVERANCE PAY/O-T DBLTY (1140)
1150	N	SEVERANCE PAY/DBLTY (1150)
1160	N	SEPARATION PAY (1160)
1J	Y	FICA(TOTAL) (1JXX)
1JENT	N	FICA ENTL. ADJ. (1JTO-TT)
1JTOT	N	FICA(TOTAL + ENTL. ADJ.) (1JTO)
1J00	N	FICA (1J00)
BA1	N	TOTAL BUDGET ACTIVITY 1 (1AXX1BXX1CXX1DXX1EXX1FXX1GXX1HXX1IXX1JXX)
XOSP	N	SPECIAL PAYS / BONUSES (1BXX 1CXX 1FXX 1GXX 1HXX 1IXX)
XOSRM	N	STRENGTH RELATED MPN (1AXX 1DXX 1EXX 1JXX)

ENLISTED

2A	N	BASIC PAY(TOTAL) (2AXX)
2AENT	N	BASIC PAY (ENTITLEMENT ADJUSTMENT) (2ATO-TT)
2ARPA	N	RETIRED PAY ACCRUAL (ZZZZ)
2ATOT	N	BASIC PAY (TOT + ENT ADJ.) (2ATO)
2A00	Y	BASIC PAY (2A00)
2A10	Y	ESSENTIAL SERVICE PAY (2A10)
2B	Y	INCENTIVE PAY - HAZARDOUS DUTY (2BXX)
2BCR	Y	FLY PAY PREM (CREW) - LOS TOT (2B11 2B12)
2BC01	Y	FLY PAY PREM (CREW)-2 OR LESS YRS (2B11-01)
2BC02	Y	FLY PAY PREM (CREW)-OVER 2 YRS (2B11-02)
2BC03	Y	FLY PAY PREM (CREW)-OVER 3 YRS (2B11-03)
2BC04	Y	FLY PAY PREM (CREW)-OVER 4 YRS (2B11-04)
2BC06	Y	FLY PAY PREM (CREW)-OVER 6 YRS (2B11-06)
2BC08	Y	FLY PAY PREM (CREW)-OVER 8 YRS (2B11-08)
2BC10	Y	FLY PAY PREM (CREW)-OVER 10 YRS (2B11-10)
2BC12	Y	FLY PAY PREM (CREW)-OVER 12 YRS (2B11-12)
2BC14	Y	FLY PAY PREM (CREW)-OVER 14 YRS (2B11-14)
2BC16	Y	FLY PAY PREM (CREW)-OVER 16 YRS (2B11-16)
2BC18	Y	FLY PAY PREM (CREW)-OVER 18 YRS (2B11-18)
2BC20	Y	FLY PAY PREM (CREW)-OVER 20 YRS (2B11-20)
2BC22	Y	FLY PAY PREM (CREW)-OVER 22 YRS (2B11-22)
2BC26	Y	FLY PAY PREM (CREW)-OVER 26 YRS (2B11-26)
2BENT	N	INCENT/HAZ. DUTY ENTITLEMENT ADJ. (2BTO-TT)
2BHD	N	MISC. HAZARDOUS DUTY (2B40 2B60 2B95 2B97)
2BNCR	N	FLY PAY NON-CREW (TEMP) (2B14)
2BPAT	N	PRESS. CHAMBER,ACL/DCL,THERMAL PAY (2B30 2B50 2B80)
2BTOT	N	INCENTIVE PAY - HAZ. DUTY (W/ENT ADJ) (2BTO)
2BTOX	N	TOXIC FUEL, VIRUS PAY (2B95, 2B97)
2B1	Y	FLY PAY (ALL) (2B1X)
2B12	Y	FLY PAY (CREW) (2B12)

2B2	Y	SUBMARINE PAY - LOS TOT (2B21 2B22)
2B201	Y	SUBMARINE PAY-2 OR LESS YRS (2B21-01 2B22-01)
2B202	Y	SUBMARINE PAY-OVER 2 YRS (2B21-02 2B22-02)
2B203	Y	SUBMARINE PAY-OVER 3 YRS (2B21-03 2B22-03)
2B204	Y	SUBMARINE PAY-OVER 4 YRS (2B21-04 2B22-04)
2B206	Y	SUBMARINE PAY-OVER 6 YRS (2B21-06 2B22-06)
2B208	Y	SUBMARINE PAY-OVER 8 YRS (2B21-08 2B22-08)
2B210	Y	SUBMARINE PAY-OVER 10 YRS (2B21-10 2B22-10)
2B212	Y	SUBMARINE PAY-OVER 12 YRS (2B21-12 2B22-12)
2B214	Y	SUBMARINE PAY-OVER 14 YRS (2B21-14 2B22-14)
2B216	Y	SUBMARINE PAY-OVER 16 YRS (2B21-16 2B22-16)
2B218	Y	SUBMARINE PAY-OVER 18 YRS (2B21-18 2B22-18)
2B220	Y	SUBMARINE PAY-OVER 20 YRS (2B21-20 2B22-20)
2B222	Y	SUBMARINE PAY-OVER 22 YRS (2B21-22 2B22-22)
2B226	Y	SUBMARINE PAY-OVER 26 YRS (2B21-26 2B22-26)
2B4	N	PARACHUTE JUMPING (TOTAL) (2B40 2B41)
2B40	N	PARACHUTE JUMPING (2B40)
2B41	N	PARACHUTE JUMPING HI ALT (2B41)
2B6	N	DEMOLITION DUTY (2B60)
2B7	N	FLIGHT DECK PAY (2B70)
2C	Y	SPECIAL PAY (2CXX)
2CCA	N	NUC CN + ACC. BONUS (2C51 2C52 2C53)
2CCSP	N	CAREER SEA PAY (2C11 2C12 2C13 2C14 2C15 2C16 2C17)
2CDCS	N	SEA DUTY / CAREER SEA PAY (2C10 2C11 2C12 2C13 2C14 2C15 2C16 2C17)
2CENT	N	SPECIAL PAY ENTITLEMENT ADJ. (2CTO-TT)
2CLLP	Y	LINGUIST LEVEL PAY TOTAL (2C32 2C33 2C34)
2CLP	Y	LINGUIST PAY TOTAL (2C32 2C33 2C34 2C36 2C37 2C38)
2CLPP	Y	LINGUIST PARTIAL PAY TOTAL (2C36 2C37 2C38)
2CPSP	Y	PREMIUM SEA PAY (2C19)
2CSP	Y	SEA PAY LOS TOT (2C18)
2CS00	Y	SEA PAY 1 OR LESS YRS (2C18-00)
2CS01	Y	SEA PAY OVER 01 YRS (2C18-01)
2CS02	Y	SEA PAY OVER 02 YRS (2C18-02)
2CS03	Y	SEA PAY OVER 03 YRS (2C18-03)
2CS04	Y	SEA PAY OVER 04 YRS (2C18-04)
2CS05	Y	SEA PAY OVER 05 YRS (2C18-05)
2CS06	Y	SEA PAY OVER 06 YRS (2C18-06)
2CS07	Y	SEA PAY OVER 07 YRS (2C18-07)
2CS08	Y	SEA PAY OVER 08 YRS (2C18-08)
2CS09	Y	SEA PAY OVER 09 YRS (2C18-09)
2CS10	Y	SEA PAY OVER 10 YRS (2C18-10)
2CS11	Y	SEA PAY OVER 11 YRS (2C18-11)
2CS12	Y	SEA PAY OVER 12 YRS (2C18-12)
2CS13	Y	SEA PAY OVER 13 YRS (2C18-13)
2CS14	Y	SEA PAY OVER 14 YRS (2C18-14)
2CS15	Y	SEA PAY OVER 15 YRS (2C18-15)
2CS16	Y	SEA PAY OVER 16 YRS (2C18-16)
2CS17	Y	SEA PAY OVER 17 YRS (2C18-17)
2CS18	Y	SEA PAY OVER 18 YRS (2C18-18)
2CS19	Y	SEA PAY OVER 19 YRS (2C18-19)

