

INVENTORY CONTROL ON SOME PRODUCTS
(A COMPUTER PERSPECTIVE)

A CASE STUDY OF GBO BIDA BRANCH

BY

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DECLARATION

I, Mr IWUCHUKWU PATRICK ANAYOCHI PGD/mcs/94/039, hereby declare that this project has been written by me and that is a record of my own research work. It has not been presented before in any form to any other organization for the purposes of post Graduate Diploma or Higher Degree. All sources of information as appropriate are acknowledged by means of references.

CERTIFICATION

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EXTERNAL EXAMINER

DATE

DEDICATION

WITH GRATITUDE TO GOD, ALPHA AND OMEGA, this work is deservedly
Dedicated to MY PARENTS MR & MRS R.C. IWUCHUKWU AND ALL THOSE WHO
SHARE THE PAINS IN THE PERIOD OF RUNNING THIS PROGRAM.

ACKNOWLEDGEMENT

Unless the Lord builds a house, they labor in vain that builds. First of all, I give all honor to ALMIGHTY GOD who made it possible for me to be alive till this very moment and for His abundant grace which in my sufficiency. He stands before me as shield throughout the duration of my course of study. Blessing and honor and glory and praise be to the Lord Jesus who is my unmovable rock.

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ABSTRACT

In today's competitive and ever changing environment, it is essential to hold adequate stock in order to meet customer's demand. But holding large stock will mean high inventory, such as storage, possible losses due to declines, hence, the need for inventory control measure. The inventory control measure applied in this project is the Economic Order Quantity (E.O.Q.).

E.O.Q. is a calculated ordering quantity which minimises the balance of costs between inventory holding costs and re-order costs. The holding costs and reorder costs are defined in pages 5 and 6 respectively.

provides accelerated progress in virtually every field of endeavor.

- (b) Accuracy: If programmed correctly, computers are extremely accurate devices. For all practical purposes, computers do not make mistakes. Because computers can operate error-free, they can be trusted to provide accurate results in situations that require precise and reliable processing of data.
- (c) Storage Capability: The memory of the machine enables a complete program of instruction to be held in store, and this in turn makes the running of a program automatic. Secondary storage can be loaded to a computer system to enable information to be retained on a permanent basis. This information can be retrieved and brought into the main memory when required.

1.2 AIMS AND OBJECTIVES OF THE PROJECT

The existence and indeed the survival of every organization - supermarkets, factories, etc. depend on sufficient stock of merchandise to meet customers demand. The stock of this merchandise is called inventory.

Thus, inventory refers to the physical stock of goods which though remain idle in a store but is essential for smooth running of the company and hence have economic value. In today's competitive and ever changing environment, it is essential to hold adequate stock to minimize loss hold-ups and win customer satisfaction. A constant review of inventory can reduce this capital tied up without hampering the customer goodwill.

The primary purpose of having inventories is to meet the demand of users. The simplest way of satisfying users is to hold large stock. But holding large stock will mean high inventory such as storage, deterioration expenses and possible losses caused by price declines. Therefore, there is need for inventory control or what is sometimes termed inventory planning.

The aims and objectives of this study are:

(i) To ensure the keeping of inventories of selected goods. So as to have adequate stock at hand throughout the period.

(ii) To find a technique by which to control or reduce inventory losses of the selected commodities caused by inadequate inspection of incoming goods and losses due to obsolete, deterioration, waste and theft while in storage.

(iii) Finally, to recommend necessary policy measures by which to maintain good and efficient inventory planning and control by the management of GBO (A DIVISION OF UAC PLC).

Thus, this write-up would then find solution to this objectives through the analysis of inventory models.

1.3 SCOPE AND LIMITATIONS

The project will cover the various processes involved in the task of inventory management and control. It will be limited to selected commodities of GBO i.e. (Evaporated peak milk, Swam water, Quaker Oat, Bournvita and Derica tin tomatoes).

1.4 INVENTORY CONTROL TERMINOLOGIES

Inventory control at its best, is a procedure by which the quantity of a material or finished products is held within predetermined limits to ensure that the overall costs of carrying them will be at a minimum.

In any organization ,the control function is mainly that of the stores and purchasing departments. They are the major departments that are concerned in that they deal with procurement, storage and issue of material, this is not to say that other departments in the organization are not connected with inventory management and control, in fact, some departments make significant contributions either directly or indirectly. According to A. Morrison in his book "Storage and Control of Stock" published in 1962, the nature of other departments varies from company to company as does the scope of the responsibility of the purchasing and stores departments functions.

Before developing the decision models, brief definitions of common inventory control terms are given below:

(a) Lead or Procurement Time: The period of time, expressed in days, weeks, months, etc between ordering (either externally or internally) and replenishment i.e. when goods are available for use.

(b) Holding Costs: This represents the cost of carrying inventory in storage. It includes the interest on invested capital, storage cost, handling costs, depreciation costs e.t.c. Holding costs usually varies with the level of inventory and the length of time the item is held in stock.

