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# AIR FORCE LOGISTICS COMMAND

## MATERIEL MANAGEMENT ANALYSIS

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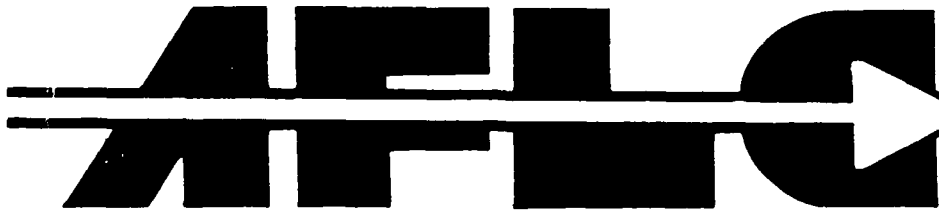
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THE AIR LOGISTICS EARLY REQUIREMENTS TECHNIQUE (ALERT)  
FORECASTING MODEL USER'S GUIDE

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Mr Rob Lucas  
Ms Adrienne Rexroad  
Mr Larry Collins

April 1989



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HEADQUARTERS AIR FORCE LOGISTICS COMMAND  
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-5001

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SUBJECT Final Report - ALERT Forecasting Model User's Guide

See Distribution List

1. In this report, we document a user's guide for the Air Logistics Early Requirements Technique (ALERT) for estimating Program Objective Memorandum (POM) inputs for the Peacetime Operation Spares (POS) portion of the aircraft replenishment spares budget (BP15). This user's guide provides the technical detail and procedures necessary for the BP15 program budget manager and/or budget analyst to run ALERT.

2. Our point of contact is Mr Rob Lucas, HQ AFLC/MMISA, AUTOVON 787-5249.

FOR THE COMMANDER

  
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ABSTRACT

This user's guide describes the Air Logistics Early Requirements Technique (ALERT) aircraft replenishment spares (BP15) Peacetime Operating Stock (POS) Program Objective Memorandum (POM) forecasting model. A description of the ALERT model, its inputs, and the procedures and outputs from the model are provided.

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## EXECUTIVE SUMMARY

Headquarters Air Force Logistics Command (AFLC) uses the Air Logistics Early Requirements Technique (ALERT) forecasting model to project the Program Objective Memorandum (POM) outyear budget for the Peacetime Operating Stock (POS) portion of the aircraft replenishment spares (BP15) Budget Estimate Submission. The model resides on the Planning, Programming, Budgeting System (PPBS) Subproject 5 analysis and forecasting region of the Requirements Data Bank (RDB) computer system. The model is programmed in the SAS statistical programming language. ALERT can be accessed by the budget analyst and/or BP15 program manager through the RDB. This user's guide gives the technical detail and procedures necessary to run ALERT.

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## CHAPTER 1

### INTRODUCTION

In this report, we will explain how to run the Air Logistics Early Requirements Technique (ALERT) forecasting model. First we describe the model. Then we discuss the model inputs and how to gather them. In the final section, we describe the actual steps in running the ALERT model.

#### Model Description

We describe the ALERT model in the last two year's ALERT forecast reports [1] and [2]. We repeat the description of the model here. Further updates in the description of the model will occur as we continue to document the annual ALERT forecasts.

ALERT is a multivariate regression based model that uses historical data to predict future Program Objective Memorandum (POM) requirements by weapon system. The model resides on the Planning, Programming, and Budgeting System (PPBS) Subproject 5 analysis and forecasting region of the Requirements Data Bank (RDB) computer system [3]. The model is programmed in the SAS statistical programming language. ALERT predicts the aircraft replenishment spares (BP15) Peacetime Operating Stock (POS) POM requirement. The model currently uses up to eleven years of historical data which includes the following:

1. Past Budget Estimate Submissions for the BP15 POS.
2. The sum of the D041 Central and Secondary Item Stratification (CSIS) extended year buy requirement plus the CSIS Approved Force Acquisition objective (AFAO) buy requirement for condemnations only (this is the estimate of recoverable buy requirements three to four years from the current June computation).
3. The reciprocal of the present and projected age of the fleet (developed by USAF/AC).
4. The dollar value of the fleet. This data was developed in the past by USAF/AC. Current efforts are underway in HQ AFLC/ACC to develop the data in-house.

ALERT is actually a five step process.

Step 1 - Update the ALERT Data Base - In this step, we collect the most up-to-date data on each of the variables. This includes updating the D041 Central and Secondary Item Stratification (CSIS) data and the age and value of the fleet data and entering them in the data base.

Step 2 - Develop Regression Equations - In this step, we run the ALERT model on the RDB computer which computes regression equations. Then we select the equations that result in the best fit of the data. The criteria used to determine the best fit consist of the following statistical tests: the adjusted r-square (the coefficient of determination), the F statistic, the residual pattern, and the Durbin-Watson test. We document these statistical techniques in chapter 3.

Each weapon system has its own regression equation and its own set of independent variables. We develop a different set of equations for the POM forecasts. We include the output of the first set of regression equations as historical data in developing the second set. (Using a regression forecast as another data point in developing yet another forecast is a statistical technique called bootstrapping.)

Step 3 - Management Review - The results of step 2 reflect the best set of regression equations and forecasts based on historical data. However, historical data is not always the best prediction of the future. This is because it assumes the forces at work in the past will continue in a predictable way into the future. Therefore, we include a management scrub which provides management a chance to look at the results and identify any known occurrence that would impact the future.

Step 4 - Develop New Regression Equations - We repeat step 2 with the data updated from the management scrub, and we include "dummy" variables to reflect future known occurrences. For example, if the budget program managers know of a significant modification or program change, we adjust the regression equation to account for the change.

Step 5 - Present the ALERT Forecasts - At this point, we present the ALERT forecasts by weapon system and total BP15 requirements to the budget program manager.

## CHAPTER 2

### MODEL INPUTS

This chapter provides the general information needed to gather the data for the ALERT BP15 POM forecasts. In it we provide what data is needed for the ALERT model, the timing of the data collection and the time frame of the forecast period, and how the CSIS data is gathered from the RDB computer system.

#### Description of the ALERT Data

The data needed for the ALERT model is as follows:

1. The latest BP15 Peacetime Operating Stock (POS) Budget Estimate Submission (BES) numbers. We use the data from the weapon system summary tables as provided in the annual BP15 BES. The data is for the current year, the AY, BY and EY. We receive the data not earlier than 1 October annually. This data represents the dependent variable 'POSBES' which the ALERT model forecasts.

2. The aircraft fleet value numbers. This is the projected fleet value from the present through the POM outyears. Previously, UASF/AC provided the data. The data had to be developed manually this year. We have requested that AFLC/ACC provide the numbers not later than 1 August annually for the BP15 POM submission. This data represents the independent variable 'VALUE' in the ALERT model.

3. The fleet age numbers. This is the projected fleet age from the present through the POM outyears. Previously, USAF/AC provided the data. We had difficulty getting the data from Air Staff this year. To ensure that the data is made available to us in a timely manner, we requested AFLC/ACC to secure this resource for in-house (AFLC) use, or to develop the data in-house. We have requested that we receive the data not later than 1 August annually. We use the reciprocals of these numbers are used in the ALERT data base. This data represents the independent variable 'AGEREC' in the ALERT model.

4. D041 CSIS data. We use the restratified numbers for the 30 June CSIS cycle for the ALERT model. They are considered more accurate than the initial June CSIS products. This is because file maintenance is done on the data base between the initial and restratified CSIS runs. However, these numbers are generally not available until October/November. MMRMS keeps track of when the data base is loaded on the RDB. Sometimes the physical reports are produced before the June data base is loaded on the RDB. However, manually extracting the numbers from this report is time consuming and should be avoided if possible. We gather the data from the RDB

D041 budgeting data base from the T02 and T05 reports. We describe how to gather this data from the RDB at the end of this chapter. This data represents the independent variable 'TBUY' in the ALERT model.

5. System Management Code (SMC) data. A complete list of SMC codes used in last year's ALERT run is given to the BP15 budget manager to review and update in a timely manner before the CSIS data needs to be gathered. We have listed the current SMCs (the ones used in the 1988 ALERT forecasting analysis) in Appendix A.

6. We also maintain the following other variables in the ALERT model data base:

- a. WSYS - this variable is not used by ALERT except to identify the data for the particular weapon system forecasted.
- b. YEAR - (independent variable) - self explanatory.
- c. AY - (independent variable) - the apportionment year deficit from the D041 CSIS.
- d. BY - (independent variable) - the budget year deficit from the D041 CSIS.
- e. DUMMY - (independent variable) - an inflation surrogate.
- f. DUMMY2 - (independent variable) - a deflation surrogate.
- g. FLTINV - (independent variable) - fleet inventory - used for the B-1 only as it was being introduced to the ALERT model data base.