2CS20	Y	SEA PAY OVER 20 YRS (2C18-20)
2CTOT	N	SPECIAL PAY(W/ENT ADJ) (2CTO)
2C10	N	SEA DUTY (2C10)
2C2	Y	FOREIGN DUTY (2C20)
2C3	N	HOSTILE FILRE PAY (2C30)
2C32	Y	LINGUIST LEVEL III PAY (2C32)
2C33	Y	LINGUIST LEVEL II PAY (2C33)
2C34	Y	LINGUIST LEVEL I PAY (2C34)
2C36	Y	LINGUIST PARTIAL III PAY (2C36)
2C37	Y	LINGUIST PARTIAL II PAY (2C37)
2C38	Y	LINGUIST PARTIAL I PAY (2C38)
2C4L0	N	DIVING PAY (TOTAL) (2C40)
2C4L1	N	DIVING PAY (LEVEL 01) (2C40-01)
2C4L2	N	DIVING PAY (LEVEL 02) (2C40-02)
2C4L3	N	DIVING PAY (LEVEL 03) (2C40-03)
2C4L4	N	DIVING PAY (LEVEL 04) (2C40-04)
2C51	N	NUC CN PAY PO-1 (2C51)
2C52	N	NUC CN PAY PO-2 (2C52)
2C53	N	NUC ACC. BONUS (2C53)
2C6	Y	EXTENSION PAY (2C60)
2D	Y	PROFICIENCY/SDA PAY (TOTAL) (2DXX)
2DENT	N	PROFICIENCY/SDA PAY ENTL. ADJ. (2DTO-TT)
2DPRO	N	PROFICIENCY/SDA PAY (2DPX 2DSX (2D08-2D26))
2DP08	N	T1-PROPAY-\$15 (2DPP-08)
2DP09	N	P1-PROPAY-\$30 (2DPP-09)
2DP10	N	P1-PROPAY-SS-\$50 (2DPP-10)
2DP11	N	P2-PROPAY-SS-\$75 (2DPP-11)
2DP12	N	P3-PROPAY-SS-\$100 (2DPP-12)
2DP13	N	P3-MAX-PROPAY-SS-\$150 (2DPP-13)
2DP14	N	T1-PROPAY-SS-TERMNS-\$25 (2DPP-14)
2DP15	N	T2-PROPAY-SS-TERMNS-\$25 (2DPP-15)
2DP16	N	T2-PROPAY-SS-TERMNS-\$37.50 (2DPP-16)
2DP17	N	T2-PROPAY-SS-TERMNS-\$50 (2DPP-17)
2DP18	N	T3-PROPAY-SS-TERMNS-\$25 (2DPP-18)
2DP19	N	T3-PROPAY-SS-TERMNS-\$50 (2DPP-19)
2DP20	N	T3-PROPAY-SS-TERMNS-\$75 (2DPP-20)
2DS21	N	P1-SDA-PAY-\$30 (2DSP-21)
2DS22	N	P1-SDA-PAY-\$50 (2DSP-22)
2DS23	N	P2-SDA-PAY-\$75 (2DSP-23)
2DS24	N	P3-SDA-PAY-\$100 (2DSP-24)
2DS25	N	P3-SDA-PAY-\$150 (2DSP-25)
2DS26	N	P2-SDA-PAY-\$100 (2DSP-26)
2DS27	N	P1-SDA-PAY-\$55 (2DSP-27)
2DTOT	N	PROFICIENCY/SDA PAY + ENTL. ADJ. (2DTO)
2D1	N	PROFICIENCY PAY (2DPP (2D08-2D20))
2D2	N	SDA PAY (2DSP (2D21-2D26))
2D30	N	P5-SDA-PAY-\$275 (2DSP-30)
2D31	N	P4-SDA-PAY-\$220 (2DSP-31)
2D32	N	P3-SDA-PAY-\$165 (2DSP-32)
2D33	N	P2-SDA-PAY-\$110 (2DSP-33)