(c) Demand: The amount required by sales, usually expressed as a rate of demand per week, month etc. Estimates of the rate of demand during the lead time are critical factors in inventory control system. The demand pattern of a commodity may be either deterministic or probabilistic. In the quantities needed over subsequent periods of time (week, month) are known with certainty. While probabilistic demand occurs when the requirements over a certain period of time are not known with certainty but their pattern can be described by a known probability distribution.

(d) Re-order Level: The level of stock at which a further replenishment order should be placed. The re-order level is dependent upon the lead time and the demand during the lead time.

(e) Economic Ordering Quantity (EOQ): This is a calculated ordering quantity which minimizes the balance of costs between inventory holding costs and reorder costs.

1.5 INVENTORY MODELS

An inventory is the physical stock of goods that a business keeps on hand in order to promote the smooth and effective running of its affairs. This stock of goods varies in quantity overtime in response to a 'demand' process which operates to diminish it and a 'replenishment' process which operates to increase it. Usually, the demand is not subject to control, but the timing and magnitude of the replenishment can be regulated.

Different inventory model of inventory policies can be

formulated if each possible combination of such factors as nature of demand, nature of lead time, holding costs, number of commodities, number of locations, number of inventory levels and availability of discount is considered.

In this project, the discussion shall be limited to the deterministic only.

1.5.1 DETERMINISTIC MODEL

The objectives are:

- (a) Increasing inventory so as to:
 - (i) Stabilize work load
 - (ii) Take advantage of economic of large scale production.
 - (iii) Secure faster shipment of orders.
 - (iv) Maximize profit form speculation in a market where the prices are expected to rise.
- (b) Minimize inventory so as to reduce:
 - (i) holding cost.
 - (ii) warehouse rent.
 - (iii) depreciation and deterioration.
 - (iv) interest on capital
 - (v) physical handling and accounting.

The assumption here is that

- (a) Demand is constant i.e. demand rate is known. This helps us to know what quantity is required and when to place an order.
- (b) Replenishment time is negligible i.e. zero lead time.
- (c) New replenishment order is started when inventory is zero.

(D) The cost of holding inventory is proportional to both the amount of inventory and the time inventory is held.

(e) The constraints is such that demand must be satisfied.

1.5.2 NON-DETERMINISTIC MODEL

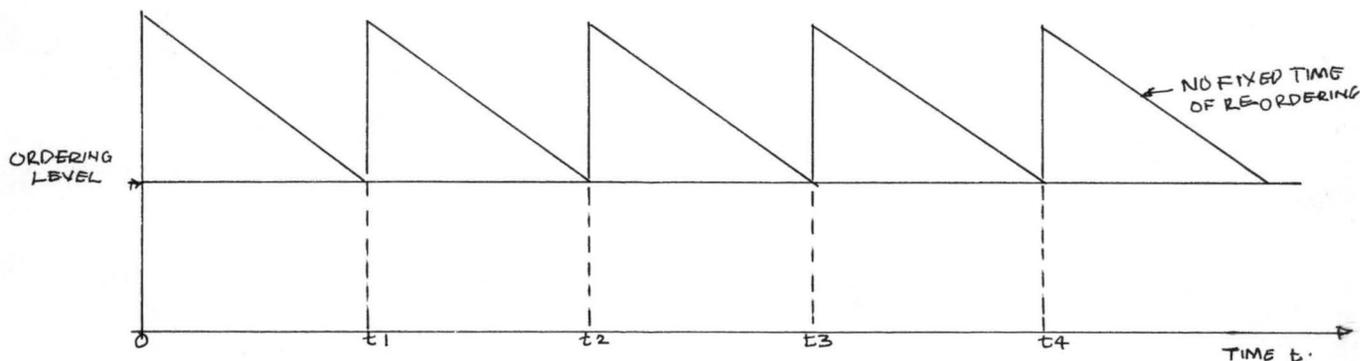
This assume that, the demand rate is probabilistic (i.e. not certain)

1.5.3 RE-ORDER LEVEL SYSTEM

Its characteristics are as follows:

- (i) A predetermined re-order level is set for each item.
- (ii) When the stock level falls to the reorder level, a replenishment order is issued.
- (iii) The replenishment order quantity is invariably the Economic Ordering Quantity (EOQ).
- (iv) Most organizations (like GBO) operating the re-order level system maintain stock records with calculated re-order levels which trigger off the required replenishment order.

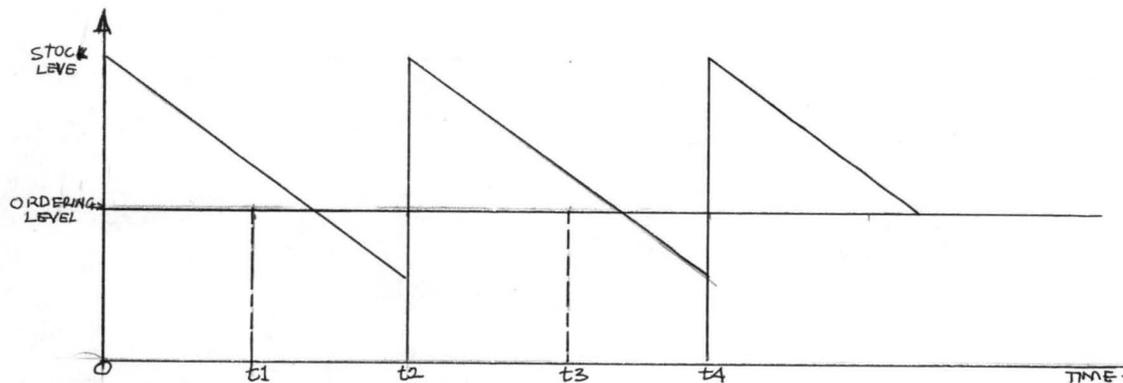
The illustration below is a simple re-order level system.



