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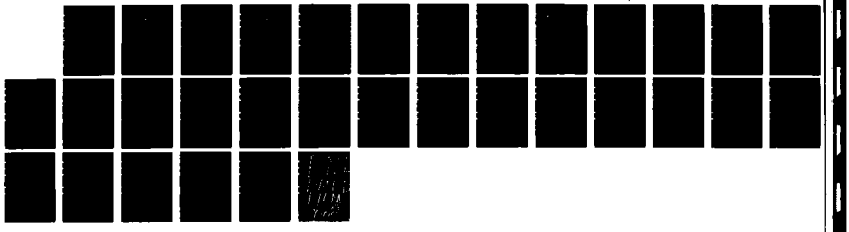

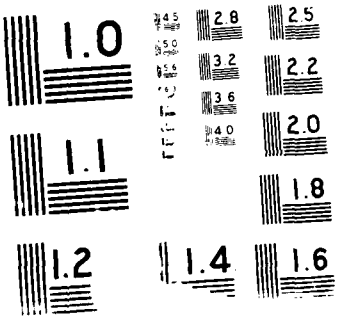
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AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

CHURN IN THE AIRCRAFT SPARES REQUIREMENTS PROCESS

MAJOR PAUL M. NEEDHAM 88-1955

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REPORT NUMBER 88-1955

TITLE CHURN IN THE AIRCRAFT SPARES REQUIREMENTS PROCESS

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The aircraft replenishment spares budget process is dynamic and is subject to considerable change between the time the budget requirement is submitted and the time the parts are purchased. The variables used in the D041 requirements computation system will change. The constant changing of variables' values is referred to as churn. Churn causes the individual item requirements to change from the budget requirement to the buy requirement. This paper examined the affect of churn on the budget requirement in terms of dollars. The study concludes that the budget process is good and that the dollars requested are within plus or minus 10% of the amount of dollars required at the buy point.

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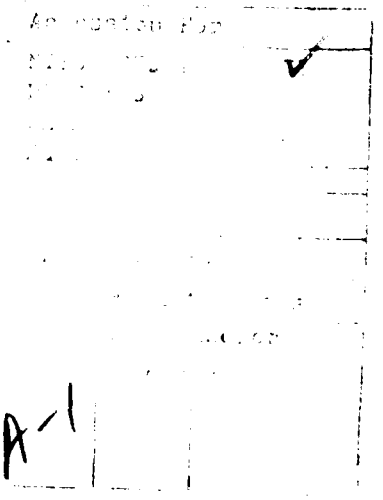
TABLE OF CONTENTS



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PREFACE

The aircraft replenishment spares budget process is dynamic and complex. The D041 requirements computation system is used to compute a buy requirement and to forecast a budget requirement for spare parts. The spares requirement is subject to considerable change between the time the budget requirement is submitted and the time the parts are purchased. The variables used in the D041 will change. The constant changing of variables is referred to as churn. Churn causes the individual item requirements to change from the budget requirement to the buy requirement. This paper will examine churn by looking at churn's effect on individual item requirements and on the budget requirement in terms of dollars. There are hundreds of millions of dollars at stake in being able to convince budget examiners that churn is to be expected and results in a good buy requirement.

The author wishes to thank Lieutenant Colonel James McClaugherty and Ms Deborah Alexander from AF/LEXW for their support and encouragement. Also, Ms Virginia Mattern from Logistics Management Institute provided the data used, without which this project could not have been accomplished.