#### Timing of the ALERT Data

To enhance your understanding of what value ALERT forecasts, and how the model's results are applied, we present the following discussion. The timing cycles for budget reporting, for recomputing a new TBUY value (described below), for reviewing each fiscal year's BP15 budget requirements estimate across the POM and budget timeframes, and for the analysis steps (as discussed in the Model Description part of this report) all dramatically affect the usefulness, accuracy, and currency of the ALERT results. For instance, ALERT was originally developed as a POM forecasting tool. Now, because the budget timeframe was extended from one year to two years and because the POM exercises are conducted every two years instead of annually, ALERT also baselines the second year of the budget (See Figure 2-1). ALERT forecasts are annually updated to be more responsive to changes in the recoverable item CSIS results and other changes to input variables such as the value of the fleet or the inclusion of indicator variables. We hope to provide you a better appreciation for the timing dynamics inherent in the ALERT estimation process after you have read this part of the report.

Figure 2-1

BUDGET AND POM TIMING

- SEP 86 ALERT
  - NO 2-YEAR BUDGET
  - MMMI USED SEP 85 ALERT TO BASELINE FY88 BUDGET
  - MODEL FORECASTED FY89-93 POM
  
- SEP 87 ALERT
  - FIRST 2-YEAR BUDGET
  - MMMI USED SEP 86 ALERT TO BASELINE FY90 OF THE FY89/90 BUDGET
  - MODEL FORECASTED FY90-94 POM
  
- NO FY91-95 POM
  
- SEP 88 ALERT
  - MMMI USED SEP 87 ALERT TO BASELINE FY91 OF THE FY89/90 BUDGET
  - MODEL FORECASTED FY92-97 POM

Budget Reporting

In any given year, a budget manager can look over ten years' worth of budget estimates. In addition to the three years of current program year funds s/he is managing, s/he can also look out seven years from today (See Figure 2-2). For the purposes of this example, we are assuming that the present FY is FY88. The budget manager is directly responsible for the FYs 1988 through 1990. The ALERT model's POSBES does not occur until four years from the present--in 1991. Then, ALERT-generated values are also used to estimate the BP15 POSBES from 1992 to 1997. The last POM year (1997) is ten years from the current FY.

Figure 2-2

BUDGET MANAGER'S VIEW OF ESTIMATES

YEAR:	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
DATA	MMMIA HAS VALUES			ALERT	ALERT RUN WITH 1991			ALERT POSBES		
FROM:	FROM BES AND AIR STAFF			RUN W/ TBUY	FORECAST ENTERED AS VALUE			REAL POSBES		

### Recomputing a new TBUY value

The TBUY value is an independent variable in the regression against which ALERT forecasts the BP15 budget requirement. It is the sum of the CSIS extended year (EY) buy requirement (for repairs and condemnations) plus the Approved Force Acquisition Objective (AFAO) buy requirement for condemnations only. Figure 2-3 depicts where the EY and AFAO time periods fall in a look out from today. The CSIS values are used to "bootstrap" the ALERT model--and give the model's results more credibility because they are based upon the D041 recoverables computation (see Reference 1 for a description of bootstrapping).

FIGURE 2-3

BUDGET MANAGER'S PLANNING TIMEFRAMES

APPORTIONMENT YEAR (AY)	BUDGET YEAR (BY)	EXTENDED YEAR (EY)	AIR FORCE ACQUISITION OBJECTIVE TIMEFRAME (AFAO)
THIS YEAR'S ESTABLISHED REQUIREMENT	THIS YEAR'S FORECASTED REQUIREMENT	WHAT THE BP MANAGER IS BUDGETING	WHAT THE BP MANAGER IS PLANNING FOR THE POM
TODAY	0 TO 1 YRS OUT FROM TODAY	1 TO 2 YRS OUT FROM TODAY	3 TO 8 YEARS OUT FROM TODAY
FY88 -----	FY89 -----	FY90 -----	FY91 -----
- N - O - W - - -	----- B - U - D - G - E - T -----	-----	----- P - O - M -----

## Analysis steps

The ALERT analysis process typically begins in July and ends in December of each calendar year (see Figure 2-4). In July, we request updated data for the age of the fleet and the value of the fleet, or update it ourselves. This new data is then appended or overwritten to last year's ALERT data base. In August, the previous year's ALERT results are presented to the Air Staff as BES and POM forecasts. By September, the D041 June cycle item manager file maintenance and recoverables computation are completed; then the recoverables CSIS products and results are produced. The ALERT model's TBUY value is developed from the June final computation cycle CSIS results, generated in September. By early October, all the new data has been collected and entered in to the ALERT data base. Within three weeks, after updating the files, the ALERT forecasts are ready for input to the next FY's President Budget. ALERT-related activities continue into November and December with briefings and reports documenting this year's results and answering questions regarding the model (from Air Staff, auditors, other DCSS, etc.) The analysis process begins again in July of the subsequent year.

Figure 2-4

### ANALYSIS TIMING

- JUNE/JULY
  - COMPLETE JUNE CSIS IM REVIEWS AND GENERATE COMP
  - RECEIVE MAR COMP DATA TO USE IN DEVELOPING THE BES
  - BEGIN COLLECTING OTHER DATA INPUTS (VALUE, AGE)
- AUG/SEP
  - IF A 'POM' YEAR, USE LAST YEAR'S ALERT TO PROVISIONALLY PRESENT POM ESTIMATES TO AIR STAFF
  - UPDATE DATA BASE WITH 'YEAR', 'VALUE', 'AGE' VALUES
- OCT
  - EACH YEAR, RUN ALERT TO BASELINE THE 2ND BUDGET YEAR
  - USE SEP COMP DATA TO DEVELOP 'TBUY' VALUE
  - PREPARE RESULTS

### Review of the BP15 Budget Requirements Estimate

Specifically, we will address how many times a given fiscal year's BP15 POS budget requirement estimate is formally reviewed and presented for Air Staff approval (see Figure 2-5). For example, the first time a BP15 POS budget requirement estimate (forecast) is presented is in the FY89 POM submission. The ALERT

model will estimate the POSBES number for FY96. The next time the BP15 FY96 POS budget requirement forecast is formally reviewed is in the FY90 POM , the third time will be in the FY91 POM, and the fourth time will be in the FY92 POM. In between these POM cycles, the estimates will be reported in the President's Budget reports, but the numbers will NOT be re-estimated. All of these bottom-line POM forecasts will be developed using the ALERT model. The first FY96 BES for BP15 will be in FY94. This "second year budget" estimate is baselined from the ALERT model's forecast, but the estimate is subject to a management scrub. The second FY96 BES will be in FY95 and is developed from the D041 CSIS results and management judgment. The actual budget execution, or spending of the FY96 BP15 budget will begin in FY96.

Figure 2-5

HOW OFTEN IS A FISCAL YEAR EXAMINED?

EXAMPLE: FY96

- FIRST POM LOOK IS IN FY89
- SECOND POM LOOK WILL BE IN FY90
- THIRD POM LOOK WILL BE IN FY91
- FOURTH POM LOOK WILL BE IN FY92
- 1ST BUDGET LOOK WILL BE IN FY94
- 2ND BUDGET LOOK WILL BE IN FY95
- ACTUAL BUDGET EXECUTION WILL BE IN FY96

Gathering CSIS Data from the RDB

As your initial starting point, we assumed that you, the ALERT model user, will be accessing the RDB computer system through the Local Area Network (LAN). Using a Z-248, you can access the LAN by using your CALL program. At the LAN prompt, type "connect rdb" and the <return> key. Your screen should appear as follows:

You may now enter Net/One commands.

```
>>  
>> <--- This is a LAN prompt.  
>>  
>>connect rdb  
Connecting ... (3) 407720A2 Success.
```

Now hit the <return> key. This should bring up the prompt for the terminal type. Enter "rdbz248" and <return>.

ENTER TERMINAL TYPE: rdbz248

This should bring up the RDE access screen. Type "rdb" and <return> at the cursor as shown below:

ENTER APPLICATION REQUEST

```
RRRRRRRRRR      DDDDDDDDD      BBBBbbb  
RR      RR      DD      DD      BB      BB  
RR      RR      DD      DD      BB      BB  
RRRRRRRRRR      DD      DD      BBBBbbb  
RR      RR      DD      DD      BB      BB  
RR      RR      DD      DD      BB      BB  
RR      RR      DDDDDDDDD      BBBBbbb
```

rdb

This should bring up the RDB user-id screen. Enter your user-id and password: type "user-id" <tab> and "password" <return>. This is shown below:

WELCOME TO THE  
REQUIREMENTS DATA BANK SYSTEM !