2D40	N	P5-PROPAY-SS-\$275 (2DPP-40)
2D41	N	P4-PROPAY-SS-\$175 (2DPP-41)
2E	Y	REENLISTMENT BONUS (2EXX)
2EBE	N	REENLISTMENT BONUS AND EXTENSIONS (2E05 2E10)
2EENT	N	REEN BONUS ENTITLEMENT ADJ. (2ETO-TT)
2ETOT	N	REENLISTMENT BONUS (W/ENT ADJ) (2ETO)
2EVRB	N	REENLISTMENT BONUS (VRB) (2E15-2E24)
2EZA	Y	REENLISTMENT BONUS (SRB ZONE A)((2E ZONE A) 2EZA)
2EZB	Y	REENLISTMENT BONUS (SRB ZONE B)((2E ZONE B) 2EZB)
2EZC	Y	REENLISTMENT BONUS (SRB ZONE C)((2E ZONE C) 2EZC)
2EZT	Y	REENLISTMENT BONUS (SRB TOTAL)((2E ZONE A+B+C) 2EZX)
2F	Y	ENLISTMENT BONUS (TOTAL) (2FXX)
2FENT	N	ENLISTMENT BONUS ENTITLEMENT ADJ. (2FTO-TT)
2FTOT	N	ENLISTMENT BONUS (TOTAL W/ENT ADJ) (2FTO)
2F09	N	ENLISTMENT BONUS - \$5,000 (2F09)
2F1	N	ENLISTMENT BONUS (2F09 2F10 2F11 2F12 2F13 2F14 2F15 2F16)
2F10	N	ENLISTMENT BONUS - \$4,000 (2F10)
2F11	N	ENLISTMENT BONUS - \$3,000 (2F11)
2F12	N	ENLISTMENT BONUS - \$2,500 (2F12)
2F13	N	ENLISTMENT BONUS - \$2,000 (2F13)
2F14	N	ENLISTMENT BONUS - \$1,500 (2F14)
2F15	N	ENLISTMENT BONUS - \$1,000 (2F15)
2F16	N	ENLISTMENT BONUS - \$500 (2F16)
2G	Y	TOTAL BAQ/VHA (2GXX)
2GBAQ	Y	BASIC ALLOWANCE QUARTERS (BAQ) (2G10 2G20 2G21 2G30)
2GBND	Y	BAQ NO DEPENDENTS (2G20)
2GBPL	Y	BAQ REBATE (2G21)
2GBSH	Y	BAQ SUBSTANDARD HOUSING (2G30)
2GBWD	Y	BAQ WITH DEPENDENTS (2G10)
2GENT	N	TOTAL BAQ/VHA ENTITLEMENT ADJ. (2GTO-TT)
2GTOT	N	TOTAL BAQ/VHA (W/ENT ADJ) (2GTO)
2GVD	Y	VHA WITH DEPENDENTS NOT OVERSEAS (2G40)
2GVDO	Y	VHA WITH DEPENDENTS OVERSEAS (2G42)
2GVF	Y	VHA FAMILY (2G43)
2GVHA	Y	VARIABLE HOUSING ALLOWANCE (VHA) (2G40 2G41 2G42 2G43)
2GVND	Y	VHA WITHOUT DEPENDENTS (2G41)
2GVWD	Y	VHA WITH DEPENDENTS (2G40 2G42 2G43)
2H	Y	STATION ALLOWANCES OVERSEAS (2HXX)
2HENT	N	STATION ALLOW OVERSEAS ENTL. ADJ. (2HTO-TT)
2HHO	Y	HOUSING W/O DEPENDENTS AND INTERIM (2H22-2H23)
2HHW	Y	HOUSING W/DEPENDENTS (2H21)
2HTLA	Y	TLA (TOTAL) (2H31 2H32 2H33)
2HTOT	N	STATION ALLOW OVERSEAS + ENTL. ADJ (2HTO)
2HW	Y	COLA W/DEPENDENTS (2H11)
2HWO	Y	COLA (MEMBER ONLY,FRACTIONAL) (2H12 2H13)
2H1	Y	TOTAL COLA (2H11 2H12 2H13)
2H2	Y	TOTAL HOUSING (2H21 2H22 2H23)
2I	Y	CLOTHING ALLOWANCES (C.A.)/INITIAL (2IXX)
2IAB	Y	C.M.A.B. (2I11)
2IAS	Y	C.M.A.S. (2I21)

2IASP	Y	C.M.A.S.P. (2I22)
2IBND	N	CASI - (NAV BAND, UNIT BAND) (2I42 2I43)
2ICAC	N	CACF, CACR, CACA (2I51 2I52 2I53)
2ICAX	N	CAX - (R, G, D, L, I, C, P, M, PMU), CASI - FM (2I31-2I39 2I47)
2IENT	N	CLOTHING ALLOW. ENTITLEMENT ADJ. (2ITO-TT)
2IFR	N	FEMALE RECRUIT CLOTHING INITIAL (ZZZZ)
2IIN	N	INITIAL CLOTHING ALLOWANCE (TOTAL) (2IMR 2IFR 2IOCS 2I44 2I41 2I42 2I43 2I51 2I52 2I53)
2IMR	N	MALE RECRUIT CLOTHING INITIAL (ZZZZ)
2IOCS	N	OCS CLOTHING INITIAL (ZZZZ)
2ISCA	N	SUPPLEMENTARY CLOTHING ALLOWANCES (2I31 2I32 2I33 2I34 2I35 2I36 2I37 2I38 2I39 2I45 2I46 2I47)
2ITOT	N	CLOTHING ALLOWANCES (W/ENT ADJ) (2ITO)
2I40	N	CASI - E6 (2I40)
2I41	N	CASI - E7 (2I41)
2I44	N	CASI - AOC/NAOC (2I44)
2I45	N	CASI - NEEP (2I45)
2I46	N	CASI (OTHER THAN ADV. E7) (2I46)
2J	Y	FAMILY SEPARATION ALLOWANCE (2JXX)
2JENT	N	FAMILY SEP. ALLOW ENTL. ADJ. (2JTO-TT)
2JST	N	FSAR, FSAS, FSAT (2J20 2J30 2J40)
2JTOT	N	FAMILY SPE. ALLOW+ENTL. ADJ. (2JTO)
2J1	Y	FSAF (2J10)
2J2	N	FSAR (2J20)
2J3	N	FSAS (2J30)
2J4	N	FSAT (2J40)
2K	Y	SEPARATION PAYMENTS (2KXX)
2KDIS	N	DISCHARGE (2K30 2K40)
2KENT	N	SEPARATION PAYMENTS ENTL. ADJ. (2KTO-TT)
2KR	Y	LSL REEN (BP, QTRS, SUBS) (2K13 2K14 2K15)
2KS	Y	LSL SEP (BP, QTRS, SUBS) (2K10 2K11 2K12)
2KSD	N	SEVERANCE / DISCHARGE (2K20 2K30 2K40)
2KST1	Y	LSL (SEP BP, REEN BP) (2K10 2K13)
2KST2	Y	LUMP SUM LEAVE (SEP + REEN) (2K10 2K11 2K12 2K13 2K14 2K15)
2KTOT	N	SEPARATION PAYMENTS + ENTL. ADJ. (2KTO)
2K10	Y	LUMP SUM LEAVE (SEP BP) (2K10)
2K11	Y	LUMP SUM LEAVE (SEP QTRS) (2K11)
2K12	Y	LUMP SUM LEAVE (SEP SUBS) (2K12)
2K13	Y	LUMP SUM LEAVE (REEN BP) (2K13)
2K14	Y	LUMP SUM LEAVE (REEN QTRS) (2K14)
2K15	Y	LUMP SUM LEAVE (REEN SUBS) (2K15)
2K20	N	SEVERANCE PAY DISABILITY (2K20)
2K30	N	DISCHARGE GRATUITIES (2K30)
2K40	N	RES. INVOL. DISC/REL FM (2K40)
2L	Y	FICA(TOTAL) (2LXX)
2LENT	N	FICA ENTL. ADJ. (2LTO-TT)
2LTOT	N	FICA(TOTAL + ENTL. ADJ.) (2LTO)
2L90	N	FICA (2L90)
BA2	N	TOTAL BUDGET ACTIVITY 2 (2AXX2BXX2CXX2DXX2EXX2FXX2GXX2HXX2IXX2JXX2KXX2LXX)
40	Y	BASIC ALLOW. FOR SUBSISTENCE (40XX)