1.5.4 PERIODIC REVIEW SYSTEM

This means that at fixed intervals e.g. every fortnight stock levels are reviewed and if it is below re-ordering point, order is place. In other words, stock level is

checked at discrete intervals and decision to re-order is taken as shown in fig 1.1.2.



In this system, the quantity of the replenishment order is not a previously calculated EOQ, but is based upon; the likely demand until the next review, the present stock level and the lead time. The replenishment order quantity seeks to bring stocks up to a predetermined level

The effect of this system is to order variable quantities at fixed intervals as compared with the re-order level system where fixed quantities are ordered at variable intervals.

TECHNIQUES OF INVENTORY CONTROL

Inventory models mainly relate to optimizing the inventory levels where in the problem hovers around two aspects, viz" how much to buy and when to buy. The technique of inventory control put emphasis on the minimization of total cost associated with inventory. The technique can better understood under the heading:

ECONOMIC ORDERING QUANTITY (EOQ)

The EOQ has been previously defined as the ordering quantity which minimizes the balance cost between inventory holding costs and re-order costs. To be able to calculate

a basic EOQ certain assumptions are necessary:

- (i) There is a known, constant stockholding cost
- (ii) There is a known, constant ordering cost,
- (iii) Rates of demand are known to be constant,
- (iv) There is a known, constant price per unit,
- (v) Replenishment is made instantaneously. i.e. the whole batch is delivered at once,
- (vi) No stockouts allowed,
- (vii) The time between placing a replenishment order and receiving the items into stock (i.e. the lead time) is zero.

There are two methods for determining EOQ and these are:

- (a) Graphical method and
 - (b) Algebraic method.
- (a) The example below will be employed to explain the graphical method.

Example One:

If GBO orders 50000 cartons of peak milk per annum which are N100 each carton to purchase. The ordering and handling cost are N1500 per order and it cost N15 to carry a carton in stock. If GBO ordering quantity of the item is 5,000 cartons. Calculate the Economic Order Quantity (EOQ) using both the graphical and algebraic methods.

Graphical Method

To graph the various costs involved the following calculations are necessary:

Total costs p.a. = ordering cost p.a. + carrying cost p.a.

Ordering cost p.a. = No of orders x N1500 and

$$\frac{\text{Annual Demand}}{\text{Order Quantity}} = \frac{50000}{5000}$$

$$= 10$$

and ordering cost p.a. = 10 x N1500

$$= \text{N}15000$$

Carrying cost p.a. = average stock level x N15

and

$$\frac{\text{Order Quantity}}{2}$$

the average cost stock =

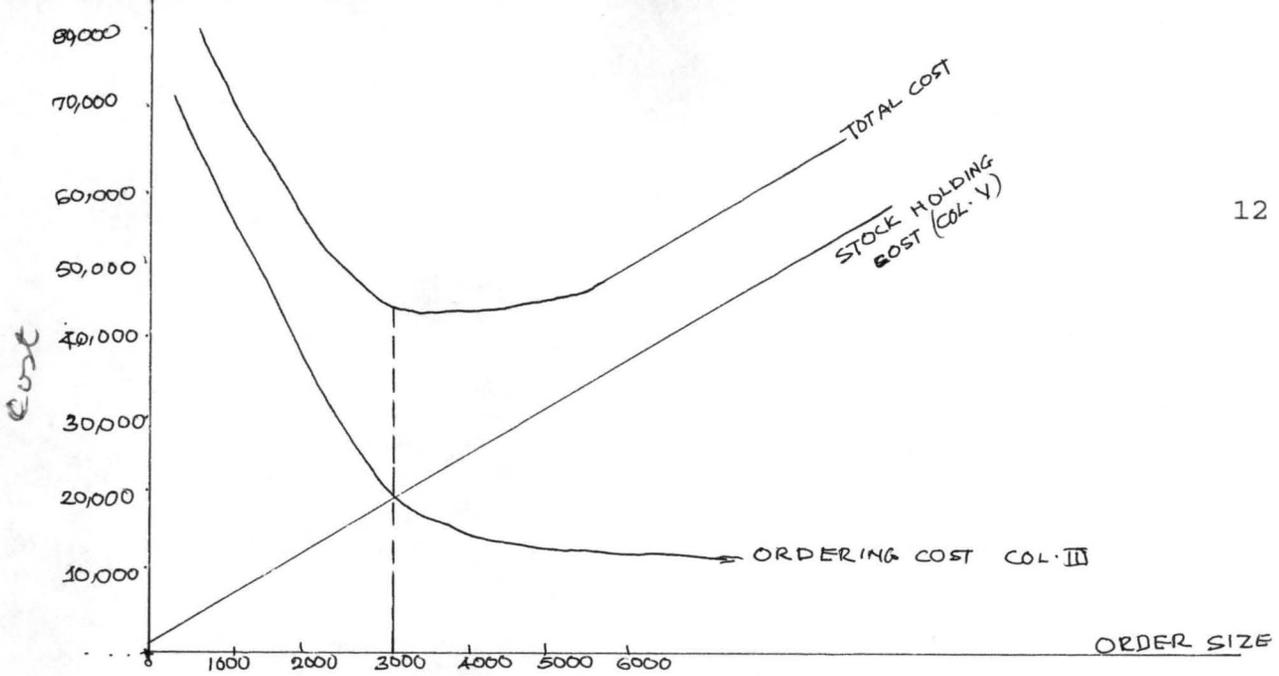
$$= \frac{5000}{2} \times \text{N}15 = \text{N}37,500$$