PLEASE ENTER YOUR USERID AND PASSWORD.

USER-ID: user-id  
PASSWORD: password

This will bring up the current system news screen. Enter <return> to bring up the main menu. You should see the following screen:

REQUIREMENTS DATA BANK MAIN MENU

1. HELP - THE RDB HELP SYSTEM
2. NEWS - GENERAL NEWS, AND INFORMATION
3. ELECTRONIC MAIL - SEND OR RECEIVE MAIL
4. DISCREPANCY REPORT STATUS

APPLICATION AREA:

- |                        |             |
|------------------------|-------------|
| 6. EOQ DEPOT DATA BANK | (D062DDB)   |
| 7. EOQ CSIS            | (D062 CSIS) |
| 8. RECOVERABLE ITEMS   | (D041)      |
| 9. EQUIPMENT ITEMS     | (D039)      |

SYSTEM MANAGEMENT:

- |                       |              |
|-----------------------|--------------|
| 20. PROGRAM DATA      | (K004/G033J) |
| 21. FINANCIAL SYSTEMS |              |
| 22. RETAIL STOCK FUND | (D141A/B)    |

ENTER SELECTION: XX

At the "XX" you should enter "8" or "08" for recoverable items.  
This will bring up the following screen:

REQUIREMENTS DATA BANK  
MAIN MENU FOR D041 CSIS

TYPE 'X' NEXT TO THE DESIRED SELECTION

- \_ DIS DISPLAY
- \_ DQ DATA QUERY
- \_ JS JOB SUBMISSION

CMD: F1=HELP F10=DONE MSG:

Enter an "X" at DIS DISPLAY and <return> or you can type "DIS" next to CMD: on the bottom line of the screen and <return>. This will bring up the following menu:

DISPLAY  
DIS DISPLAY

TYPE 'X' NEXT TO THE DESIRED SELECTION

- \_ ACO CURRENT ASSET CUTOFF DATE
- \_ BUD BUDGET PRODUCTS
- \_ RPR REPAIR PRODUCTS

CMD: F1=HELP F10=DONE MSG:

If you want to see the dates of the latest data bases loaded for the D041 CSIS, type an "X" next to ACO and <return>. To return to the DISPLAY menu type <Esc> "0" (which corresponds to the 'F10=DONE') or enter "done" at the 'CMD:' line and <return>. Now enter an "X" next to BUD and <return>. This will bring up the following menu:

DISPLAY  
BUD BUDGET PRODUCTS

TYPE 'X' NEXT TO THE DESIRED SELECTION

- |       |                    |       |                    |
|-------|--------------------|-------|--------------------|
| - S01 | BUDGET ITEM DETAIL | - T07 | BP INS/NSO         |
| - S04 | BP                 | - T08 | BP NEW             |
| - S05 | DIV BP             | - T12 | BP MMC/FSC         |
| - S06 | DIV IMS BP SMC     | - T13 | TOTAL ITEMS        |
| - S07 | BP SMC             | - T14 | TOTAL BUY          |
| - S08 | DIV BP SMC         | - T15 | TOTAL INS/NSO      |
| - T01 | MMC/FSC            | - T16 | TOTAL NEW          |
| - T02 | BP SMC             | - T20 | DIV IMS BP         |
| - T03 | BP SMC BUY         | - T21 | DIV BP SMC MMC/FSC |
| - T04 | BP SMC NEW         | - T22 | DIV BP SMC         |
| - T05 | BP                 | - T23 | DIV BP             |
| - T06 | BP BUY             | - T24 | DIV TOTAL          |

CMD: F1=HELP F10=DONE MSG:

Enter an "X" next to the T02 and <return>. The T02 report gives the necessary CSIS data by budget program (BP) and system management code (SMC). Enter a <tab> to bring up the screen below and fill in the necessary information. The screen should appear as follows:

```
PCN: A D041.-T02  CENTRAL SECONDARY ITEM STRATIFICATION  PROD RECS4160
PAGE:  1 OF 1          BUDGET SUMMARY  CUR DT/TIME: 30 NOV 88 07:48
  -MM POSITION-OP  FUNDING-FULL  PRICE-FORECASTED  AS OF DT: 30 JUN 88
BP-   SMC-
------(DOLLARS IN THOUSANDS)-----
```

CMD: F1=HELP F10=DONE MSG:

The previous screen is not aligned compared to the compressed computer screen, but all the information should be correct. You will need to be sure that all the underlined areas are correct. Tabbing will move you from underlined area to underlined area. If you make a mistake or miss an underlined area, keep tabbing until you return to the desired position. The following underlined areas must be filled in:

<u>MM</u>	Enter "HQ" (Other selections are "OC," "OO," "SA," "SM," and "WR")
<u>POSITION-OP</u>	Enter "AY," "BY," or "EY"
<u>FUNDING-FULL</u>	Leave alone
<u>PRICE-FORECASTED</u>	Leave alone
AS OF DT:30 <u>JUN 88</u>	Should be JUN or appropriate cut off date
BP- <u>  </u>	Enter "15"
SMC- <u>      </u>	Enter appropriate four letter code

After you have entered all the appropriate information, enter <return> for the computer to call the information to the screen. For each SMC in BP15, you will need:

- in AY: Total apportionment year deficit (row 13, column 9)
- in BY: Total budget year deficit (row 13, column 9)
- in EY: Total extended year deficit plus on-order commit plus on-order contract (row 13, columns 7, 8 and 9)

When you are finished gathering data, enter <Esc> and "0." This will return you to the DISPLAY menu. Select the T05 report and gather the data as you did from the T02 report. Note the 'SMC-      ' line is missing. The T05 data gives you the summation of CSIS data across all SMCs for the BP. The total T05 data minus the total of the T02 data yields the CSIS data for the 'other' weapon systems we forecast.

When you are finished gathering data, enter <Esc> and "0" until you return to the RDB screen.

## CHAPTER 3

### RUNNING THE ALERT MODEL

This chapter contains the procedures for running the ALERT BP15 POM forecasting model on the Requirements Data Bank's Subproject 5 analysis and forecasting region. We present our assumptions made for these procedures and then present them in a step by step fashion.

#### Assumptions

We make the following assumptions about the user running the ALERT model.

1. It is assumed that the user has a working knowledge of the ROSCOE on-line program development system. The user should know how to save, retrieve, and edit program data sets using ROSCOE.
2. It is assumed that the user has an RDB ROSCOE user-id and password. If they do not, a user-id and password can be obtained from HQ AFLC/MMISA.
3. It is assumed that the user has a fundamental understanding of the multivariate regression and bootstrapping techniques used in ALERT.
4. It is assumed that the user has a statistical background from which he can interpret the results of the model.
5. It is assumed that the user has gathered the necessary data to update the data bases used in ALERT.
6. A working knowledge of the SAS programming language would be appropriate but not totally necessary for running the model.

## Procedures

Running the ALERT forecasting model involves the updating and running of seven different programs. We list the programs in the Table 3-1.

### ALERT PROGRAM NAMES

PROGRAM NAME	DESCRIPTION
RLA.ALERTDB	UPDATES ALERT DATA BASE
RLA.ALERT1A	ALERT MODEL PART 1 - STEP A
RLA.ALERT1B	ALERT MODEL PART 1 - STEP B
RLA.ALERT1C	ALERT MODEL PART 1 - STEP C
RLA.ALERT2A	ALERT MODEL PART 2 - STEP A
RLA.ALERT2B	ALERT MODEL PART 2 - STEP B
RLA.ALERT2C	ALERT MODEL PART 2 - STEP C

Table 1

The RLA.ALERTDB program is used to update the ALERT's data bases. RLA.ALERT1A, RLA.ALERT1B, and RLA.ALERT1C are used in the initial bootstrapping run of the ALERT model. RLA.ALERT2A, RLA.ALERT2B, and RLA.ALERT2C are used to make the ALERT projections for the POM outyears. The following steps describe how to run the ALERT forecasting model.

Step 1 - Getting onto the ROSCOE on-line program development system on the RDB.

As your initial starting point, we assumed that you, the prestigious ALERT model user, will be accessing the RDB computer system through the Local Area Network (LAN). Using your Z-248, you can access the LAN by using your CALL program. At the LAN prompt, type "connect rdb" and then hit the <return> key. Your screen should appear as follows:

You may now enter Net/One commands.