ABOUT THE AUTHOR

Major Needham enlisted in the Air Force in 1969. In 1973 he obtained his commission through Officer Training School after graduating from the University of Nebraska at Omaha. He was assigned as a supply officer to the 5th Weather Wing and then to a radar squadron at Baudette Air Force Station. In 1978 Major Needham obtained a Master of Science degree in Logistics Management from the Air Force Institute of Technology. Following graduate school he was assigned to the International Logistics Center in Air Force Logistics Command. Major Needham was chosen to initiate foreign military sales programs with the Islamic Republic of Iran, and while in Tehran in 1979 he was taken hostage. After he was released by Iran in 1981, Major Needham was assigned to the Acquisition Logistics Branch in Strategic Air Command Headquarters. In 1982 he was assigned to the Air Staff as a Logistics Capabilities Analyst. He assisted in developing the Logistics Capability Measurement System, which was used to justify the aircraft replenishment spares budget within the Defense Department and to Congress. In 1984 Major Needham became manager of the aircraft replenishment spares budget program on the Air Staff. He obtained 100 percent funding for aircraft replenishment spares in 1985, which was the only time in recent history this had been accomplished. Major Needham was appointed chief of the aircraft initial spares budget program in 1986. He obtained 100 percent funding for initial spares and spare engines for all aircraft acquisition programs. Major Needham is currently attending the Air Command and Staff College and will remain there as a faculty instructor after graduating in June.

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"insights into tomorrow"

REPORT NUMBER 88-1955

AUTHOR(S) Major Paul M. Needham, USAF

TITLE Churn in the Aircraft Spares Requirements Process

I. Purpose: To explain what churn is and the impact it has on the aircraft replenishment spares budget process.

II. Problem: The aircraft replenishment spares budget is built using a bottoms-up approach based on the D041 requirements computation system. This process generates a forecasted list of items and anticipated costs which becomes the basis for the budget. Some Congressional staffers believe that the forecasted items are the ones that should be bought and want the Air Force to notify Congress each time the actual buy deviates from the forecast. Churn, the budget process, and the impact of churn on the process needs to be explained to the staffers.

III. Data: The D041 computes buy requirements and forecasts future requirements by using numerous variables. The variables are time sensitive, and their values change over time. This changing of variables' values over time is defined as churn. As the values change, the requirements computed by the D041 also change. To see the impact of churn

on individual items and at the budget level, an item sample was selected. Two sets of budget and buy requirements were computed using Logistics Management Institute's Aircraft Availability Model and the D041 variables' values from Air Force Logistics Command (AFLC). The variables' values for each item were compared to determine which variable caused the greatest increase or decrease from the budgeted requirement to the buy requirement. The dollar value of the items requirements were then summed and comparisons made. Although the requirements were not actual AFLC budget and buy requirements, some conclusions and recommendations can be made since the logic of the two models is very similar.

IV. Conclusions: Based on the items examined we observed a change of over 70 percent in dollars of individual item requirements from the budget to the buy. The change was only about plus or minus 10 percent, however, from the total budget requirement to buy requirement. Because the sample data in this paper was a selected sample no extrapolations to the population can be made.

V. Recommendations: AFLC should conduct a similar study using actual budget and buy requirements. Additionally, AFLC should establish an analysis office that would concentrate on budget analysis and help in explaining the relationship between the budget and the buy. Such an office would help create greater Congressional confidence in the budget.

Chapter One

INTRODUCTION

The Air Force aircraft replenishment spares appropriation increased from 2.1 billion dollars in 1981 to 3.9 billion dollars in 1985, then decreased to 1.9 billion dollars by 1988. These funds are used to buy spare parts for the supply inventory which are then used to repair aircraft. The total value of the spares inventory has grown during this same period from 12 billion dollars to over 35 billion dollars (10:5). This growth is partly the result of inflation (the inventory is costed at replacement value) but is mostly due to the expansion of parts in the inventory. The annual budget for spares is based on the need to replace condemned parts (those beyond economical repair), expand the inventory for various reasons, and to buy war reserve materiel.

The results of the increased inventory are most clearly seen in mission-capable rates. For example, the F-15 and F-16 mission-capable rates have gone from 60 percent in 1982 to over 85 percent in 1987. The major variables affecting mission-capable rates are spares, maintenance manpower, maintenance techniques, and benchstock type items. Of the four major variables, only spares availability has significantly changed. As a result, we can conclude that the increase in mission-capable rates is a direct result of the increases in the spares inventory.