Based on the above principles, the following tables gives the costs for various order quantities.

TABLE I

Column I	II	III	IV	V	VI
Order Quantity	Average No of Orders p.a.	Annual Ordering Cost	Average Stock	Stock Holding Cost p.a.	Total cost
	50,000 <u>Col. I</u>	Col. II x N1500	Col. I <u>2</u>	Col. IV x N15	Col. III + Col. V
		N		N	N
1000	50	75,000	500	7,500	82,500
2000	25	37,500	1000	15,000	52,500
3000	16.67	25,005	1,500	22,500	47,505
4000	12.5	18,750	2000	30,000	48,750
5000	10	15,000	2,500	37,500	52,500
6000	8.33	12,495	3000	45,000	57,495

The costs in Table I can be plotted in a graph and the approximate EOQ ascertained.



From the graph it can be seen that EOQ is approximately 3,000, which ^{means} earns that an average of slightly under 17 orders will have to be placed a year. $3000 \times 17 = 51000$

It is possible, and more usual to calculate the EOQ using a formula. The method gives an exact answer. The calculations is based on estimates of costs, demand, etc which are, of course, subject to error.

The mathematical derivation is as follows:

Let D = annual demand for product

Q = order quantity

C_o = Cost of ordering for one order

C_c = carrying cost for one item p .a.

Average cost = $\frac{Q}{2}$

Total annual stock holding cost = $\frac{QC_c}{2}$

$$\frac{D}{Q}$$

Number of orders per annum =

$$\text{Annual ordering costs} = \frac{DCo}{Q}$$

$$\text{Total cost} = \frac{QCc}{2} + \frac{DCo}{Q}$$

The order quantity which makes the total cost (TC) at a minimum is obtained by differentiating w.r.t. Q and equating the derivatives to zero.

$$\frac{dTc}{dQ} = \frac{Cc}{2} - \frac{DCo}{Q^2}$$

and when $\frac{dTc}{dQ} = 0$ costs are at a minimum,

$$\text{i.e. } 0 = \frac{Cc}{2} - \frac{DCo}{Q^2} \quad \text{and to find } Q, \quad \frac{DCo}{Q^2} = \frac{Cc}{2}$$

$$2DCo = Q^2 Cc$$

$$2 \frac{DCo}{Cc} = Q^2$$

$$Q \text{ (i.e. the EOQ)} = \sqrt{2 \frac{CoD}{Cc}}$$

Using the data in example one to illustrate this algebraically:

$$Co = \text{N}1500$$

$$D = 50,000$$

$$Cc = \text{N}15$$

$$\text{EOQ} = \sqrt{2 \frac{CoD}{Cc}}$$

$$= \sqrt{\frac{2 \times 1500 \times 50000}{15}}$$

$$= \sqrt{10000000}$$

= 3162.28 cartons of peak milk which also indicates that an average of slightly under 17 orders will have to be placed a year.

$$\text{ie } 30000 \times 17 = 51,000 \approx 50000 \text{ (Demand).}$$

CHAPTER TWO

The Existing System

This chapter contains the survey of the activities of the existing manual system of inventory in GBO. It investigates and ascertains its strength and weakness in order to determine whether there is need to enhance its performance by partial or total automation of some or all its processes.

2.1 OPERATION OF THE EXISTING SYSTEM

Like every other conventional system, the present inventory is manually operated. Officers are assigned to physically take inventory report of items in a card.

The card contains variable names like:

N ----- item number _____
D ----- item description _____
C ----- cost per item _____
Q ----- Quantity in stock _____

At the end of every day sale, information is updated in the cards. This system is tedious and time consuming, hence there is a need for the development of a new system that can take care of these deficiencies.

2.2 PROBLEMS WITH EXISTING SYSTEM

The existing system since it is manually controlled has a lot of inadequacies. The system requires a lot of human resources, and employing more staff means more spending for the organization. The system is error prone as wrong information may be entered in the card. This may lead to not having adequate stock at hand to meet customers demand.