40AM Y RATIONS (SEPARATELY) (4010)  
 40AR Y RATIONS (LEAVE,PROCEED,AND SICK LEAVE) (4020 4030 4040)  
 40AS Y BASIC ALLOWANCE (SUBTOTAL 50 60 70) (4050 4060 4070)  
 40ENT N BAS ENTITLEMENT ADJ. (40TO-TT)  
 40RT N RATIONS (TOTAL) (4010 4020 4030 4040)  
 40TOT N BASIC ALLOW. FOR SUBS. (W/ENT ADJ) (40TO)  
 4020 Y RATIONS (LEAVE) (4020)  
 4030 Y RATIONS (PROCEED) (4030)  
 4040 Y RATIONS (SICK LEAVE) (4040)  
 4050 Y BASIC ALLOWANCE (SUBTOTAL 50) (4050)  
 4060 Y BASIC ALLOWANCE (SUBTOTAL 60) (4060)  
 4070 Y BASIC ALLOWANCE (SUBTOTAL 70) (4070)  
 XESP N SPECIAL PAYS / BONUSES (2BXX 2CXX 2DXX 2EXX 2FXX 2HXX 2IXX  
 2JXX 2KXX)  
 XESRM N STRENGTH RELATED MPN (2AXX 2GXX 2LXX 40XX)

COMBINED OFFICER AND ENLISTED

XCSP N COMBINED-TOTAL SPECIAL PAYS / BONUSES  
 (1BXX1CXX1FXX1GXX1HXX1IXX2BXX2CXX2DXX2EXX2FXX2HXX2IXX2JXX2KXX)  
 XCSR N TOTAL STRENGTH RELATED MPN (1AXX 1DXX 1EXX 1JXX 2AXX  
 2GXX 2LXX 40XX)

**APPENDIX B**  
**ROLLBACK FORECASTING IN BOATS**

## Background

Pays and allowances (i.e., entitlements) earned by the Navy's military members are recorded and reported by the Joint Uniform Military Pay System (JUMPS). Due to lags in the reporting system, some entitlement amounts earned in a month may not be reported for many months. These retroactively reported entitlements are called rollback. JUMPS reports rollback for up to 23 months after it was actually earned. Figure B-1 is a graphic representation of the pattern of rollback reporting months. Each cell of Figure B-1 represents an entitlement amount reported as occurring in fiscal year (FY) t. The vertical time-line indicates the months of FY t. The horizontal time-line indicates the months of FY t, t+1, and t+2 during which entitlement amounts are reported for FY t.

For example, the cell labelled 1 contains the reported entitlement amount for October FY t (the amount reported in October FY t and earned in October FY t). Cell 4 contains the amount reported in November FY t and earned in November FY t. All other "diagonal" cells (6 and so on) contain the amounts reported and earned in successive months of FY t. Cell 2 contains the rollback amount which was reported in November FY t but was earned in (and hence, rolled back to) October FY t. The sum of the amounts in cells 1 through 6 is the FY t year-to-date reported total through December FY t.

Notice that in FY t+2 the rollback amounts reported for FY t are not month-specific. Because these amounts are not attributed to specific months of FY t but rather to the year as a whole, they are referred to as annualized rollback (ARB). Cell 7 contains the ARB reported in October FY t+2 as earned in FY t.

Figure B-2 represents the pattern of reported amounts over six consecutive fiscal years (t-3 to t+2) for entitlements earned in four of those years (t-3 to t). Notice that, during FY t, the first previous year for which complete data is available is FY t-3.

## Objective

The objective is to forecast, after each month of FY t, the amount that will ultimately accrue to the current month and all previous months of FY t. This quantity is referred to as the year-to-date ultimate (YTDU). For example, in Figure B-3, after December of FY t, the YTDU (Dec) is represented by A+B. However, only the A component is known at that time. The objective is to forecast the amount A+B, given the known component A. This latter component is referred to as the year-to-date reported, or in this case YTDR (Dec).

## Forecasting Methodology

The forecast of YTDU (Dec) is based on the assumption that the ratio of YTDR (Dec) to YTDU (Dec) in FY t will be the same as the analogous ratio in the previous year. In Figure B-4, the assumption is that