Since 1985 the spares appropriation has been seriously reduced--by almost two billion dollars. The House Appropriations Committee (HAC) justified the cuts primarily by using the results of a House Surveys and Investigations report which concluded that the Air Force 1986 budget request was overstated by over 800 million dollars (4:1). Additionally, there have been a continuing series of GAO audits looking at the spares budget and the method of developing the budget. These GAO audits have been critical of the relationship between the budget and the actual execution (spending the money). In reviewing the FY88-89 budget request, the HAC questioned why the Air Force has been buying parts other than those listed in the budget documentation (6:--).

The dynamic nature of variables used to develop the budget and the buy requirements is one of the most

significant reasons for the discrepancy between the items budgeted for and those actually purchased. There are over 1000 variables used to compute the future requirement for each part in the inventory over an eight-year period. Multiply that complexity by the 150,000 parts for which requirements are computed, and the dimensions of the requirements computation process begin to become apparent.

In an attempt to produce the best possible statement of requirements, the variables used in the requirements computation model are updated quarterly. This constant updating adds to the dynamic nature of the requirements process and is called churn. Churn is the constant changing of variables, which results in changing parts requirements. Because of the large number of dollars involved in the replenishment spares budget and the impact of spares on aircraft mission-capable rates, the phenomenum of churn needs to be understood, especially its impact on the spares budget.

Churn causes individual item requirements submitted as part of the Air Force budget request to change between the time the budget is submitted and the time the actual purchases are made. That time lapse is about one and one-half years. As a result, the items the Air Force buys during the execution year are not necessarily the same items Congress reviewed in approving the budget. Congressional staffers, not fully knowledgable of churn, want the Air Force to tell them each time the buy requirement changes from the Air Force budget request.

There are billions of dollars at stake in being able to understand what churn is and how it affects the spares budget. This paper will explain what churn is in Chapter Two. It will examine the impact of churn on selected parts in Chapter Three. Chapter Four will explain the effect of churn on budget and buy requirements and why churn should not lessen confidence in the aircraft spares budget process. Finally, Chapter Five will present conclusions and recommendations.

Chapter Two

CHURN--WHAT IS IT AND WHAT CAUSES IT?

"Churn" can be defined simply as the changing over time of the values of the variables used in the requirements computation model (2:3-7; 5:1-2). To understand what churn actually is and what causes it, we need to examine the basic nature of the requirements computation system, the most significant variables, and what causes the values of the variables to change.

The current Air Force aircraft spares budget is built with a bottoms up approach using the D041 requirements computation model. The D041 model computes the requirement for each recoverable part in the Air Force inventory. The model considers numerous variables including operating time (flying hours), order and shipping time, repair time for both base and depot, mean time between removals, etc. An exhaustive list of the variables is contained in AFLCP 57-4. The model's results for items which require purchase of additional units for inventory are then stratified in the Central Standard Item Stratification (CSIS). The CSIS converts parts to dollars and becomes the Air Force budget submission for spares (9:8-1).

The actual CSIS includes three sets of requirements. These sets are categorized by year with the current year (execution) being the AY or appropriation year; the budget year (next year) being the BY; and the extended year (one additional year in the future) being the EY. The AY requirement, which is computed as of March is what Air Force Logistics Command (AFLC) is actually putting on contract. The BY requirement is six months away and is subject to changes in the six months before purchase requests are actually prepared. Finally, the EY requirement is subject to changes over the next two years and has generally been regarded as being inaccurate in trying to predict quantities required at the individual item level. The EY requirement becomes the budget for spares. Given the number of variables entering into the model and the time frame over which the model computes present and future buy requirements, all computations are subject to change until items are placed on contract.

Based on the mathematical treatment of the variables in the D041, the most significant variables are:

-unit cost
-failure rate--removal rate
-not repairable this station--NRTS
-order and shipping time
-repair time--base and depot
-number of users
-procurement leadtime
-condemnation rate
-flying hour program (9:9-37; 7:26)

Changes in the values of these variables will cause projected buy requirements to change when put into the D041. The definitions of and sources of the values for each of these variables is in Appendix 5.