>>

>> <--- This is a LAN prompt.

>>

>>connect rdb

Connecting ... (3) 407720A2 Success.

Now hit the <return> key. This should bring up the prompt for the terminal type. Enter "rdbz248" and <return>.

ENTER TERMINAL TYPE: rdbz248

This should bring up the RDB access screen. Type "roscoe" and <return> at the cursor as shown below:

ENTER APPLICATION REQUEST

```
RRRRRRRRRR      DDDDDDDDD      BBBB BBBB
RR              RR DD          DD BB      BB
RR              RR DD          DD BB      BB
RRRRRRRRRR      DD            DD BBBB BBBB
RR              RR DD          DD BB      BB
RR              RR DD          DD BB      BB
RR              RR DDDDDDDDD      BBBB BBBB
```

roscoe

This should bring up the ROSCOE access screen. Enter your user-id and password: type "user-id" <tab> and "password" <return>. This is shown below:

KEY user-id

PASSWORD password

This will bring up a compressed font version of the Active Work Space (AWS) screen. To return the AWS screen to a normal width, enter "mod 2" and <return>.

Step 2 - Updating the ALERT data bases.

The top of your computer screen should now appear as follows:

(These top three blank lines are the command section of the screen.)

```
>
> AWS()                SCRL FULL COLS 00001 00072 PAU( .SYNON)
>
<...+....1....+....2....+....3....+....4....+....5....+....6....+..
```

Fetch the program RLA.ALERTDB to your AWS. Enter "fetch rla.alertdb & attach" and <return> in the command section of your

screen. If you are using the 'ppb5rla' user-id, you will not need to enter the prefix "rla." Your screen should now appear as follows:

```

>
> AWS(RLA.ALERTDB)      SCRL FULL COLS 00001 00072 PAU(      .SYNON)
>
<...+....1....+....2....+....3....+....4....+....5....+....6....+..
.....  ===== T O P =====
000100 //PPB5RLA2 JOB (00000,LCA),'BIN84 LUCAS 75249',
000200 //      CLASS=A,MSGCLASS=X,NOTIFY=ROS1RLA
000300 //SAS      EXEC PROC=SAS,WORK='50,10'
000400 //ALERTDB DD DSN=PPB5GRP.ALERT.JUN88,DISP=(OLD,CATLG,KEEP),
000500 //      UNIT=PPB5,SPACE=(CYL,(30,30),RLSE)
000600 //SYSPRINT DD  SYSOUT=*
000700
000800      /*****/
000900      /*      PROGRAM: ALERTDB      */

```

The bold printing needs to be updated. The 'RLA' in 'PPB5RLA2' and 'ROS1RLA' should be the last three letters of your user-id. The '2' in 'PPB5RLA2' can be any number or letter of your choice. The 'PPB5RLA2' is the job identification number. After you have submitted the program, the 'ROS1RLA' notifies you when your job is finished. The 'BIN84 LUCAS 75249' is for further identification of your job. 'BIN84' identifies the bin the job should be routed to when it is completed. The other two are your name and phone extension. The 'PPB5GRP.ALERT.JUN88' identifies the SAS data set that the SAS programming language is to create when the job is run.

The 'JUN88' identifies this data base as being updated with June 1988 data. Enter an appropriate string to replace 'JUN88,' i.e., 'JUN89.'

After you have completed these initial efforts, you will want to update the data base in the RLA.ALERTDB program. On the following page is an example of the FY88 A-7 aircraft data. We added the column markings above the data for clarity.

A	B	C	D	E	F	G	H	I	J	K	L
003700		CARDS;									
003800	A7	78	14269	7342	53001	7.0	1958	.17	0	0	-
003900	A7	79	.....								
.											
.											
004800	A7	88	16180	15753	415200	14.2	3431	.069	0	0	-
004900	A7	89	3102	24050	66678	9.6	3522	.070	0	0	-
005000	A7	90	7207	8646	166060	15.7	3585	.065	0	0	-
005100	A7	91	.....								
.											
.											
005600	A7	96	0	0	0	-	1442	.047	0	0	-
005700	A7	97	0	0	0	-	1477	.045	0	0	-
005800	.....										

If we were updating this June 1988 data base for the FY89 ALERT POM run, we would not modify any of the history data (anything up to and including 1988). We would only modify those data lines from 1989 on. In addition, we would also add a line of data for the last POM outyear, FY98.

The definitions for the columns of data are:

- Column A - the program line numbers
- Column B - weapon system
- Column C - year
- Column D - AY deficit
- Column E - BY deficit
- Column F - EY total CSIS buy (on-order contract, commit, and deficit)
- Column G - BP15 POS BES
- Column H - fleet value
- Column I - fleet age reciprocal
- Column J - inflation surrogate
- Column K - deflation surrogate
- Column L - fleet inventory

When you have completed updating the data bases, you will need to save this updated program for future use and/or reference. If you are using the 'ppb5rla' user-id, you will enter "update \*" (or the asterisk can be the name of the user file: alertdb). If you are using a different user-id you will want to save the file under your own user-id. The first time you save it you will enter "save

alertdb" (or some other unique file name. We recommend, however, that for consistency you should use the same file names that are used in this report). You do not need to add the prefix, as ROSCOE will automatically put the last three letters/numbers of your user-id as a prefix to the file you are saving. After the file has been saved for the first time, you can update the existing file by entering "update alertdb."

Now submit this program to the job stream. Enter "sub" and <return> in the command section of the screen. Enter "dis ppb\*" to get an update of the job status; or you may periodically hit your return key and look for the computer's notification of the job's completion.

When the job run is completed, attach the job for viewing on your PC computer screen. Enter "attach job ppb5rla2" and <return>. The first of five job output files will be attached to your screen. You may view each of the files by entering "prev file" and <return> or "next file" and <return>.

To print the job files, while the job is still attached, enter "status" and <return>. Something similar to the following screen will appear:

```
>
> STA(PPB5RLA2,####) SCRL FULL COLS 00001 00072 PAU( .SYNON)
>
<...+....1....+....2....+....3....+....4....+....5....+....6....+..
                                ROSCOE ALTER/STATUS PROCESSOR
JOB NAME      NO      FILE      LINE      PAGE/      LINE  FIND LIMIT I/O CO
PPB5RLA2     2238      4         1         1         1         6000

(1)          (2) (3)          (4)  (5)
A  FILE STA C  DEST          LINES FORM  CPY NOTES
-   1 NOP X  LOCAL          17 STD    1 JES2.$JES2LOG
-   2 NOP X  LOCAL          43 STD    1 JES2.$JCLIMG
-   3 NOP X  LOCAL          98 STD    1 JES2.$SYSMSG
-   4 NOP X  LOCAL          364 STD   1 STATS.SAS.FT11F001
-   5 NOP X  LOCAL          1784 STD  1 STATS.SAS.FT11F001
===== END OF OUTPUT FILES =====
```

The first three files are JCL files. The fourth is the program's SAS source code, and the fifth is the program output. You will probably only want the fourth and fifth files. In column (1), enter a "P" (for "Print") next to FILE lines 4 and 5. Then detach the job by entering "detach job" at the top of the screen and <return>. The listings will print out in the computer room in the basement of the building and will be routed to your program listings pickup bin. If you want to print the program out at the AFLC/MMM Lee printer, you may enter the following code under column (3) on the last two lines: "U721 " to print on the Lee printer at

post 106R.

If for some reason you make an error in the ALERT data base (i.e., loading bad data), you can correct this in the following manner. First load the RLA.ALERTDB file into your AWS space and make the necessary corrections to the file. Then you can rerun the program which will recreate your data base.

You are now ready for your first bootstrap run of the ALERT model.

Step 3 - First part of the ALERT model run - Step A.

The first part of the ALERT model run is to select the last POS BES value before the POM outyears. Step A computes all the possible R-square values for all combinations of the regression variables. From these you will select a "library" of possible regression equations to model in step 4. The main SAS procedure executed for each weapon system is as follows:

```
PROC RSQUARE CP;  
MODEL POSBES = TBUY DUMMY DUMMY2 VALUE YEAR AGEREC;
```

Fetch the first ALERT model, RLA.ALERT1A, to your AWS computer space. Your computer screen should appear as follows:

```
>  
> AWS(RLA.ALERT1A) SCRL FULL COLS 00001 00072 PAU( .SYNON)  
>  
<...+....1....+....2....+....3....+....4....+....5....+....6....  
..... ===== T O P =====  
000100 //PPB5RLA2 JOB (00000,LCA), 'BIN84 LUCAS 75249',  
000200 // CLASS=A,MSGCLASS=X,NOTIFY=ROS1RLA  
000300 //STATS EXEC PROC=SAS,WORK='50,10'  
000400 //ALERTDB DD DSN=PPB5GRP.ALERT.JUN88,DISP=SHR  
000500 //SYSPRINT DD SYSOUT=*000600  
000700 /******  
000800 /* */  
000900 /* FIRST ALERT PROGRAM */  
000000 /* STEP A */  
001100 /* (ALERT1A) */  
001200 /* */  
001300 /******
```

You will need to update the bold characters as you did in step 2. No further modifications are necessary unless you are adding or deleting weapon systems from the ALERT model runs.