In today's competitive and ever changing environment, it is essential to hold adequate stocks to minimize lost, hold-ups and win customer satisfaction.

2.3 APPRECIATION OF THE NEED FOR COMPUTERIZATION

Every organization/company wants a first class information about sales; automated set of inventory records so that popular products that people want to buy do not run out of stock.

Through use of a computer, all sales are recorded and reported according to product. Managers can use this information for inventory control. With computer-produced data, managers can see at a glance which products are popular and which products sell poorly. These reveal why computerization should be embraced by the management of GBO.

It is true that people are fascinated with computers. But this fascination is not the main reason for the proliferation and popularity of computers. The computer industry has grown and continues to grow because computers have proven to be practical aids in all areas of human endeavors.

2.4 BENEFITS OF THE PROPOSED SYSTEM

Computers have been the basis for the development and growth of a giant industry. This has all happened very rapidly.

If the present conventional system gives way to a computer based system, the following are some of the benefits that can be realized:

- (a) Cost reduction in services of GBO
- (b) Speedy information retrieval
- (c) Reduction in storage space and materials.
- (d) Efficiency in storing, filing, processing data and information.
- (e) Removing the cumbersomeness of inflow and outflow of data and information.
- (f) Data centralization and effective management.

Thus, the proposed system is an inexpensive device when we consider its versatility. In this aspect, we are talking about cost versus benefits. There are a number of factors to consider, such as:

- (i) Development cost
- (ii) Operation cost
- (iii) Maintenance cost

Development Cost: This refers to the actual cost of design and installation for the system. These cost includes the amount of time that may be spent to develop the system, the number of analysts, programmers and user staff involved and the length of their involvement.

Operation Cost: This is the cost of operating a new system which is manual, it requires acquisition of new computers.

Maintenance Cost: This refers to the cost of maintenance and enhancement. It is a well known fact that every system will in future need repair, and users will request periodic enhancements as they work with the proposed system.

Having seen the general view of the different costs and their operation, it is obvious that the proposed system will reduce costs and enhance better profit for the management of GBO than is realized from the present system.

C H A P T E R T H R E E

3.0 SYSTEM SPECIFICATION

3.1 THE INPUT SPECIFICATION FILES.

In the computerization of inventory records in GBO, a division of United African Company (UAC) Plc, seven types of basic inputs are required.

1. ITEM NUMBER: Each item in stock should have a number tag. The number may be a numeric or alpha-numeric.
2. ITEM DESCRIPTION: Every item in stock is expected to have a name associated with it. This is to enable the programmer to be precise which item is being referred to.
3. QUANTITY IN STOCK: Exact number of quantity of each item have to be known. The program will be run weekly to give store managers information for reordering merchandise and replenishing stock.
4. COST PER ITEM: This refers to the selling price for each item. This is determined after the purchasing price and other factors have been taken into consideration.
5. QUANTITY SOLD: This is the number of each item sold. With computer-produced data, managers can see at a glance which products are popular and which products sell poorly. Then goods that people want to buy will be stored - and also make sure that they do not run out of popular items.

The input file for the inventory reporting program should look like this:

6. REORDER POINT: This is the level reached at which the store manager is expected to place an order for replenishment.

7. REORDER QUANTITY: It refers to the quantity of each item to be replenished.

The inventory reporting program of the input file should look like this:

1. ITEM NUMBER
2. ITEM DESCRIPTION
3. QUANTITY IN STOCK
4. COST PER ITEM
5. QUANTITY SOLD
6. REORDER POINT
7. ORDER QUANTITY

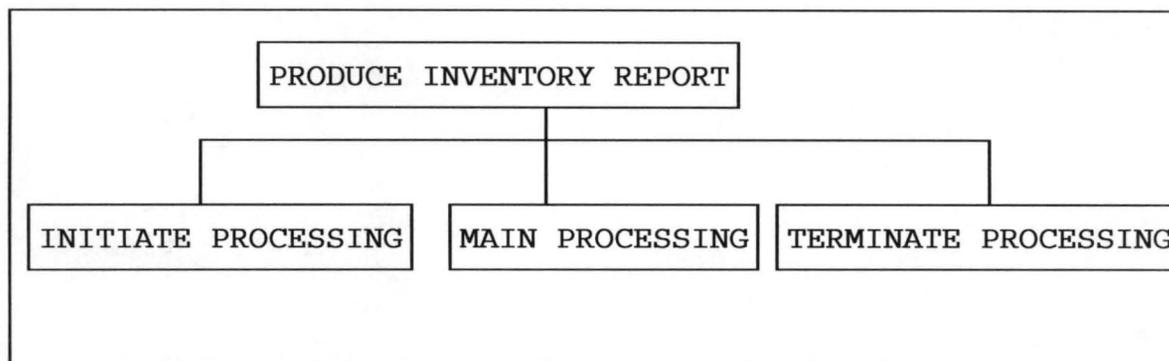
These seven records provide the test data for the program. When the program is put into production there will be an unknown number of inventory records in the file. However, each record will be in the format.