The value of each variable enumerated above will change for different reasons. For example, the unit cost of an item, basically the price paid the last time the item was ordered, ignores the reality of the market place and is only updated for inflation. It is not updated for greater or lesser quantity (economic production rate), technological state of the market (e.g., tubes vs solid state), or specific market anomalies such as steel alloys, labor problems, production capacity, competitive bidding, etc. The failure rate or removal rate measures reliability and is basically the mean time between removals (failures), and it can also change for a number of reasons. Factors such as change in mission profile (e.g., suddenly beginning to fly low and fast over the desert), termination of an item's life cycle (wearout rate), faulty test equipment, and lack of training for technicians can all affect the failure rate.

Based on constant update and revision of variables, we can see churn is caused by their mathematical impact on the requirements model, not a mysterious hand massaging of the quantities of items to be bought. The next chapter explains and evaluates this impact.

Chapter Three

EVALUATION OF THE IMPACT OF CHURN

We know in general terms what churn is and what causes it. In order to examine the impact of churn, data must be acquired and analyzed and conclusions drawn. This chapter will explain how the data was acquired and examined and will present the analysis and the conclusions to be drawn from the analysis.

HOW THE DATA WAS ACQUIRED

The data was acquired from the Logistics Management Institute (LMI), which used its data base of past AFLC D041 computations to compute the basic pipeline data. LMI computed the data using its Aircraft Availability Model (AAM) which simulates the actual D041 and provides the Air Force a capability to quickly generate computations to make comparisons. Only pipeline data was acquired since LMI computes the variable safety level portion of the requirement using a different technique from that used by AFLC.

The D041 data bases used were those for March 1983, March 1984, September 1984, and September 1985. The March 1983 data was used to compute the BY and EY (1984 and 1985) requirements. The EY requirement would have been used for the 1985 budget request submitted to Congress in January 1984. The September 1984 data was used to compute a buy requirement for 1985. This data was then used to compare a budget requirement for 1985 with a buy requirement for 1985. In a similar manner, the March 1984 data was used with the September 1985 data to look at budget and buy requirements for 1986.

In each of the D041 data bases there are over 150,000 stock numbers which represent the population. In order to examine the changes caused by churn, a sample was selected. This sample was not random and can not be assumed to be representative of the population. The stock numbers chosen for this analysis were the top ten (dollar weighted) buy items for the F-15, F-16, and E-3 aircraft in 1985, 1986, and 1987. These stock numbers were pulled from the budget brochures that each Air Logistics Center prepares as part of its budget backup material.

The data are based on the AFLC actual depot data bank factors, the pipeline requirements derived from the AAM, and the buy requirement computed by the AAM. The requirement computed by the AAM was not used in the actual budget nor was that requirement used to generate purchase requests for parts. The data was selected because of its availability and the responsiveness of LMI in providing it.

EXAMINING THE DATA

The complete list of the stock numbers which were examined for our FY85 budget and buy and our FY86 budget and buy are listed in Appendices 1 and 2 respectively. This section will examine both years and will present the significant variables.

FY85

In looking at FY85, 44 stock numbers were in both data bases--March 1983 and September 1984. The data in the two computations was compared only for the stock numbers whose buy quantities changed between the March 1983 FY requirement and the September 1984 requirement. There were 17 items whose quantities changed from budget to buy. Of the 17 items, the quantities of five increased (29 percent) and the quantities of 12 decreased (71 percent). The major variables used in the computation were examined to determine if there was any trend to the data. We will first look at the items whose quantities increased and then examine the ones whose quantities decreased.