Submit this program to the job stream as you did in step 2.

On the following two pages is the output for RLA.ALERT1A, Step A for FY88. Your objective is to select the models that have a high R-square and a C(P) value that approaches the number of variables in the model. For each type of model (i.e., one variable, two variables, three variables, etc.), there appears to be a natural break where the R-square and C(P) values suddenly change and get worse. These natural breaks are indicated by the straight lines that we've drawn. Note that R-square is the coefficient of determination and C(P) is Mallow's Cp statistic. R-square is interpreted as being the percentage of the total variation in the dependent variable that can be explained by the model (regression equation) [4]. For Mallow's statistic, when the right model is chosen, the parameter estimates are unbiased, and this is reflected in Cp being near to the number of variables in the model [5].

Those models below the lines are candidates for input in Step B (Step 4). We further narrowed the possible models to those indicated by the asterisks (\*). Since the A-7 data base has nothing but zeros for the DUMMY2 variable, this variable is meaningless in the regression equations. Therefore, we eliminated all models that have this variable in it. Also, no regression equations can be dependent on the variables DUMMY and/or DUMMY2 alone. Therefore, we eliminated all such type models. The models with the asterisks are the ones that become the input to the next step.

AIR LOGISTICS EARLY REQUIREMENTS TECHNIQUE  
A-7 POM FORECAST  
BP15 PUS

REGRESSION MODELS FOR DEPENDENT VARIABLE: POSSES MODEL: MODEL1

NUMBER IN MODEL R-SQUARE C(P) VARIABLES IN MODEL

NUMBER IN MODEL	R-SQUARE	C(P)	VARIABLES IN MODEL
1	0.00000000	98.462837	DUMMY2
1	0.00003483	98.459094	AGEREC
1	0.00226096	98.219867	VALUE
1	0.04903918	93.192947	YEAR
1	0.08959468	88.834739	TBUY
1	0.78455627	14.152195	DUMMY
-----			
2	0.00003483	100.459	DUMMY2 AGEREC
2	0.00226096	100.220	DUMMY2 VALUE
2	0.02525037	97.749360	VALUE AGEREC
2	0.04903918	95.192947	DUMMY2 YEAR
2	0.08959468	90.834739	TBUY DUMMY2
2	0.0986404	90.096538	TBUY YEAR
2	0.10366295	89.322922	TBUY VALUE
2	0.11821102	87.759545	TBUY AGEREC
2	0.26975269	71.474447	VALUE YEAR
2	0.47208900	49.730813	YEAR AGEREC
2	0.78455627	16.152195	DUMMY DUMMY2
2	0.78484700	16.120952	* DUMMY VALUE
2	0.78588832	16.009048	* DUMMY AGEREC
2	0.78819324	15.761356	* TBUY DUMMY
2	0.78960906	15.609207	* DUMMY YEAR
-----			
3	0.02525037	99.749360	DUMMY2 VALUE AGEREC
3	0.09646404	92.096538	TBUY DUMMY2 YEAR
3	0.10366295	91.322922	TBUY DUMMY2 VALUE
3	0.11821102	89.759545	TBUY DUMMY2 AGEREC
3	0.13775907	87.658856	TBUY VALUE AGEREC
3	0.26975269	73.474447	DUMMY2 VALUE YEAR
3	0.34248229	65.658718	TBUY VALUE YEAR
3	0.47208900	51.730813	DUMMY2 YEAR AGEREC
3	0.47385571	51.540958	VALUE YEAR AGEREC
3	0.56015562	42.266925	TBUY YEAR AGEREC
3	0.78484700	18.120952	DUMMY DUMMY2 VALUE
3	0.78588832	18.009048	DUMMY DUMMY2 AGEREC
3	0.78819324	17.761356	TBUY DUMMY DUMMY2
3	0.78945211	17.733536	* TBUY DUMMY VALUE
3	0.78960906	17.609207	DUMMY DUMMY2 YEAR
3	0.79050637	17.512779	* TBUY DUMMY YEAR
3	0.79438181	17.096314	* TBUY DUMMY AGEREC
3	0.81484444	14.897342	* DUMMY VALUE YEAR
3	0.82522497	13.781021	* DUMMY VALUE AGEREC
3	0.91743691	3.872464	* DUMMY YEAR AGEREC
-----			
4	0.13775907	89.658856	TBUY DUMMY2 VALUE AGEREC
4	0.34248229	67.658718	TBUY DUMMY2 VALUE YEAR
4	0.47385571	53.540958	DUMMY2 VALUE YEAR AGEREC
4	0.56015562	44.266925	TBUY DUMMY2 YEAR AGEREC
4	0.56298296	43.963091	TBUY VALUE YEAR AGEREC
4	0.78845211	19.733536	TBUY DUMMY DUMMY2 VALUE

↑ R-SQUARE SUDDENLY DECREASES AT THIS POINT.  
C(P) SUDDENLY INCREASES.

AIR LOGISTICS EARLY REQUIREMENTS TECHNIQUE  
 A-7 PUM FORECAST  
 BP15 PUS

NUMBER IN MODEL	R-SQUARE	C(P)	VARIABLES IN MODEL
4	0.79050637	19.512779	TBUY DUMMY DUMMY2 YEAR
4	0.79430181	19.096314	TBUY DUMMY DUMMY2 AGEREC
4	0.81464444	16.897342	DUMMY DUMMY2 VALUE YEAR
4	0.81902149	16.448464	* TBUY DUMMY VALUE YEAR
4	0.82522497	15.781821	DUMMY DUMMY2 VALUE AGEREC
4	0.83132437	15.125824	* TBUY DUMMY VALUE AGEREC
4	0.91743691	5.872464	DUMMY DUMMY2 YEAR AGEREC
4	0.92404140	5.162727	* DUMMY VALUE YEAR AGEREC
4	0.92981643	4.542126	* TBUY DUMMY YEAR AGEREC
-----			
5	0.56298296	45.963091	TBUY DUMMY2 VALUE YEAR AGEREC
5	0.81902149	18.448464	TBUY DUMMY DUMMY2 VALUE YEAR
5	0.83132437	17.125824	TBUY DUMMY DUMMY2 VALUE AGEREC
5	0.92404140	7.162727	DUMMY DUMMY2 VALUE YEAR AGEREC
5	0.92981643	6.542126	TBUY DUMMY DUMMY2 YEAR AGEREC
5	0.93486120	6.000000	* TBUY DUMMY VALUE YEAR AGEREC
-----			
6	0.93486120	6.000000	TBUY DUMMY DUMMY2 VALUE YEAR AGEREC

Step 4 - First part of the ALERT model run - Step B.

As we stated in step 3, the first part of the ALERT model run is to select the last POS BES value before the POM outyears. Step B computes all the regression equations for all the models we selected in step 3. This creates a "library" of possible regression equations to model from which to select the POS BES value.

Fetch the ALERT model, RLA.ALERT1B, to your AWS computer space. Your computer screen should appear as follows:

```
>
> AWS(RLA.ALERT1B)      SCRL FULL COLS 00001 00072 PAU(      .SYNON)
>
<...+....1....+....2....+....3....+....4....+....5....+....6....+..
..... ===== T O P =====
000100 //PPB5RLA2 JOB (00000,LCA), 'BIN84 LUCAS 75249',
000200 //      CLASS=A,MSGCLASS=X,NOTIFY=ROS1RLA
000300 //STATS      EXEC PROC=SAS,WORK='50,10'
000400 //ALERTDB   DD DSN=PPB5GRP.ALERT.JUN88,DISP=SHR
000500 //SYSPRINT   DD      SYSOUT=*
000600
000700          /*****/
000800          /*                                */
000900          /*          FIRST ALERT PROGRAM          */
000000          /*          STEP B                                */
001100          /*          (ALERT1B)                                */
001200          /*                                */
001300          /*****/
```

You will need to update the bold characters as you did in step 2.