3.1 OUTPUT SPECIFICATION FILES

The inventory report will appear in the format shown below. The report can be delivered either as a printed report or as a screen display. The inventory report collected are as follows:

ITEM	QTY	DESCRIPTION	COST PER ITEM	NO OF ITEM
100	253	swan water	N1000	24
215	225	peak milk	N2880	96
221	91	quaker oats	N2000	12
435	134	Bournvita	N1440	12
540	150	Derica Tomatoes	N2250	96

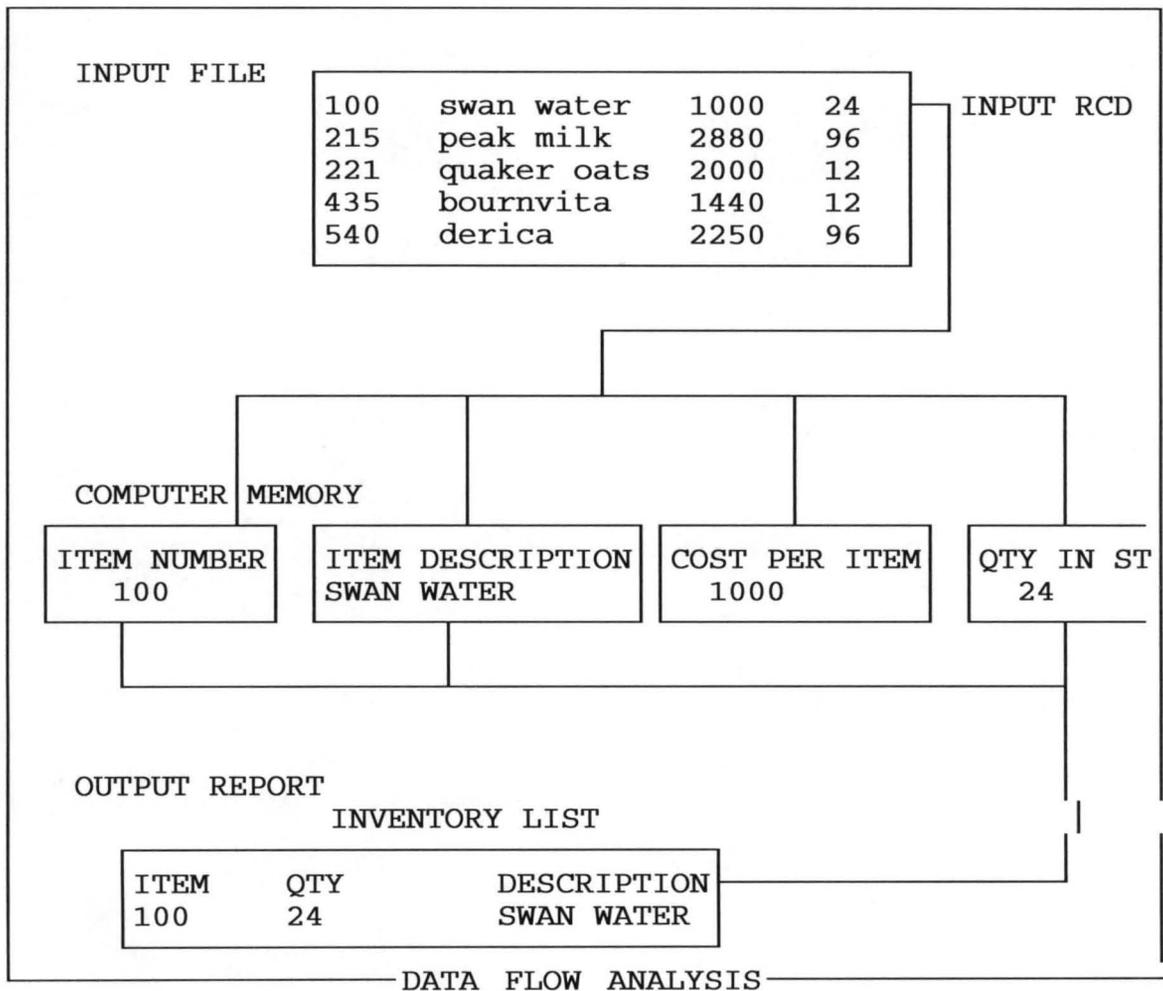
The structure chart below establishes three major processing functions for the program. The INITIATION function includes those activities that will take place one time at the beginning of processing. The MAIN PROCESSING function includes those activities that will take place once for each record to be processed. The TERMINATION function includes those activities that the computer will perform one time at the completion of the processing.



Main processing involves those activities that take place over and over, once for each record in the input file. In this case, the computer will access the appropriate data fields from memory and format them as a line of printing on the report. Then it will bring the next input record into memory so that the data are available when this processing is repeated. These two processing functions - printing a detail line on the report and inputting the next record are

repeated until there are no more records in the input file to process.

This data flow analysis is visualized and illustrated below:



After all the input records have been processed and the body of the report has been printed, any remaining termination activities take place otherwise the program execution is halted.

For this program, the main processing functions are:

- (a) Item number

- (b) Item description
- (c) Quantity in stock
- (d) Re-order point

3.3 DETAILED LAYOUT OF INPUT FILE STRUCTURE

The files are in three main categories: They are the input, the processing and the output files.