The five items whose quantities increased from budget to buy are listed in Appendix 3. Condemnations were the major cause of the increase in buy quantities, although many factors affected the increase. Changes in more than one computational variable accounted for the increase in the buy quantities of each of four of the five items. On one item the projected condemnations increased from zero to 28, and the procurement leadtime increased from 12 months to 27 months. The other three items had increases for the following reasons: increases in projected condemnations, more parts removals from the aircraft, and increases in the number of bases using the parts. The buy requirement for one item was increased only for insurance.

The 12 items whose quantities decreased from budget to buy are listed in Appendix 4. The primary reason for the decrease was a reduction in the anticipated number of parts removals from aircraft. Nine of the 12 items' requirements

decreased because of better reliability than anticipated. The remaining three requirements were reduced because the Air Force repaired more items in the depot rather than buying more.

FY86

In looking at FY86, 42 items were in both the March 1984 EY computation and the September 1985 computation. Nineteen of the items' quantities changed from budget to buy. Nine of the nineteen (47 percent) increased, and ten (53 percent) decreased. We will first look at the items whose quantities increased and then examine the ones whose quantities decreased.

The stock numbers of the nine items whose quantities increased from budget to buy are listed in Appendix 3. The primary reason for increases for five of these nine items was a projected increase in condemnations. Two of the items had increases because of an unanticipated increase in the number of bases using the items. One item had an increase because the time to repair broken items at the base and depot increased. Finally, one item had an increase because the buy of needed items had been deferred in prior years.

Decreases from budget to buy occured in the requirements of ten items, and their stock numbers are listed in Appendix 4. The reason nine of the ten had lower requirements was an improvement in the reliability of the part. This improvement resulted in projecting fewer removals and, therefore, fewer required parts.

ANALYSIS OF THE DATA

As we analyze the data and the reasons for buy quantities to change from budget quantities, it is important to recognize that the way the data was selected makes it inappropriate to extrapolate from this skewed sample to the population. The data and reasons nevertheless provide an insight into the dynamics of the multi-variable, multi-echelon inventory model that is used to both budget for and buy items.

Within this limited two-year sample, there were changes from budget to buy requirements for 31 out of 86 items. Increases in the requirement were found for 14 items and decreases for the other 17. The change in quantity from budget to buy for most items was due to a combination of variables.

To understand the basic relationship of the variables, the inventory model can be explained as follows: the

requirement is a function of failure rate, base repair time, percent of items repaired at the base, depot repair time, order and shipping time, number of condemnations, number of users, and procurement leadtime (1:2-2). The changing value of these variables and their interaction over time will cause buy requirements to change from budget requirements. The primary variables which change and result in changing quantities are: expected condemnations, item failure rates, number of users, repair times, expected number of repairs, and procurement leadtime.

No single variable was the sole reason for the buy quantity changing from the budget quantity, but the biggest reason for change was failure rate. Changes in the failure rate have the potential to change the requirement the most since the other variables are subordinate to the failure rate in the mathematical equation. Failure rate change was evident in 23 of the 31 buy quantity changes. Change in anticipated condemnations was a major cause of increased quantity for eight items. The number of users changed for 24 items. Projected repairs at base and depot changed for 29 items.

This chapter evaluated the impact of churn, discussed how the data were obtained, and showed how numerous variables change in the dynamic inventory model. Now that the reasons for churn and its impact at the item level have been presented, it is important to see the impact of churn on the budget process.

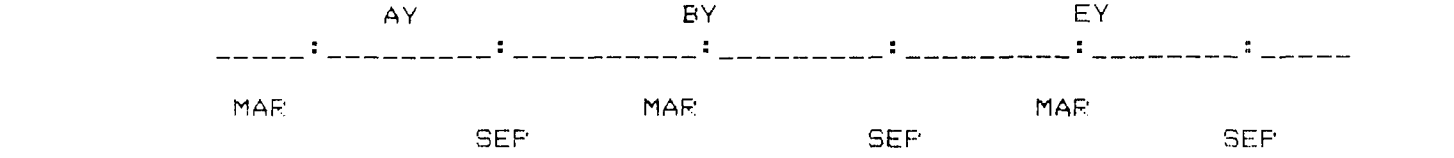
Chapter Four

EFFECT OF CHURN ON THE BUDGET PROCESS

We have discussed the impact of churn on the budget and buy quantities of individual items. We will look at the larger impact of churn on the budget process. First, we will review the budget process for spares. Second, we will show the effect of time on the budget process. Third, we will illustrate the the overall impact of churn at the budget level. Finally, we will examine the reasons for maintaining confidence in the spares budget process.