The main SAS procedure executed for each weapon system is as follows:

```
PROC REG;
  ID YEAR;
  MODEL POSBES = TBUY DUMMY DUMMY2 VALUE YEAR AGEREC
  / P R CLI CLM DW;
```

The third line is the one you will vary for each model. Further modifications may be necessary as you incorporate the different ALERT models you selected in the last step into this ALERT program. You may need to add or delete PROC REGs as necessary.

When you have completed making changes, submit this program to the job stream and output it as you did in step 2. An example of the output for the A-7 aircraft is included on the next two pages.

There are five criteria from which you can decide which is the optimum model to use to select the last POS BES value before the POM outyears. They are: the adjusted R-square value, the F statistic, the residual pattern, the Durbin-Watson statistic, and subjective judgement. The R-square statistic was described in step 3. The F value (denoted by 'F VALUE' on the SAS output) ought to be such that the probability (denoted by 'PROB>F' on the SAS output) of exceeding it is very small. The residual pattern (the difference between the predicted and actual value) ought to be small also. The Durbin-Watson statistic measures autocorrelation and generally should approach the value of 2 (see reference [6] for more detail). If the other tests are reasonable, subjective judgement plays heavily in the decision making as knowledge of future trends and circumstances not reflected in historical data will determine which model is the best to use. In the A-7 example, the \$9.35 million was the predicted value used for the last POS BES value before the FY92 to FY97 POM outyears.

AIR LOGISTICS EARLY REQUIREMENTS TECHNIQUE  
A-7 PUM FORECAST  
UPI5 PDS

DEP VARIABLE: PCSBES UPI5 PDS DES

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	5	2571.99733	514.39947	20.093	0.0005
ERROR	7	179.21036	25.60148027		
C TOTAL	12	2751.20769			
ROUT MSE		5.059791	K-SQUAKE	0.9349	
DEP MEAN		22.52077	AUJ K-SU	0.8883	
C.V.		22.45725			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB >  T	VARIABLE LABEL
INTERCEP	1	499.60371	124.48110	4.006	0.0052	INTERCEPT
TBUY	1	-0.000018273	0.000016946	-1.078	0.3166	BY TOTAL CSIS BUY
DUMMY	1	28.60929948	4.52561586	6.322	0.0004	INFLATION SURROGATE
VALUE	1	-0.007336057	0.009963518	-0.736	0.4855	FLEET VALUE
YEAR	1	-4.82814163	1.38752413	-3.336	0.0125	AY YEAR
AGEECL	1	-691.55105	196.00464	-3.528	0.0096	FLEET AGE RECIPROCAL

Obs	IU	ACTUAL	PREDICT VALUE	STU ERR PREDICT	LUMER95% MEAN	UPPER95% MEAN	LOWER95% PREDICT	UPPER95% PREDICT	RESIDUAL	STU ERR RESIDUAL
1	78	7.0000	4.7725	4.5435	-5.9713	15.5162	-11.3079	20.8529	2.2275	2.2267
2	79	14.5000	19.6137	2.8422	12.8929	26.3344	5.8907	33.3360	-5.1137	4.1861
3	80	21.0000	20.2518	2.3688	14.6505	25.8531	7.0410	33.4626	0.8482	4.4711
4	81	30.7000	27.7753	3.2615	20.0631	35.4874	13.5405	42.0100	2.9247	3.8684
5	82	46.2000	52.0526	3.5924	44.1379	61.1473	37.9791	67.3261	-4.4526	3.5632
6	83	57.3000	52.8474	3.5924	44.3527	61.3421	38.1739	67.3261	4.4526	3.5632
7	84	28.4000	22.8945	2.4039	17.2102	28.5787	9.6482	36.1407	5.5055	4.4523
8	85	20.3000	22.7116	2.2214	17.4590	27.9645	9.6449	35.7780	-2.4118	4.5461
9	86	11.8000	13.8708	4.5891	3.0392	24.7423	-2.2618	30.0434	-2.0908	2.1311
10	87	14.2000	15.5413	4.8677	4.0308	27.0517	-1.0612	32.1438	-1.3413	1.3808
11	88	9.8000	15.9227	2.6784	9.2892	22.2562	2.3851	27.4602	-6.3227	4.2927
12	89	15.7000	12.4741	2.7152	6.0536	18.8940	-1.1044	26.0525	3.2259	4.2696
13	90	14.1000	11.5518	3.5799	3.0867	20.0169	-3.1040	26.2082	2.5482	3.5758
14	91	4.3494*	4.3494*	4.5899	-1.5042	20.2029	-6.8046	25.5033		
15										

AIR LOGISTICS EARLY REQUIREMENTS TECHNIQUE  
 A-7 PUM FORECAST  
 UP15 PUS

16:11 WEDNESDAY, NOVEMBER 16, 1988 14

Obs	ID	STUDENT RESIDUAL	-2	-1	0	1	2	COOK'S D
1	78	1.0004			**			0.694
2	79	-1.2216						0.115
3	80	0.1897						0.002
4	81	0.7561			*			0.068
5	82	-1.2496			**			0.265
6	83	1.2496				**		0.265
7	84	1.2366				**		0.074
8	85	-0.5305			*			0.011
9	86	-0.9811			*			0.744
10	87	-0.9714			*			1.954
11	88	-1.4729			**			0.141
12	89	0.7556			*			0.038
13	90	0.7126			*			0.085
14	91							
15								

SUM OF RESIDUALS 2.70006E-12  
 SUM OF SQUARED RESIDUALS 179.2104  
 PREDICTED RESID SS (PRESS) 1022.024

DURBIN-WATSON D 2.279  
 (FOR NUMBER OF OBS.) 13  
 1ST ORDER AUTOCORRELATION -0.171

Step 5 - First part of the ALERT model run - Step C.

For those weapon systems that you may need to make additional program runs on, an individual weapon system program the same as the RLA.ALERT1B is provided. Simply follow the same steps as provided for in step 4 above. The program's name is RLA.ALERT1C.

Step 6 - Second part of the ALERT model run - Step A.

The purpose for the second part of the ALERT model run is to select the projection for the BP15 POM outyears. Step A computes all the possible R-square values for all combinations of the regression variables. From these you will select a "library" of possible regression equations to model the BP15 POM outyear projections in step 7. The main SAS procedure executed for each weapon system is as follows:

```
PROC RSQUARE CP;  
MODEL POSBES = DUMMY DUMMY2 VALUE YEAR AGEREC;
```

Fetch the ALERT model, RLA.ALERT2A, to your AWS computer space. Your computer screen should appear as follows:

```
>  
> AWS(RLA.ALERT2A) SCRL FULL COLS 00001 00072 PAU( .SYNON)  
>  
<...+....1....+....2....+....3....+....4....+....5....+....6....+..  
..... ===== T O P =====  
000100 //PPB5RLA2 JOB (00000,LCA),'BIN84 LUCAS 75249',  
000200 // CLASS=A,MSGCLASS=X,NOTIFY=ROS1RLA  
000300 //STATS EXEC SAS,WORK='50,10'  
000400 //ALERTDB DD DSN=PPB5GRP.ALERT.JUN88,DISP=SHR  
000500 //SYSPRINT DD SYSOUT=*  
000600  
000700 /*****/  
000800 /* */  
000900 /* SECOND ALERT PROGRAM */  
000000 /* STEP A */  
001100 /* (ALERT2A) */  
001200 /* */  
001300 /*****/
```

You will need to update the bold characters as you did in step 3. No further modifications are necessary unless you are adding or deleting weapon systems from the ALERT model runs.

Submit this program to the job stream as you did in step 3.

On the following page is the output for RLA.ALERT2A, Step A for FY88. As is step 3, your objective is to select the models that have a high R-square and a low C(P) value. (If you remember what you did in step 3, you can skip the rest of this step.) For each type of model (i.e., one variable, two variables, three variables, etc.), there appears to be a natural break where the R-square and C(P) values suddenly change and get worse. These natural breaks are indicated by the straight lines that we've drawn. Those models below the lines are candidates for input in Step B (Step 7). We further narrowed the possible models to those indicated by the asterisks (\*). Since the A-7 data base has nothing but zeros for the DUMMY2 variable, this variable is meaningless in the regression equations. Therefore, we eliminated all models that have this variable in it. Also, no regression equations can be dependent on the variables DUMMY and DUMMY2 alone. Therefore, we eliminated all such type models. The asterisked models are the ones that become the input to the next step.

Step 7 - Second part of the ALERT model run - Step B.

