AD A158 914 EOQ (ECONOMIC ORDER QUANTITY) PRICE BREAK MODEL USERS GUIDE(U) AIR FORCE LOGISTICS MANAGEMENT CENTER GUNTER AFS AL S EDWARDS ET AL. MAR 85 AFLMC-LS841041 1/1

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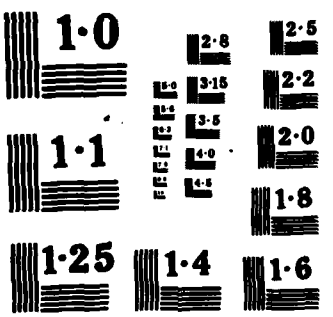
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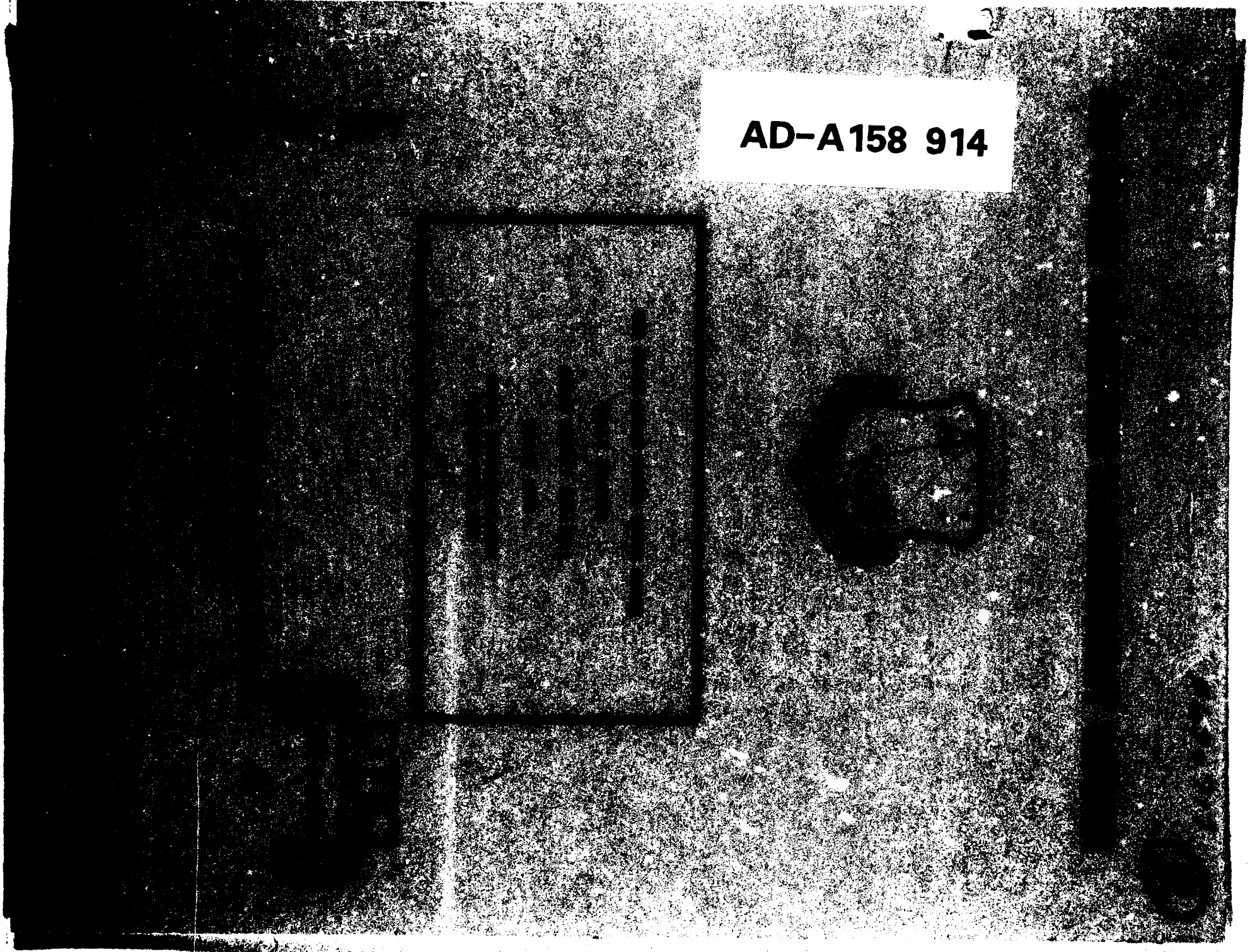


EOQ PRICE BREAK MODEL

USER'S GUIDE

INTRODUCTION

Base-level logisticians have no quick or easy way to determine whether quantity discounts for locally purchased items are cost effective. As a result, the Air Force is paying a higher unit price for some items for which the vendor offers quantity discounts. In our "Streamlining Local Purchase Procedures" Report, we recommended the development of an EOQ price break model for base-level users. We have developed a Z-100 microcomputer quantity discount model and document it in this user's guide. Our objectives were to:

a. Develop a model that determines the most economical order quantity for locally purchased EOQ items.

b. Explain to users how to obtain the model.

c. Develop procedures to use the model.