THE BUDGET PROCESS

The budget process for spares begins with the D041 Requirements Computation being run in March. The results of the computation are available in early September of the same year. This computation produces the three requirement statements known as the AY, BY, and EY requirements. The time line below illustrates the timing:



The time line shows that the AY requirement is for the remainder of the fiscal year--March through September. The BY requirement is for the next fiscal year and is used to begin the execution process as the basis for purchase requests. The EY requirement is used to prepare the budget for OSD review and incorporation in the President's Budget in January.

The BY requirement is an update to the previous EY requirement that was the basis for requirements sent to Congress as the President's Budget. This update to the President's Budget is not available to the Air Staff normally until the middle of September, just prior to passage of the Appropriation Bill by Congress. The timing of the availability of the updates makes updates to the Congress very difficult, especially if any analysis is required.

For years the Air Force has recognized the need to be able to have the BY data available earlier (8:116). When the Requirements Data Bank (RDB) system becomes available, the timing will improve. However, the RDB for budget purposes and requirements computation will not be available until 1991 (3:--). In the interim, updates will not be available in time to make adjustments to the budget request which Congress reviews before appropriating funds.

EFFECT OF TIME

Time affects the budget and buy requirements. Variables used to compute the requirements are subject to change over time. AFLCR 57-4 discusses in detail the methods used to update the various factors. Briefly, the values of the variables are computed by using a two-year moving average of data. The two-year average is comprised of eight observation points and is updated by dropping the first quarter data and adding the new data point for the last quarter (9:9-1).

The procedure for updating the values of the factors insures that the best and latest information is used to project future needs. Additionally, use of the two-year moving average minimizes the effects of sudden changes in the variables and effects of errors made in inputting data.

The effect of time on the budget process can best be illustrated by the fact that between the EY computation and the BY computation there are four quarters worth of data used to update factors. Since four of the eight quarters of observation points are updated, there is potential for significant change in the variables' values. Changes in the variables' values cause the requirements to change. Although there is significant change at the item level, the overall impact in terms of dollars needed to buy the required parts changes little.

CHURN IMPACT AT THE OVERALL LEVEL

If the 44 items in the March 1983 computation and the September 1984 computation are used, then we can make the following comparison between the budget and the buy on a dollar basis. The budget for the 44 items in our FY85 budget was 12.1 million dollars. The September 1984 computation (buy) had a dollar requirement of 10.8 million dollars. Between the budget and the buy there was a net decrease of 1.3 million dollars. In examining the individual changes in Chapter Three, we determined that the change in failure rate (mean time between removal) accounted for most of the decrease (85 percent).

Our FY86 budget and buy requirements can be examined by making the same type of comparison using the 42 items. The budget was based on the March 1984 computation and had a dollar requirement of 14.1 million dollars. The September 1985 computation (buy) had a dollar requirement of 15.8 million dollars. Between the budget and the buy there was a net increase of 1.7 million dollars. The individual item analysis in Chapter Three shows that the change in projected condemnations accounted for 66 percent of the items that increased.

Based on the items selected, we see that the number of dollars required for the FY85 buy were 10 percent less than the dollars required for the FY85 budget. From the FY86 budget to the FY86 buy, there was a 12 percent increase in the dollars required. However, if we add up the dollar increases and decreases of each item whose value changed, we discover a 75 percent change in terms of dollars for FY85 and a 73 percent change in FY86. Churn causes a great deal of change at the individual item level, but the change system-wide is not so significant as more items are included and the increases and the decreases begin to cancel each other out in terms of dollars.