$$\frac{A}{A+B} \approx \frac{C1}{C1+C2+D1} \quad (i)$$

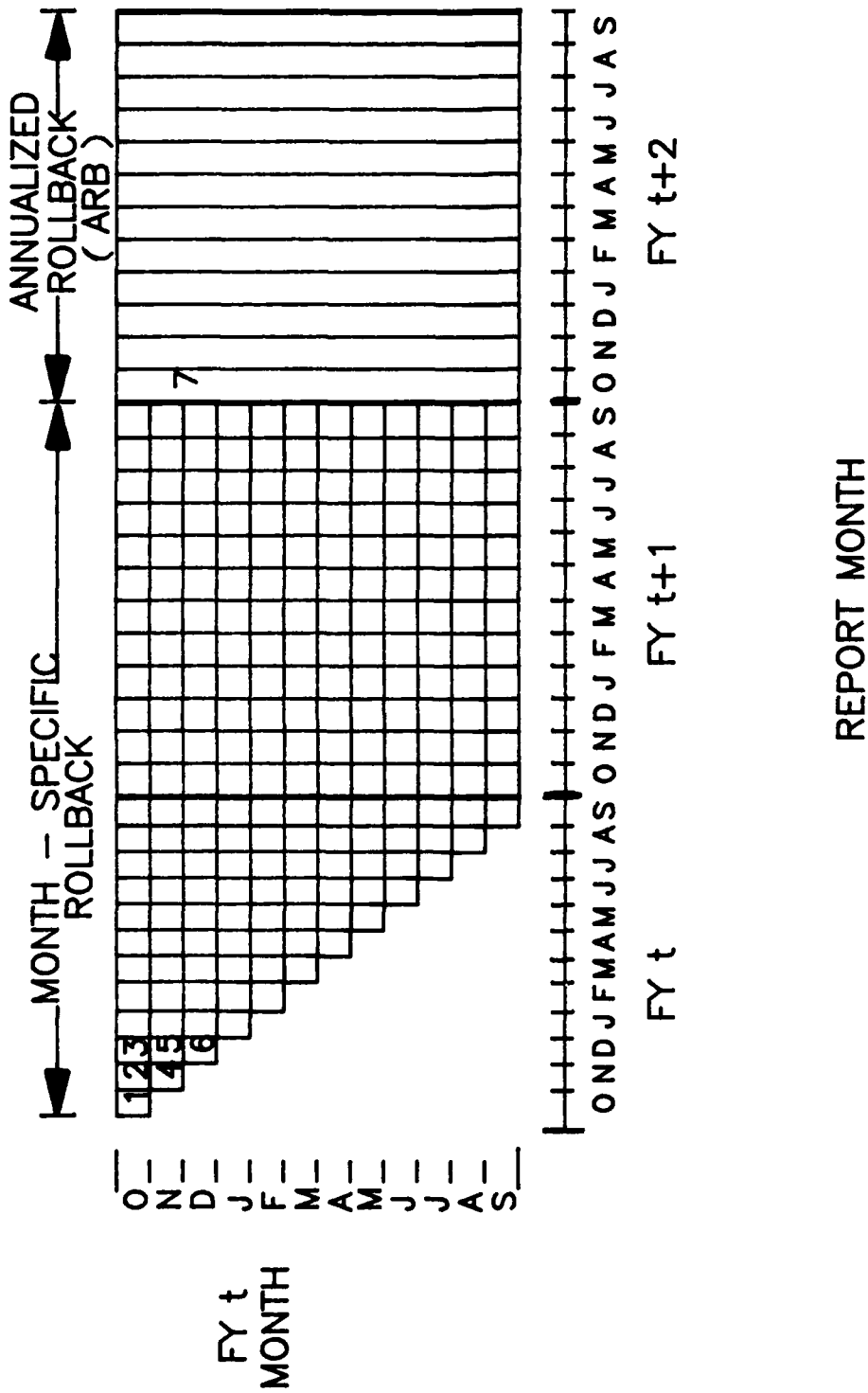


FIGURE B-1. A Graphic Representation of FY t Entitlements Reported in FY t, t+1, t+2.

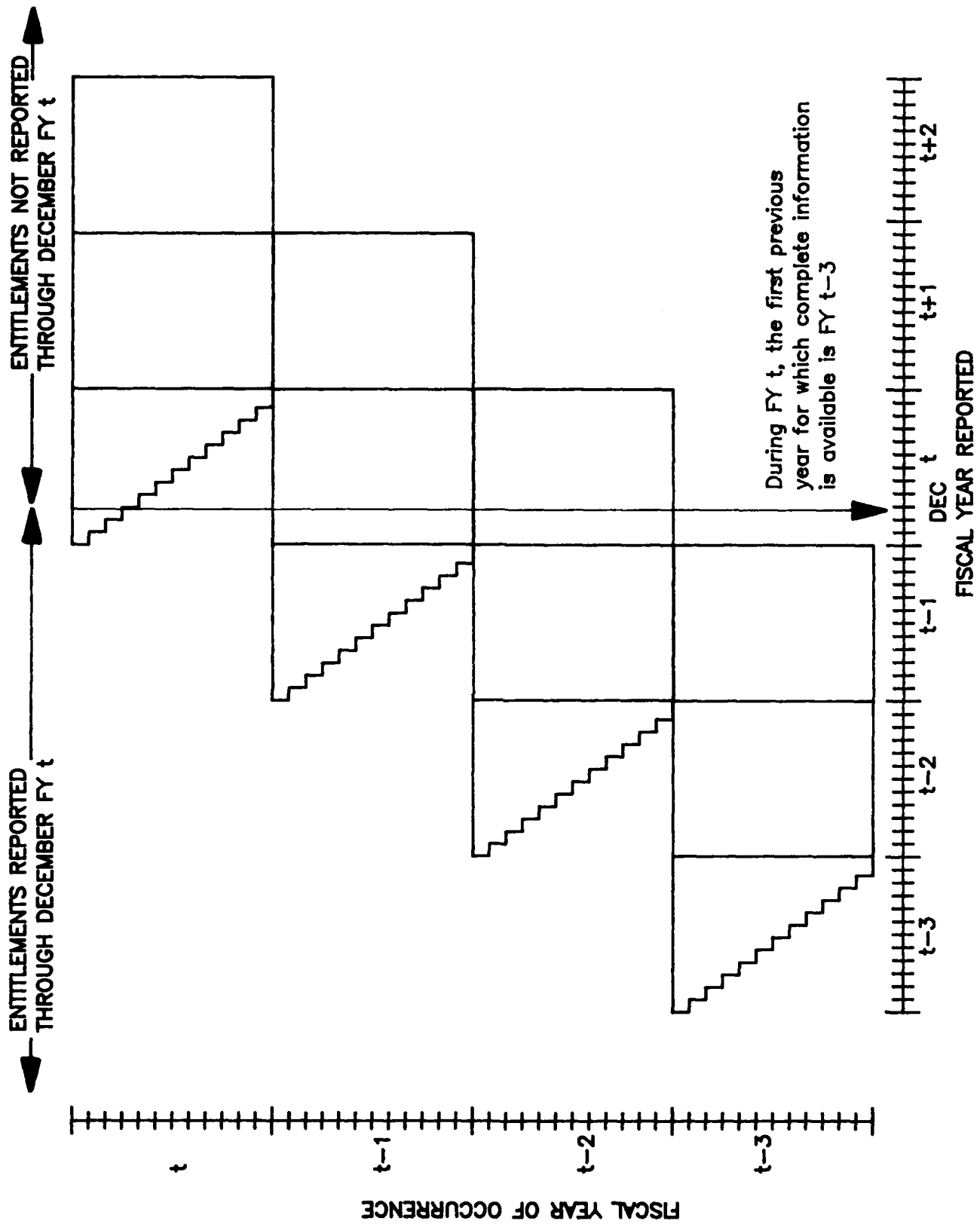


FIGURE B--2. Pattern of Entitlements Reported in FY  $t-3$  through FY  $t+2$ .