THE MODEL

Overview. We document our model in three sections. First, we describe the hardware and software for the model. Next, we describe the processes of the model. Last, we provide the procedures to use with the model.

Hardware and Software. The EOQ price break model is programmed in FORTRAN on the Z-100 microcomputer. Data input and output are described in Appendix A. Base-level logisticians may obtain the software to run the program by contacting the OPR listed in the Small Computer Applications for Logistics Engineering (SCALE) data base system, or by sending one blank diskette to AFLMC/LGS, Gunter AFS, AL 36114 (Mrs. Sally Edwards). The SCALE data base is for official use only; therefore, access instructions are available only in AFLMC Report #830810, February 1984, or through contact with AFLMC/LGY, AV 446-4524.

Model Description. The EOQ price break model will determine whether quantity discounts are cost effective for base-level logisticians. Use of the model will ensure the most economical quantity is bought.

The model considers total variable costs, including the cost to order, the cost to hold, and the purchase cost to determine the most economical order quantity. The model first calculates the EOQ for each price interval. If the calculated EOQ for an interval is feasible; i.e., the EOQ falls within the quantity interval for that price, then the total variable cost is calculated. If the EOQ for an interval is not feasible; i.e., EOQ falls outside the quantity interval for that price, then the total variable cost for the appropriate price-break quantity is determined. The EOQ or price break with the lowest total cost is selected as the order quantity.

The model includes the following features.

a. It is easy to use. The user does not need specialized skills to operate the program since the user is prompted for all data input required.

b. The model provides a hard copy showing the amount to order, unit cost, yearly cost, and savings. It identifies the most economical order quantity, so that contracting may place the order.

c. It includes a history file so yearly savings may be tracked.

d. The model computes a maximum two years' requirement.

e. The cost to order and cost to hold are set by AFM 67-1, Vol. II, Part Two, Chapter 11:

(1) Local purchase cost to order, $19.94.

(2) Total variable cost to hold, 15%.

f. The model provides **THE LOWEST TOTAL VARIABLE COST QUANTITY TO LOCALLY PURCHASE** after considering all possible costs.

Procedure. Supply and contracting must work together to use this model. Supply will initiate a quantity discount request by reviewing and selecting local purchase items with stable demand patterns. The requisition originates in supply, and it must be identified as a quantity discount candidate before it goes to contracting. If there is a question concerning constancy of the demand, supply may want to contact the customer. Until the SBSS is programmed to print "**QUANTITY DISCOUNT REQUESTED, YEARLY REQUIREMENT =** _____" when there is a positive demand level, demand data will have to be manually provided. If there is a positive demand level, supply personnel will calculate the yearly requirement, and annotate the **Remarks** section of the DD Form 1348-1.

When contracting receives an LP requisition identified as eligible for quantity discount, they will solicit price discounts from vendors. When they receive the vendor's response, they can evaluate the quantity discounts by running the EOQ price break model. They must then notify supply through a procurement status card (LPA) to adjust the requisition quantity. The procurement status card is currently used when the quantity of purchase is different from the quantity requested on the DD Form 1348-1. Contracting will select the quantity with the lowest total variable cost . Appendix A contains the step-by-step procedures.

DATA INPUT/OUTPUT

EXAMPLE

In this section we present an example showing how the model works. Actual screen images from the model are given. **Bold type** is used for data input and regular type is used for model output. The comments preceded by "**NOTE**" are not part of the model. We provide these notes to explain the model's operation. The model uses LP cost to order and holding cost that are given in AFM 67-1, Volume II, Part Two, Chapter 11. If these cost variables change, the model must be changed. Total variable cost includes holding cost, cost to order, and purchase cost. Purchase cost is the cost paid for the entire order.

To run the program, place the diskette with the program on it in Disk Drive A and type:

A: QDCALC.

Welcome to the quantity discount program. . .

This program calculates:

- The ORDER QUANTITY for the item.
- The TOTAL VARIABLE COST.
- The amount of SAVINGS COMPARED TO BUYING THE EOQ with no discounts.

Please press <return> to continue.

<V> View transaction history file

<I> Input new problem

<Q> Quit

ENTER SELECTION

NOTE: You will need to recreate a file whenever the existing file is full or at the beginning of a new fiscal year. If this is the first time you have used this diskette, you must first create a transaction history file. To do so, follow the steps between the asterisks before entering a new problem. If this is not the first time you have used this diskette, enter the transaction as shown after the asterisks.