CONFIDENCE IN THE BUDGET

Over the past few years the credibility of the budget request has been questioned. This credibility was first questioned in the FY86 Appropriations Act, and the budget request was reduced 800 million dollars based on a House Surveys and Investigations Report that was critical of the Air Force's use of a macroeconomic forecasting technique (11:248-252). The Air Force then reverted to using the D041 to forecast requirements even though that model also has limitations.

The D041 was not designed as a budget forecasting tool but has been accepted as one. The major problem is that some people believe that the D041 can accurately forecast item-level quantities and costs for 150,000 items two years before going into the marketplace to buy them. As shown in Chapter Three, the requirements at the item level change as a function of time and external factors such as wearout rates, failure rates, various Air Force actions, and economic factors.

The budget request the Air Force sends to Congress is the best estimate of the dollars required to buy parts based on the D041 computation and external adjustments by item managers. As shown above and in Chapter Three, the change in

total dollars required for the selected items was within 10 percent even though there was about a 75 percent change at the item level because of churn.

This chapter has graphically portrayed the budget cycle for spares computations and the problem of getting the updated data when desired. The effect of time on requirements was also discussed and the probability of change was shown, given that one-half of the observation points on which the value of variables is computed are updated between the budget and the buy. We discussed the effect of churn at the overall level and showed it was about plus or minus 10 percent even though there was about a 75 percent change in budgeted dollars versus buy dollars at the item level. We can conclude, then, that churn should not lessen the confidence in the budget request for dollars to buy parts.

Chapter Five

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

This paper has described the phenomenum of churn in relationship to the spares requirements process. Simply stated, churn is the changing value of variables over time. Churn impacts individual item requirements more than it impacts the total budget request in terms of dollars.

Based on our data some trends can be seen. In terms of dollars, there was a greater than 70 percent change at the item level versus an overall change of only about plus or minus 10 percent. Continous updating of the variables improves the accuracy of the buy. Updating of the failure rate and projected condemnations insures that the items now required are being bought. The closer to the buy point we can update the variables, the better we can compute the required parts. However, due to having only two data points on which to test a hypothesis and also because the data was from a selected sample, no statistical inference is made.

The D041 Requirements Computation model is not a static model, but a dynamic one. It changes with time as will any dynamic budgeting and forecasting model. It is inappropriate for anyone to expect a dynamic model to provide the same answers at two points in time which are a year apart. However, as was shown in this paper, there was only about a 10 percent net change in dollars from budget to execution. This degree of accuracy provides confidence that the budgeting process ultimately produces accurate budgets and should not be tampered with.

RECOMMENDATIONS

AFLC should use this report as a starting point to conduct a study involving more than two data points and using a random sample. Such a study would prove useful in providing additional confidence that the computation process produces an accurate budget and that the updating process provides accurate buy requirements.

Additionally, AFLC should create an analysis office to help in preparing the budget. This office would ensure that the budget and buy requirements are accurate and the that relationship between the two is explainable. The 1983 Corona Require study recommended a similar office be established for the Program Objective Memorandum submissions (8:112). Thus, the concept is not new. The need is clear.

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APPENDICES

APPENDIX 1

FY85 Sample

1560-00-518-6889FX
1560-00-523-5267FX
1560-01-564-4844FX
1560-01-103-1977FX
1630-01-069-0093
1650-00-288-6044
1650-01-041-4433
1650-01-052-0503
1650-01-073-0351
1650-01-096-4603
1660-00-273-8669
1660-00-544-4334
1660-01-015-5017
1660-01-046-0943
1660-01-084-6853
1680-01-048-8977WF
2620-01-055-4600
2835-01-068-6525
2835-01-091-2433
2835-01-140-1623
2840-01-018-4493RV
2840-01-020-1322RV
2840-01-146-5023JF
2840-01-146-9374JF
2840-01-146-9391JF
2840-01-147-0559JF
2840-01-147-0561JF
2910-01-037-8565
2925-01-115-0306YP
4810-01-034-0196
4810-01-118-7989Y0
4920-00-553-3376D0
4920-01-059-5118D0
5821-01-007-7236
5821-01-035-1521
5841-01-073-2065
6610-01-010-2018
6610-01-010-4516
6615-01-007-4290
6615-01-013-5966
6615-01-035-0744
6625-01-045-5759D0
6625-01-051-6832D0
6625-01-052-5588D0
6625-01-108-6627D0
7025-01-032-5339