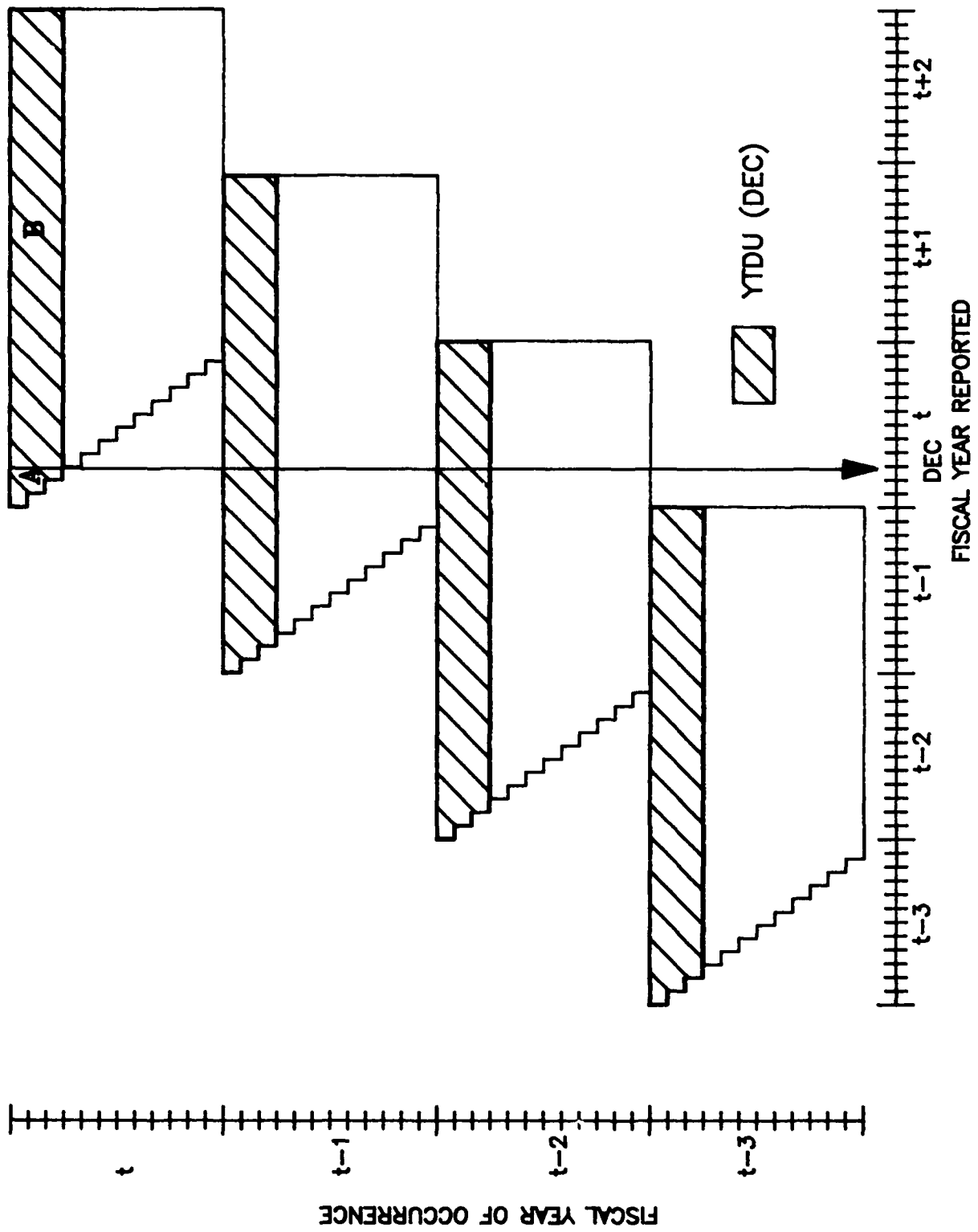


FIGURE B-3. Year-to-Date Ultimate (December) in FY  $t-3$ ,  $t-2$ ,  $t-1$ ,  $t$

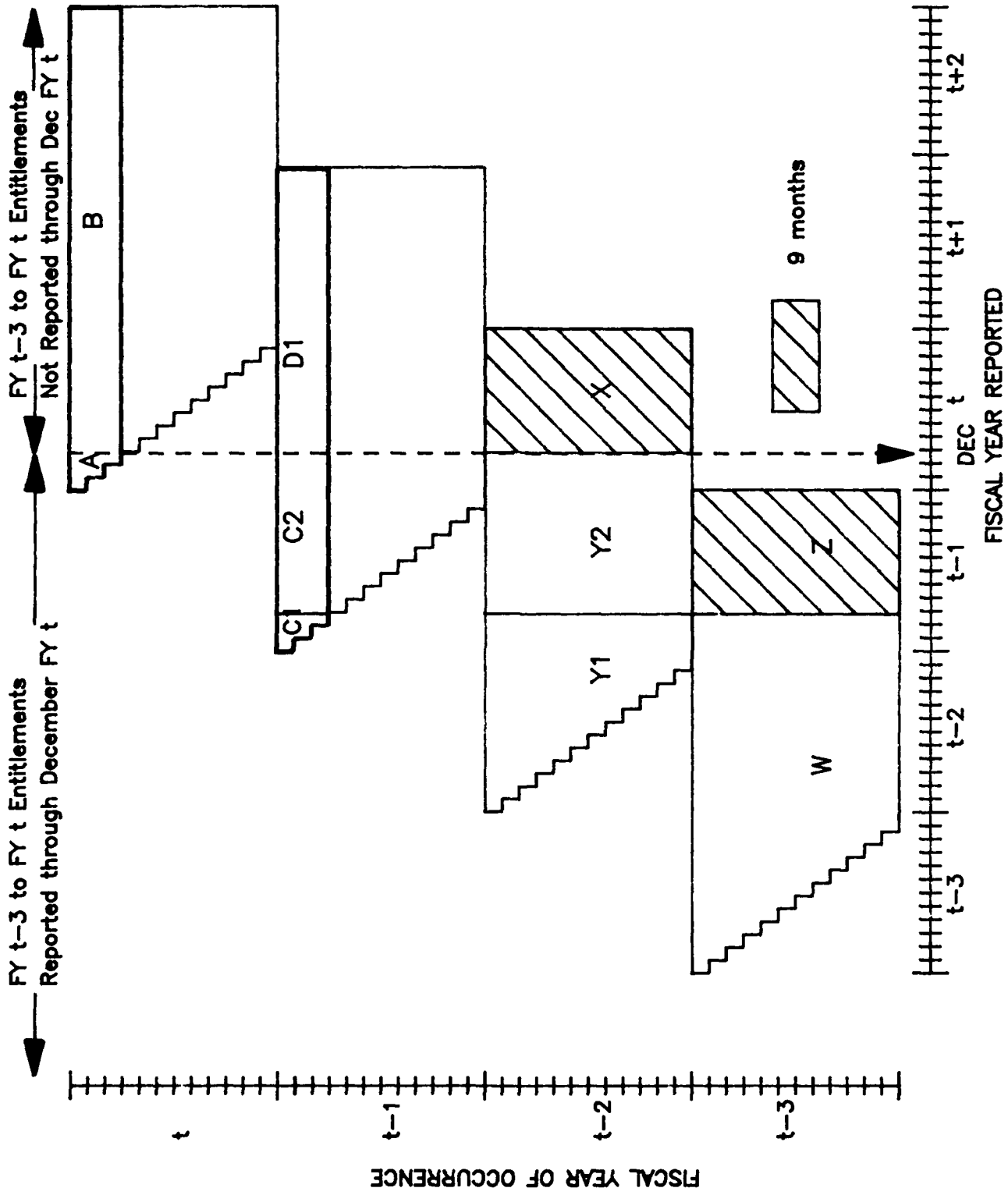


FIGURE B-4. FY  $t-3$  to FY  $t$  Entitlements Reported Through FY  $t+2$ .