****

V

NOTE: You are now looking at the transaction history menu.

(1) VIEW TRANSACTION HISTORY FILE.
(2) ADD TRANSACTION TO HISTORY FILE.
(3) PRINT TRANSACTION HISTORY FILE.
(4) DELETE AN ENTRY FROM THE TRANSACTION HISTORY FILE.
(5) CREATE A NEW HISTORICAL FILE (DESTROYS EXISTING FILE).
(6) QUIT.

NOTE: We have entered the HISTORY file, and it asks what action you want to take. The choices are to:

(1) VIEW TRANSACTION HISTORY FILE: This option lists all the contracts where a quantity discount buy was chosen. It also provides the cumulative yearly savings.

(2) ADD TRANSACTION TO HISTORY FILE: This option places the transaction in the history file and adds the savings to the cumulative yearly savings.

(3) PRINT TRANSACTION HISTORY FILE: This option provides a hard copy of the transaction history file. In the event the history file is very large, you have the option of starting the printed listing with other than the first entry. A cumulative savings for all transactions will still be shown.

(4) DELETE AN ENTRY FROM THE TRANSACTION HISTORY FILE: This option will delete a contract from the transaction history file. It would be used if the item was not going to be bought after a previous decision had been made to buy the item.

(5) CREATE A NEW HISTORICAL FILE (DESTROYS EXISTING FILE). This option will create a new history file and destroy the old file. It can be used at the end of the fiscal year to start a new history file or to start a new diskette if the current disk is full.

(6) QUIT: This option terminates the program.

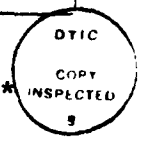
NOTE: Select (5) to create a new historical file.

5

Are you sure? This will destroy any historical file you currently have on this diskette (Y/N).

NOTE: Since this is the first time you have used this diskette, you do not have a historical file on it, so the answer is yes.

Y



(1) VIEW TRANSACTION HISTORY FILE.
(2) ADD TRANSACTION TO HISTORY FILE.
(3) PRINT TRANSACTION HISTORY FILE.
(4) DELETE AN ENTRY FROM THE TRANSACTION HISTORY FILE.
(5) CREATE A NEW HISTORICAL FILE (DESTROYS EXISTING FILE).
(6) QUIT.

6

<V> View history file

<I> Input new problem

<Q> Quit

****

NOTE: You are now ready to enter a new transaction.

I

Enter a problem name to use as a label for the results (max 20):
5935P5552-B

NOTE: The problem name may be any name (of 20 or less characters) selected by the user. In this case we use a part number.

Enter yearly demand for item

NOTE: The yearly demand will be furnished by Supply on the DD Form 1348-1 until the SBSS can be programmed to print it automatically.

10

Enter the number of price discount intervals (MAX of 10): 4
Enter the maximum quantity for interval 1:
1 - 5
Enter the cost per unit for quantities in this interval: $6
Enter the maximum quantity for interval 2:
6 - 10
Enter the cost per unit for quantities in this interval: $5.75
Enter the maximum quantity for interval 3:
11 - 15
Enter the cost per unit for quantities in this interval: $5.50

Enter the cost per unit for interval 4:
16 - 20 $5

NOTE: The number of discount intervals and price for each interval will be provided by the vendor. The purchase quantity of the model is limited to two years' requirement and we had entered "4" for the number of intervals. Therefore, since we entered 10 for the yearly demand, the final quantity interval is furnished by the model. In this example, 20 is the maximum quantity, and the user is asked for the cost for Interval 4 only.

Please press <return> to continue.

Problem: 5935P5552-B

Cost to place order = $19.94
Yearly demand = 10
Holding cost as a percentage of purchase = 15.00%

Quantity Interval	Unit Cost
1 - 5	6.00
6 - 10	5.75
11 - 15	5.50
16 - 20	5.00

Is this correct (Y or N) Y

NOTE: If your answers need correction, the program returns to the beginning and allows you to re-enter your data.

The optimal policy is to order 20 units
The TOTAL PURCHASE COST is $100 ($5.00 per unit)
The ANNUAL VARIABLE COST will be $67.47,
for a YEARLY SAVINGS OF $11.48 over purchasing the EOQ quantity with no price discounts.

DO YOU WANT TO SAVE THIS RUN IN THE HISTORY FILE (Y or N) Y

(1) VIEW TRANSACTION HISTORY FILE.
(2) ADD TRANSACTION TO HISTORY FILE.
(3) PRINT TRANSACTION HISTORY FILE.
(4) DELETE AN ENTRY FROM THE TRANSACTION HISTORY FILE.
(5) CREATE A NEW HISTORICAL FILE (DESTROYS EXISTING FILE).
(6) QUIT.

NOTE: To enter this transaction and add it to the cumulative total savings, enter 2.