APPENDIX 2

FY86 Sample

1560-00-518-6889FX
1560-00-523-5267FX
1560-01-564-4844FX
1620-01-009-8083
1630-01-069-0093
1630-01-083-0444
1650-00-288-6044
1650-01-041-4433
1650-01-052-0503
1650-01-073-0351
1650-01-096-4603
1660-00-273-8669
1660-00-544-4334
1660-01-015-5017
1660-01-046-0943
1660-01-084-6853
1680-01-048-8977WF
2620-01-055-4600
2835-00-612-9420
2835-01-091-2433
2835-01-140-1623
2840-01-018-4493RV
2840-01-146-5023JF
2840-01-146-9374JF
2840-01-146-9391JF
2840-01-147-0535JF
2840-01-147-0559JF
2840-01-147-0561JF
2910-01-037-8565
2925-01-115-0306YP
4810-01-034-0196
4810-01-118-7989YQ
4920-00-553-3376DQ
4920-01-059-5118DQ
4920-01-130-4476DQ
5821-01-035-1521
5841-01-073-2065
6610-01-010-2018
6610-01-010-4516
6615-01-007-4290
6615-01-013-5966
6615-01-035-0744

APPENDIX 3

Items Whose Quantities Increased

FY85

1560-01-103-1977FX
1630-01-069-0093
1680-01-048-8977WF
4920-00-553-3376DQ
6615-01-007-4290

FY86

1560-00-523-5267FX
2835-00-612-9420
2835-01-140-1623
2840-01-146-9391JF
2840-01-147-0559JF
4920-00-553-3376DQ
4920-01-130-4476DQ
6615-01-007-4290
6615-01-035-0774

APPENDIX 4

Items Whose Quantities Decreased

FY85

1560-01-564-4844FX
1650-00-288-6044
1650-01-096-4603
1660-00-273-8669
1660-00-544-4334
1660-01-084-6853
2620-01-055-4600
2835-01-140-1623
2910-01-037-8565
4920-01-059-5118D0
5821-01-007-7236
5841-01-073-2062

FY86

1560-01-056-4844FX
1630-01-069-0093
1630-01-083-0444
1650-00-288-6044
1650-01-096-4603
1660-00-273-8669
1660-01-046-0943
1660-01-084-6853
2620-01-055-4600
2840-01-147-0561JF

APPENDIX 5

Variable Definitions

Unit_cost-the latest acquisition price to procure one unit of the item, plus a 3% first-destination transportation charge.

Failure_rate-expressed as total organizational and intermediate maintenance demand rate (TOIMDR). This measures the rate at which base maintenance places demands on supply for a serviceable item.

Not_repairable_this_station-items that can not be repaired at the user's base and must be returned to the depot for repair.

Order_and_shipping_time-is the time that elapses between the initiation of a request for a serviceable item until its delivery to the requestor.

Repair_time--base_and_depot-the timespan in days from the time an unserviceable item is removed from use until it is made serviceabe in base maintenance or depot maintenance.

Number_of_users-the number of stock record accounts reporting a demand level for the item.

Procurement_leadtime-is the sum of administrative leadtime (time from start of purchase to contract award) and production leadtime (time from contract award until 10% of the order has been delivered).

Condemnation_rate-the portion of the total parts processed for repair which could no longer be repaired.

Flying_hour_program-the projected number of hours the different aircraft will be flown per quarter.

END

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