However, the D1 component of FY t-1 entitlements is still unreported. Before A+B can be estimated from (i), an estimate must be made of D1. Data for FY t-2 and t-3 are used to make this estimate. First, data for FY t-3 is used to estimate the unknown component (X) of FY t-2 entitlements. The estimate of X is then used to estimate unreported FY t-1 entitlements. The following steps are taken:

1. Estimate the as yet unreported component of FY t-2 entitlements. This component is labelled X in Figure B-4. An estimate  $\hat{X}$  of X is derived by assuming

$$\frac{X}{X+Y1+Y2} \approx \frac{Z}{W+Z} \quad (\text{ii})$$

which implies

$$\hat{X} = \frac{Z(Y1+Y2)}{W} \quad (\text{iii})$$

$\hat{X}+Y1+Y2$  provides an estimate of total FY t-2 entitlements. (Y1 and Y2 are known quantities.) Note that the assumption (ii) is analogous to (i).

2. Estimate the as yet unreported component of total FY t-1 entitlements. This component is labelled D in Figure B-5. An estimate  $\hat{D}$  of D is made by assuming

$$\frac{D}{D+E} \approx \frac{\hat{X}+Y2}{\hat{X}+Y1+Y2} \quad (\text{iv})$$

which implies

$$\hat{D} = \frac{E(\hat{X}+Y2)}{Y1} \quad (\text{v})$$

The  $\hat{X}$  derived in (iii) is used in (v). Note that the assumption (iv) is analogous to (i) and (ii).

3. Estimate the portion of D attributable to the first 3 months of FY t-1, that is, estimate D1 in Figure B-4. This is accomplished by computing the fraction of total rollback to FY t-1 reported in the most recent 2 months (November and December, FY t) which applied to the first 3 months of FY t-1. In Figure B-6, this fraction is  $F1/(F1+F2)$ . It is assumed that the same fraction of the unreported rollback D will apply to the first 3 months of FY t-1. That is, D1 is estimated as:

$$\hat{D1} = \frac{F1}{F1+F2} \hat{D} \quad (\text{vi})$$

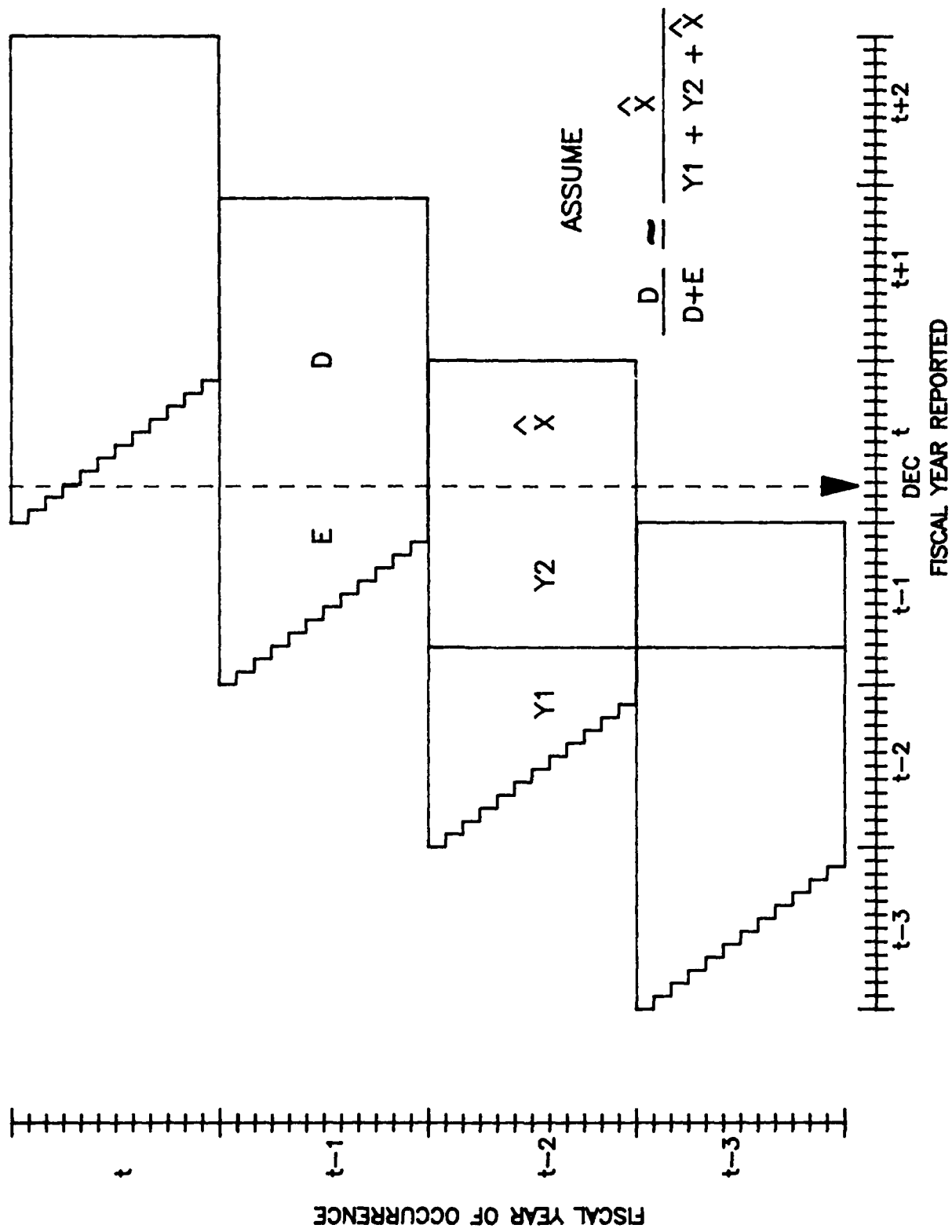


FIGURE B-5. Estimating FY t-1 Unreported Entitlements (D)