INPUT FILES: These are the data base files which contain the different fields and field-width for data entry.

In this system, the main input file, which is known as the master file, is called MASTER.DBF.

Another file known as transaction DBF is also a data base file which is used in creating files for data entry.

Temporary DBF is the input file used in storing units for data entry.

These files, a part from being data base files are used to update one another.

The input files for this system are:

1	Master DBF	System master DATABASE FILE
2	Transaction DBF	Transaction DATABASE FILE
3	Temporary DBF	Temporary Transaction DADBASE File

MASTER:DBF:FILE STRUCTURE

Field-No	Field-Name	Field-Type	Width	Description
1	Item-Num	Character	8	Item Number
2	Item-Des	Character	20	Item Description
3	Quan-Stk	Numeric	8	Quantity in stock
4	Cost	Numeric	10	Cost per carton(item)
5	Quan-SD	Numeric	8	Quantity sold
6	Date	Date	8	Date
7	State	Charater	10	State
8	Country	Character	15	Country
9	Re-PT	Numeric	8	Reorder point
10	Quan	Numeric	10	Order Quantity

TRANSACTION D F: FILE STRUCTURE

TRANSACTION. DBF: FILE STRUCTURE

FIELD-NO	FIELD-NAME	FIELD-TYPE	WIDTH	DESCRIPTION
1	Item-No	Character	8	Item-No
2	Item-Des.	Character	20	Item-Des.
3	Quan-stk.	Numeric	8	Qty in stk.
4	Cost	Numeric	8	Cost per carton
5	Pre-Date	Date	10	Date
6	Quan-SD	Numeric	8	Qty Sold
7	RE-PT	Numeric	8	Reorder pt.
8	Or-Quan.	Numeric	10	Order Qty.

These various fields will allow the user to enter data required for operation. These two input files will update one another, that is why we have some fields occurring more than once in the data base files.

3.4 DETAILED LAYOUT OF PROCESSING PROCEDURES

To implement the actual processing of data and information, the data are organized into records and files. Access mode will be provided to perform storage and retrieval of the data and information. Then, the record is brought into memory, processed, and returned to storage. This sequence of operations is repeated for each record to be processed. Computer files are entered to the following standard set of data and information processing applications:

- i File creation
- ii File updating and maintenance
- iii File inquiry and report writing.

These operations are detailed in the design stage in chapter four.

CHAPTER FOUR

4. SYSTEM DESIGN

4.1 ELEMENTS OF DESIGN

To design the inventory transaction system, a main menu known as menu of commands files have to be produced, to enable the user select the specific function he/she wants to carry out.

In this system, the menu is made up of 9 (nine) Options, including an avenue for getting out from the system environment. That is if one wants a temporary stop of work.

The options in the menu are as follows:

- (a) Item number
- (b) Item Description
- (c) Quantity in Stock
- (d) Cost per carton of item
- (e) Update Quantity Sold
- (f) Display Profit
- (g) Display Reorder Point
- (h) Display Quantity to be ordered
- (i) Print all Transactions.

Upon selection of any of the options, the procedure for the generation of the required output is set to motion in order to generate the desired output.

OPTION (A) (ITEM NUMBER)

This option allows the user to distinguish between the size of similar items. Some item may have more than two sizes, so using the alphanumeric data will be able to show

precisely which size of the item is being referred.

OPTION (B) (ITEM DESCRIPTION)

This option describes the item that is being numbered.

OPTION (C) (QUANTITY IN STOCK)

This menu command file is used to list quantity of each item (in cartons) in stock.

OPTION (D) (COST PER ITEM)

This option displays cost, i.e. selling price of each item in carton. With this, the manager can know at a glance the total sum of money being expected after total sale.

OPTION (E) (QUANTITY SOLD)

This menu command file is used to display the quantity of each item sold. It helps the store manager to know when to replenish stock This is being updated after every sale.

OPTION (F) (DISPLAY PROFIT)

With this option, profit on sale will be displayed. This profit is the difference between the selling price and the cost price.

OPTION (G) (DISPLAY REORDER POINT)

This file is used to determine when to replenish stock. It tells the manager at a glance when to replenish stock.

OPTION (H) (DISPLAY QUANTITY TO BE ORDERED)

Every item has a certain quantity to be ordered. So that the manager will know the quantity of such item to stock in order to avoid obsolete and possibly theft.

OPTION (I) (PRINT ALL TRANSACTION)

This menu command file enables the user to have a hard copy of the transactions.

4.2 SYSTEM DEVELOPMENT LIFE CYCLE

A computer information system takes on identity and a kind of life of its own. It has its own characteristics. It interacts with people and is modified in the course of normal use. The various stages in the life cycle of a system design as it apply to Inventory Control on some Products of UAC PLC, BIDA follows:

- (a) The Existing System
- (b) System Design
- (c) System Analysis and Implementation
- (d) Installation
- (e) Maintenance.