As we stated in step 6, the second part of the ALERT model run is to select the projection for the BP15 POM outyears. Step B computes all the regression equations for all the models we selected in step 6. This creates a "library" of possible regression equations to model the BP15 POM outyears. Fetch the ALERT model, RLA.ALERT2B, to your AWS computer space. Your computer screen should appear as follows:

```
>
> AWS(RLA.ALERT2B)      SCRL FULL COLS 00001 00072 PAU(      .SYNON)
>
<...+....1....+....2....+....3....+....4....+....5....+....6....+..
.....  ===== T O P =====
000100  //PPB5RLA2 JOB (00000,LCA),'BIN84 LUCAS 75249',
000200  //      CLASS=A,MSGCLASS=X,NOTIFY=ROS1RLA
000300  //STATS      EXEC PROC=SAS,WORK='50,10'
000400  //ALERTDB   DD DSN=PPB5GRP.ALERT.JUN88,DISP=SHR
000500  //SYSPRINT   DD      SYSOUT=*
000600
000700      /*****/
000800      /*                               */
000900      /*           FIRST ALERT PROGRAM      */
000000      /*           STEP B                   */
001100      /*           (ALERT2B)                  */
001200      /*                               */
001300      /*****/
```

You will need to update the bold characters as you did in step 2.

AIR LOGISTICS EARLY REQUIREMENTS TECHNIQUE  
A-7 FORECAST  
EP15 POS

N=14 REGRESSION MODELS FOR DEPENDENT VARIABLE: POSSES MODEL: MODEL1

NUMBER IN MODEL	R-SQUARE	C(P)	VARIABLES IN MODEL
1	0.00000000	113.608	DUMMY2
1	0.00645096	112.810	AGEREC
1	0.01332843	111.960	VALUE
1	0.08885969	102.624	YEAR
1	0.77774600	17.472316	DUMMY
-----			
2	0.00645096	114.810	DUMMY2 AGEREC
2	0.01332843	113.960	DUMMY2 VALUE
2	0.02896684	112.027	VALUE AGEREC
2	0.08885969	104.624	DUMMY2 YEAR
2	0.30656942	77.713393	VALUE YEAR
2	0.48520407	55.632766	YEAR AGEREC
2	0.77774600	19.472316	DUMMY DUMMY2
2	0.77782611	19.462415	* DUMMY AGEREC
2	0.78095164	19.076075	* DUMMY VALUE
2	0.79262886	17.632680	* DUMMY YEAR
-----			
3	0.02896684	114.027	DUMMY2 VALUE AGEREC
3	0.30656942	79.713393	DUMMY2 VALUE YEAR
3	0.48520407	57.632766	DUMMY2 YEAR AGEREC
3	0.48559143	57.584886	VALUE YEAR AGEREC
3	0.77782611	21.462415	DUMMY DUMMY2 AGEREC
3	0.78095164	21.076075	DUMMY DUMMY2 VALUE
3	0.79262886	19.632680	DUMMY DUMMY2 YEAR
3	0.81415674	16.971668	* DUMMY VALUE AGEREC
3	0.82448572	15.694926	* DUMMY VALUE YEAR
3	0.91970003	3.925698	* DUMMY YEAR AGEREC
-----			
4	0.48559143	59.584886	DUMMY2 VALUE YEAR AGEREC
4	0.81415674	18.971668	DUMMY DUMMY2 VALUE AGEREC
4	0.82448572	17.694926	DUMMY DUMMY2 VALUE YEAR
4	0.91970003	5.925698	DUMMY DUMMY2 YEAR AGEREC
4	0.92718903	5.000000	* DUMMY VALUE YEAR AGEREC
-----			
5	0.92718903	7.000000	DUMMY DUMMY2 VALUE YEAR AGEREC

The main SAS procedures executed for each weapon system is as follows:

```
PROC REG DATA=DBASE;
  ID YEAR;
  MODEL POSBES = DUMMY DUMMY2 VALUE YEAR AGEREC
    / P R CLI CLM DW;
OUTPUT OUT=ALERT
  P=FCST L95=L95 U95=U95 R=RESID COOKD=COOKD;
PROC PLOT DATA=ALERT;
  PLOT POSBES*YEAR='A' FCST*YEAR='F' U95*YEAR='U' L95*YEAR='L'
    / OVERLAY VPOS=32 HPOS=80;
```

The third line is the one you will vary for each model. Further modifications may be necessary as you incorporate the different ALERT models you selected in the last step into this ALERT program. You may need to add or delete the PROC statements above as necessary.

When you have completed making changes, submit this program to the job stream and output it as you did in step 2. An example of the output for the A-7 aircraft is included on the next three pages.

The same five criteria you used in step 4 you will use here to decide which is the optimum model for forecasting the POM outyears. They are, the adjusted R-square value, the F statistic, the residuals, the Durbin-Watson statistic, and subjective judgement. If the other tests are reasonable, subjective judgement plays heavily in the decision making as knowledge of future trends and circumstances not reflected in historical data will determine which model is the best to use. MMMCS should be involved in this decision making process as they are the end user of the ALERT model results.

#### Step 8 - Second part of the ALERT model run - Step C.

For those weapon systems that you may need to make additional program runs on, an individual weapon system program the same as the RLA.ALERT2B is provided. Simply follow the same steps as provided for in step 8 above. The program's name is RLA.ALERT2C.

DEP VARIABLE: POSSES BP15 FOS BES

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	2	2309.52801	1154.76400	21.022	0.0002
ERROR	11	604.22913	54.92992135		
C TOTAL	13	2913.75714			
ROOT MSE					
DEP MEAN		7.411472	R-SQUARE	0.7926	
C.V.		21.58571	ADJ R-SQ	0.7549	
		34.33508			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB >  T	VARIABLE LABEL
INTERCEP	1	54.21346448	42.62110412	1.272	0.2296	INTERCEPT
DUMMY	1	35.31804813	5.78041991	6.110	0.0001	INFLATION SURROGATE
YEAR	1	-0.44583652	0.50177647	-0.889	0.3933	AY YEAR

OBS	ID	ACTUAL	PREDICT VALUE	STD ERR PREDICT	LOWER95% MEAN	UPPER95% MEAN	LOWER95% PREDICT	UPPER95% PREDICT	RESIDUAL	STD ERR RESIDUAL
1	78	7.0000	19.4382	4.0416	10.5428	28.3337	0.8579	38.0186	-12.4382	6.2125
2	79	14.5000	18.9924	3.6256	11.0125	26.9723	0.8325	37.1522	-4.4924	6.4641
3	80	21.1000	18.5465	3.2341	11.4283	25.6648	0.7485	36.3446	2.5535	6.6686
4	81	30.7000	18.1007	2.8770	11.7684	24.4330	0.6022	35.5993	12.5993	6.8303
5	82	48.2000	52.9729	5.2467	41.4250	64.5209	32.9865	72.9593	-4.7729	5.2347
6	83	57.3000	52.5271	5.2467	40.9791	64.0750	32.5407	72.5135	4.7729	5.2347
7	84	28.4000	16.7632	2.1800	11.9651	21.5613	-0.2404	33.7668	11.6368	7.0836
8	85	20.3000	16.3174	2.1411	11.6047	21.0300	-0.6623	33.2971	3.9826	7.0955
9	86	11.8000	15.8715	2.2182	10.9894	20.7537	-1.1560	32.8990	-4.0715	7.0718
10	87	14.2000	15.4257	2.3999	10.1436	20.7070	-1.7208	32.5722	-1.2257	7.0122
11	88	9.6000	14.9799	2.6650	9.1142	20.8455	-2.3553	32.3150	-5.3799	6.9158
12	89	15.7000	14.5340	2.9914	7.9499	21.1181	-3.0572	32.1253	1.1660	6.7809
13	90	14.1000	14.0882	3.3613	6.6899	21.4865	-3.8237	32.0001	0.0118	6.6054
14	91	9.3000	13.6423	3.7619	5.3624	21.9223	-4.6513	31.9360	-4.3423	6.3858
15	92	.	13.1965	4.1844	3.9867	22.4063	-5.5364	31.9294	.	.
16	93	.	12.7507	4.6227	2.5760	22.9253	-6.4749	31.9763	.	.
17	94	.	12.3048	5.0729	1.1395	23.4702	-7.4630	32.0726	.	.
18	95	.	11.8590	5.5319	-0.3166	24.0346	-8.4965	32.2145	.	.
19	96	.	11.4132	5.9978	-1.7879	24.6142	-9.5718	32.3981	.	.
20										