ENTER SELECTION -->
2

ENTER TODAY'S DATE AS MM/DD/YY
02/13/85

```
    (1)  VIEW TRANSACTION HISTORY FILE.
    (2)  ADD TRANSACTION TO HISTORY FILE.
    (3)  PRINT TRANSACTION HISTORY FILE.
    (4)  DELETE AN ENTRY FROM THE TRANSACTION HISTORY FILE.
    (5)  CREATE A NEW HISTORICAL FILE (DESTROYS EXISTING FILE).
    (6)  QUIT.

ENTER SELECTION -->
1

                                          UNIT     PURCHASE     TOTAL      YEARLY
                                          PRICE    COST         VARIABLE   SAVINGS
NUM     PROBLEM NAME      DATE      QTY   ($)      ($)          COST ($)   ($)

 1    5930P0007814460   02/13/85   15    10.00    150.00       101.88      44.91
 2    5935P279-375      02/13/85   20     2.50     50.00        38.72      16.75
 3    5935P5552-B       02/13/85   20     5.00    100.00        67.47      11.48
                                                 CUMULATIVE SAVINGS = 73.14


PRESS RETURN TO CONTINUE


    (1)  VIEW TRANSACTION HISTORY FILE.
    (2)  ADD TRANSACTION TO HISTORY FILE.
    (3)  PRINT TRANSACTION HISTORY FILE.
    (4)  DELETE AN ENTRY FROM THE TRANSACTION HISTORY FILE.
    (5)  CREATE A NEW HISTORICAL FILE (DESTROYS EXISTING FILE).
    (6)  QUIT.

ENTER SELECTION -->
3


START PRINTING WITH TRANSACTION NUMBER -->
    ENTER STARTING NUMBER
1

*******************************************************************************

                                          UNIT     PURCHASE     TOTAL      YEARLY
                                          PRICE    COST         VARIABLE   SAVINGS
NUM     PROBLEM NAME      DATE      QTY   ($)      ($)          COST ($)   ($)

 1    5930P0007814460   02/13/85   15    10.00    150.00       101.88      44.91
 2    5935P279-375      02/13/85   20     2.50     50.00        38.72      16.75
 3    5935P5552-B       02/13/85   20     5.00    100.00        67.47      11.48
                                                 CUMULATIVE SAVINGS = 73.14

*******************************************************************************
```

```
    (1)  VIEW TRANSACTION HISTORY FILE.
    (2)  ADD TRANSACTION TO HISTORY FILE.
    (3)  PRINT TRANSACTION HISTORY FILE.
    (4)  DELETE AN ENTRY FROM THE TRANSACTION HISTORY FILE.
    (5)  CREATE A NEW HISTORICAL FILE (DESTROYS EXISTING FILE).
    (6)  QUIT.

ENTER SELECTION -->
6

Do you wish a hardcopy of the results (Y or N) Y


Problem:  5935P5552-B

Cost to place order = $19.94
Yearly demand = 10
Holding cost as a percentage of purchase = 15.00%


The optimal policy is to order 20 units
The TOTAL PURCHASE COST is $100.00 ($5.00 per unit)
The ANNUAL VARIABLE COST will be $67.47
for a YEARLY SAVINGS OF $11.48 over purchasing the EOQ quantity with no price
discounts.


Do you have another problem (Y or N) N
Normal end of program

E:
```

APPENDIX A

PROCEDURE FOR EOQ PRICE-BREAK MODEL OPERATION

PROCEDURE

1. Supply

a. Select stable demand LP items eligible for solicitation of quantity discount prices according to demand data. Eligible items are those with positive demand levels.

b. Contact the customer to verify a continuing need (optional).

c. Until the SBSS is programmed to provide the data, run an SBSS inquiry (INQ) with Releveling Indicator R in Column 23, system designator in Columns 21-22 and a 1 in Column 25 to extract the Daily Demand Rate (DDR). Multiply the DDR X 365 to get the yearly requirement.

d. Prepare a DD Form 1348-1 and annotate the Remarks section "QUANTITY DISCOUNT REQUESTED, YEARLY REQUIREMENT = _____."

e. Forward the DD Form 1348-1 and the demand card (the requisition) to contracting.

2. Contracting

a. For those items supply identifies, solicit quantity discounts from vendors.

b. Upon vendor's response, evaluate the quantity discount information by running the EOQ Price Break model and select the most economical quantity to purchase (lowest total variable cost).

c. Prepare a procurement status card (LPA) for input to the SBSS to change the order quantity.

REFERENCES

1. Schroeder, Roger G., *Operations Management*, McGraw, 1981.

2. AFMAG, "**Spare Parts Acquisition**," Vol II, October 1983.

3. Powell, Sally, "**Streamlining Local Purchase Procedures**," October 1984.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