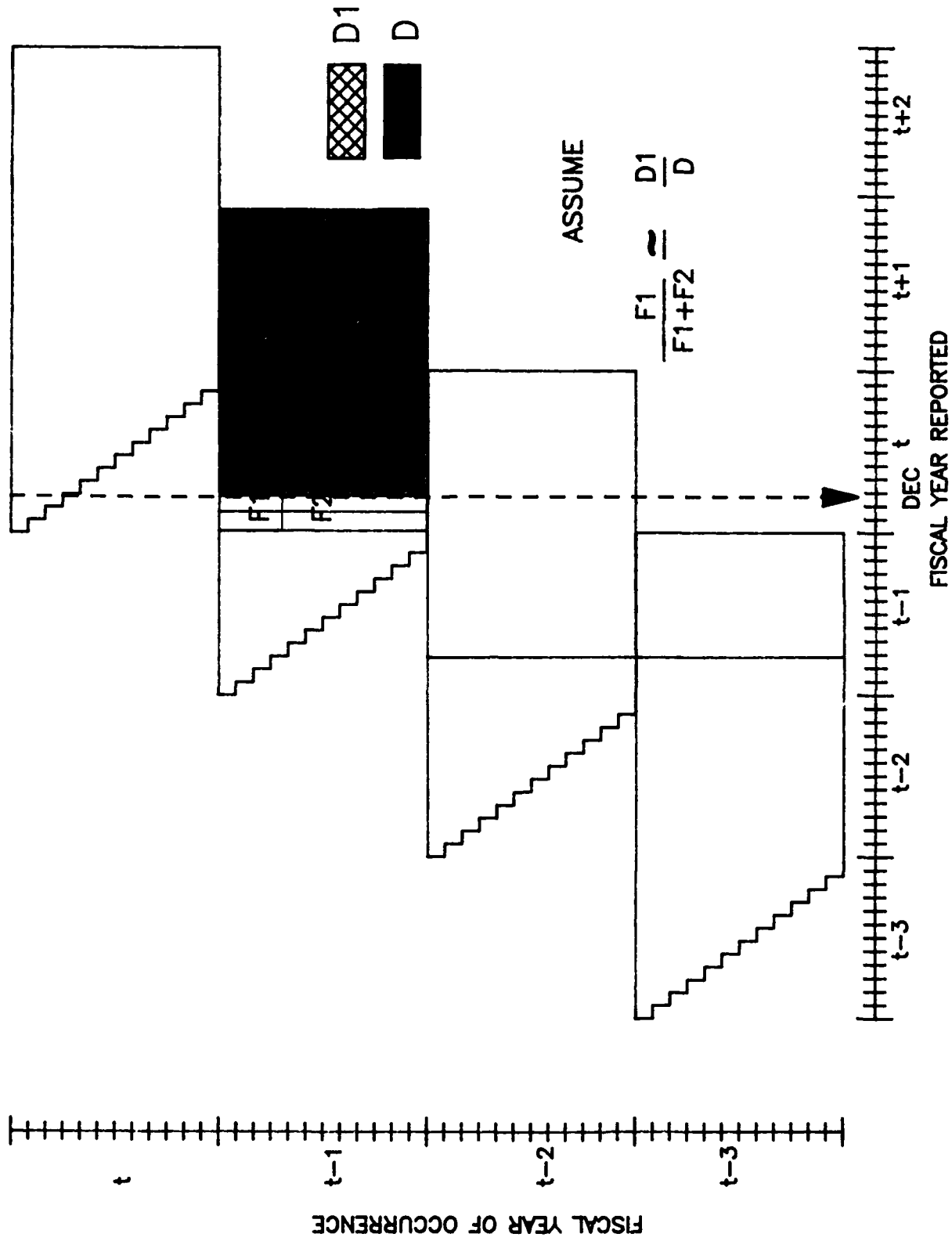


FIGURE B--6. Estimating the Fraction of Unreported FY  $t-1$  Entitlements Attributable to OCT, NOV, DEC.

$\hat{D}$  from (v) is used in (vi).

4. Finally, use the assumed relationship in (i) to estimate B as,

$$\hat{B} = \frac{A(C2 + \hat{D}1)}{C1}$$

5.  $A + \hat{B}$  provides an estimate of the FY t December year-to-date ultimate as of December FY t.

#### Accuracy of BOATS Rollback Forecasting Methodology

BOATS' rollback forecasting methodology was validated prior to its implementation in FY84. The model was applied to historical entitlement data to forecast FY83 year-to-date entitlements for several large budget categories. The accuracy of the forecasts with respect to known JUMPS actuals was then computed. The budget categories Basic Pay (BP), Basic Allowance for Quarters (BAQ), Variable Housing Allowance (VHA), and Federal Insurance Contributions Act (FICA) were examined separately for officers and enlisted members. These budget categories were selected because of their size and hence, importance to the budget\*. The accuracy of BOATS' forecasts was compared to the accuracy of the Navy's forecasts which were derived manually in FY83. The results of these comparisons are provided in Table B-1. The Mean Absolute Percentage Error (MAPE) is used to summarize average accuracy over the months March through September\*\*.

The results in Table B-1 show that, in most cases, BOATS' forecasting method outperformed the Navy's labor-intensive manual method. Of particular note are the accuracy gains in the officer and enlisted totals. Translated into dollar terms, BOATS would have prevented over \$8.6 mil in over-obligated funds in these budget categories by the end of FY83.

A large-scale validation of BOATS FY 85-87 forecasts is currently in progress. The accuracy of BOATS forecasts will be contrasted to the Navy's likely accuracy in the absence of BOATS. These results will be the subject of a future report.

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\*In FY83, these four budget categories accounted for 84.7% of officer pays and allowances and 90.1% of enlisted pays and allowances.

\*\*These are the only months for which the Navy's manually derived forecasts were available. These months provided a meaningful comparison because forecast accuracy is more critical later in the year as options for corrective actions become more limited.

Table B-1

Mean Absolute Percentage Error (March to September) of  
BOATS FY83 Year-To-Date Entitlement Forecasts and the  
Navy's FY83 Year-To-Date Entitlement Forecasts (Pre-BOATS)

FY83 MAPE  
(March to September)

<u>Officer</u>	<u>BOATS Method</u>	<u>Navy Pre-BOATS Method</u>
BP	.16%	.30%
BAQ	.23%	.47%
VHA	.58%	.40%
<u>FICA</u>	<u>.07%</u>	<u>.19%</u>
<u>Total</u>	<u>.14%</u>	<u>.28%</u>
 <u>Enlisted</u>		
BP	.15%	.21%
BAQ	.34%	.34%
VHA	.87%	.77%
<u>FICA</u>	<u>.22%</u>	<u>.33%</u>
<u>Total</u>	<u>.13%</u>	<u>.19%</u>

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