AIR LOGISTICS EARLY REQUIREMENTS TECHNIQUE  
A-7 FORECAST  
EP15 F0S

UPPER95% PREDICT 32.6198  
RESIDUAL  
STD ERR RESIDUAL

LOWER95% PREDICT -10.6851  
UPPER95% MEAN 25.2055  
LOWER95% MEAN -3.2709

PREDICT VALUE 10.9673  
STD ERR PREDICT 6.4690  
COOK'S D

OBS	ID	ACTUAL	PREDICT VALUE	STD ERR PREDICT	UPPER95% MEAN	LOWER95% MEAN	UPPER95% PREDICT	LOWER95% PREDICT	UPPER95% MEAN	LOWER95% PREDICT	UPPER95% PREDICT	RESIDUAL	STD ERR RESIDUAL
21	97	.	10.9673	6.4690	25.2055	-3.2709	32.6198	-10.6851	25.2055	-10.6851	32.6198	.	.
OBS	ID	STUDENT RESIDUAL				COOK'S D							
1	78	-2.0021	XXXXX			0.565							
2	79	-0.6950	X			0.051							
3	80	0.3829				0.011							
4	81	1.8446			XXX	0.201							
5	82	-0.9118	X			0.278							
6	83	0.9118			X	0.278							
7	84	1.6428			XXX	0.085							
8	85	0.5613			X	0.010							
9	86	-0.5757	X			0.011							
10	87	-0.1748				0.001							
11	88	-0.7779	X			0.030							
12	89	0.1720				0.002							
13	90	0.017897				0.000							
14	91	-0.6800	X			0.053							
15	92	.				.							
16	93	.				.							
17	94	.				.							
18	95	.				.							
19	96	.				.							
20	97	.				.							
21						.							

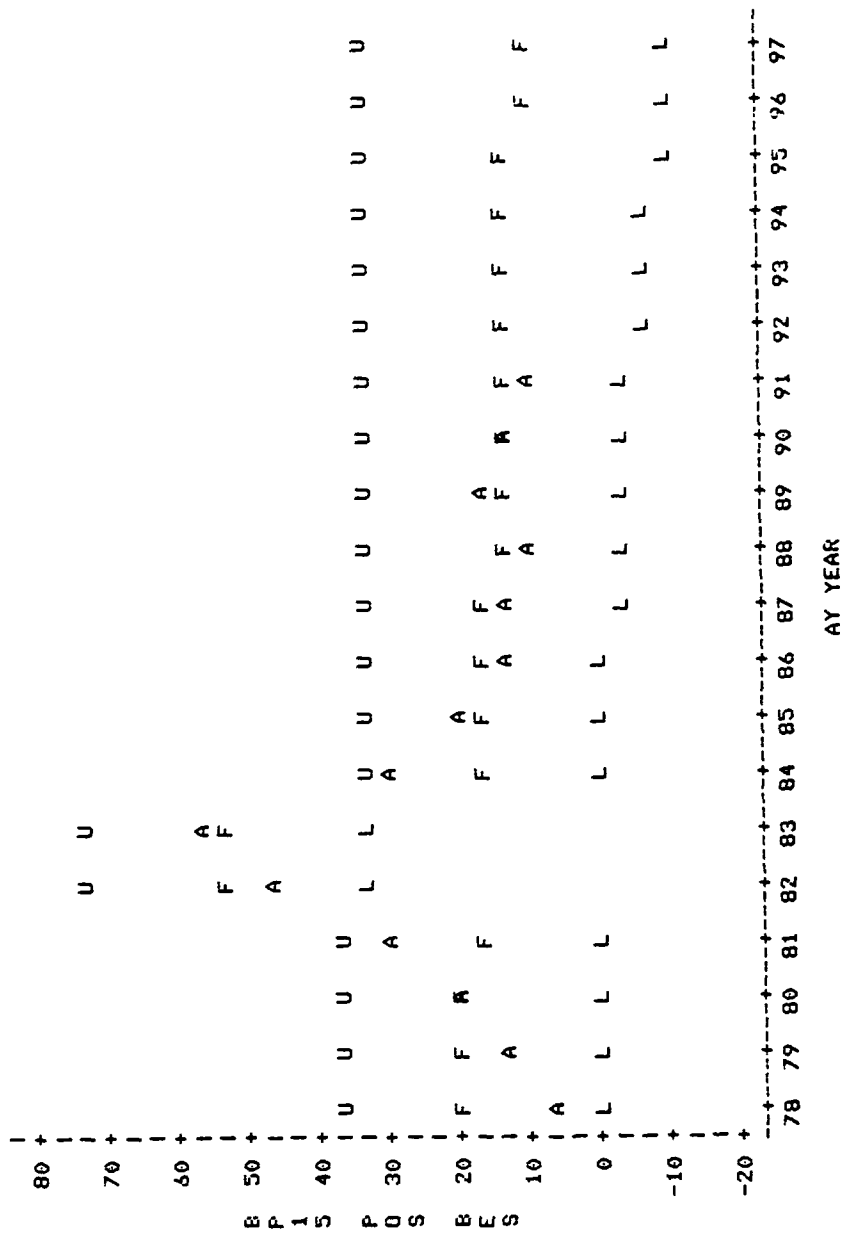
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SUM OF SQUARED RESIDUALS 604.2291  
PREDICTED RESID SS (PRESS) 1038.715

DURBIN-WATSON D 1.433  
(FOR NUMBER OF OBS.) 14  
1ST ORDER AUTOCORRELATION 0.140

AIR LOGISTICS EARLY REQUIREMENTS TECHNIQUE  
 A-7 FORECAST  
 BP15 POS

13:32 WEDNESDAY, NOVEMBER 23, 1988

FLOT OF POSSES\*YEAR SYMBOL USED IS A  
 FLOT OF FCST\*YEAR SYMBOL USED IS F  
 FLOT OF U95\*YEAR SYMBOL USED IS U  
 FLOT OF L95\*YEAR SYMBOL USED IS L



NOTE: 10 OBS HAD MISSING VALUES

## REFERENCES

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2. Lucas, Rob, Adrienne Rexroad, and Larry Collins, "Air Logistics Early Requirements Technique (ALERT) FY92-97 Program Objective Memorandum (POM) Forecasts," HQ AFLC/MMMA Technical Report, March 1989.
3. Lucas, Rob and Larry Collins, "Transfer of the Air Logistics Early Requirements Technique (ALERT) Forecasting Model from the CREATE Computer System to the Requirements Data Bank (RDB) Computer System," HQ AFLC/MMMA Technical Report, January 1989.
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5. SAS Institute Inc. SAS User's Guide: Statistics, Version 5 Edition. Cary, NC: SAS Institute Inc., 1985.
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APPENDIX A

SYSTEM MANAGEMENT CODES (SMC) USED IN THE  
AIR LOGISTICS EARLY REQUIREMENTS TECHNIQUE (ALERT)  
FORECASTING MODEL

## APPENDIX A

### System Management Codes (SMC) used in the Air Logistics Early Requirements Technique (ALERT) Forecasting Model

This appendix lists the SMC codes used to identify the appropriate weapon system funds within the D041 Central Secondary Item Stratification (CSIS) reports on the Requirements Data Bank (RDB) computer system. These SMC codes are current as of the 1988 ALERT model forecast for the BP15 POM. We present these codes to the BP15 budget managers to review and update, as necessary, before we make the ALERT based forecasts.

ALERT SMC CODES

MISSION DESIGN	SMC	MISSION DESIGN	SMC	MISSION DESIGN	SMC
A-7	337A	COMMON	634P	F-15	328A
A-10	329A		639P		328B
	329E		644P		328C
	329F		645P		328D
B-1	B01B		650C		328Z
	B01E		650P		640P
	661P		651C		654P
B-52	101D		651P		656P
	101G		655P		672P
	101H		660P		692P
	101Z		665P	F-16	687P
	608P		666P		F16A
	615P		668P		F16B
	616P		671P		F16C
	617P		674P		F16D
	635P		678P		F16Z
	636P		684P	F-111	129A
	650P		695P		324A
	652P		697P		324D
	669P		705P		324E
	676P		732P		324F
	677P		733P		324L
	722P		9999		324Z
	725P		999A		635P
	731P		999B		637P
	732P		999C		642P
C-5	410A		999F		647P
	410E		999H		657P
C-130	400H		999T		673P
	400Z		999U		728P
	632P		999V		729P
C-135	119Y	E-3	411Z		735P
	119Z		411E	F100	328E
	119E	F-4	327Z		380A
	119F		638P		380B
	679P		649P		380E
C-141	476L		682P		380N
	476E		685P		F16N
COMMON	619P		730P		