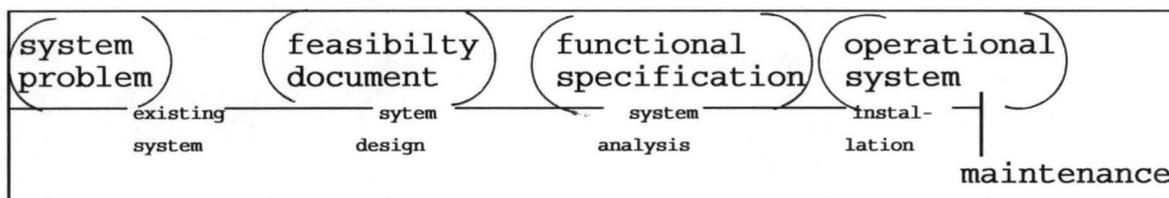


FIG: The system development life cycle.

The researcher's idea for a new information system for UAC is stimulated by a need to improve information processing procedures. The feasibility study in the development of this system was carried out to determine if a system can be developed to solve the Inventory Control problems facing the company.

The most challenging and creative part of system design life cycle is the design of a new system. In designing this system, the problem inherent in the existing system was considered as well as the cost of the new system in order to improve on the existing system.

The input and output file structure and layout are specific. The file formats; and testing of the system for operational readiness are not left out. In general, these activities translate the logical, functional requirements for the new system into a physical reality.

Since no system can operate effectively unless people are prepared for and trained in its use. Users of the new system will be trained on the operations and procedures.

4.3 FILES CREATION

In business, entities of different types whose present in the processing of day to day transactions are essential. Records that represents these entities are grouped together in files. The function of a file in a data processing system depend on the role of its record within the operational environment. In the development of this system, three files were created namely master file, transaction file and temporary file.

In short, file creation entails creating an entirely new file or converting a source document into a computer file medium like disk.

MASTER FILES

Master files are permanent files containing records vital to the running of the organization.

TRANSACTION FILES

Transaction files contain data about business activities taken place within a specified period of time. Their function is closely related to that of master file.

CHAPTER FIVE

SYSTEM IMPLEMENTATION AND ANALYSIS

Generally, system implementation is part of the design of a new system. When this phase of a project begins, a major commitment has been made. Change will take place. A new system has been developed and will supplant the existing manual processing procedures that exist in GBO, Bida branch.

5.1 COMPUTER PROGRAM

A computer program is a sequence of instructions which a computer follows to perform a specific task.

A computer language known as Dbase is used in writing the program for this system. Using precisely the Dbase III plus.

Dbase III plus query language is a high-level, English-like command language. In fact, these structured query language (SQL) is compatible with IBM machines. In addition, in database, the user is provided a great deal of flexibility in formulating commands. In fact, a DBMS often allows the user to employ rather unstructured phraseology - similar to common speech.

5.2 PRACTICAL OPERATION OF THE PROGRAM

To enter into this system, type DO PATROJ at dot prompt. The screen will then display main menu that contains the master and transaction records and an avenue to exist. It will then ask which record you want to work on. It is master, type DO PATMENU 1. If it is transaction type DO PATMENU 2. Each record contain update and order entry

Order Quantity (EOQ).

To achieve these objectives, we assume that the information below obtained from the products of study are constant throughout the year viz demand for products, ordering cost and carrying cost for each item.

Item Descr.	D Annual Demand in carton (p.a.)	Co Ordering cost p.a.	Cc carrying cost p.a
Swan water	253	N16.10	N13.35
Peak milk	225	N18.50	N15
Q.Oats	91	N12.25	N10.05
Bournvita	184	N10.05	N11.08
Derica To.	150	N10.05	N11.75

We now use the above data in calculating the EOQ for each item. This will enable us to know the number of order to Place on each item in a year.

$$\sqrt{\frac{2 \times 16.10 \times 253}{13.75}}$$

$$\sqrt{2 \frac{CoD}{Cc}}$$

Economic Batch Quantity (EBQ) =

Now,

$$\sqrt{\frac{2 \times 16.10 \times 253}{13.75}}$$

$$\text{EBQ (for swan water)} = = 24.34$$

Which indicates that slightly above ten (10) orders should be placed on swan water in a year (i.e. ~~24~~ 253 ÷ 24.34).

$$\text{EBQ (for peak mile)} = = 23.56 \quad (\text{i.e. } 225 \div)$$

$$\frac{\sqrt{2 \times 18.50 \times 225}}{15}$$

It indicates that slight above nine orders should be placed on peak milk in a year. (ie 225 = 2356)

Also,

$$\frac{\sqrt{2 \times 12.25 \times 91}}{10.05}$$

EBQ (Quaker Oats) =

$$= 14.89$$

which tells us to place slightly above 6 orders for Quaker Oats in a year.

$$\frac{\sqrt{2 \times 10.05 \times 184}}{11.08}$$

EBQ (for Bournvita) =

$$= 18.27$$

slightly above 10 orders should be placed on Bournvita per annum.

$$\frac{\sqrt{2 \times 10.05 \times 150}}{11.75}$$

EBQ (for Derica) =

$$= 16.01$$

It indicates that slightly above nine orders be placed on Tin Tomatoes per annum.

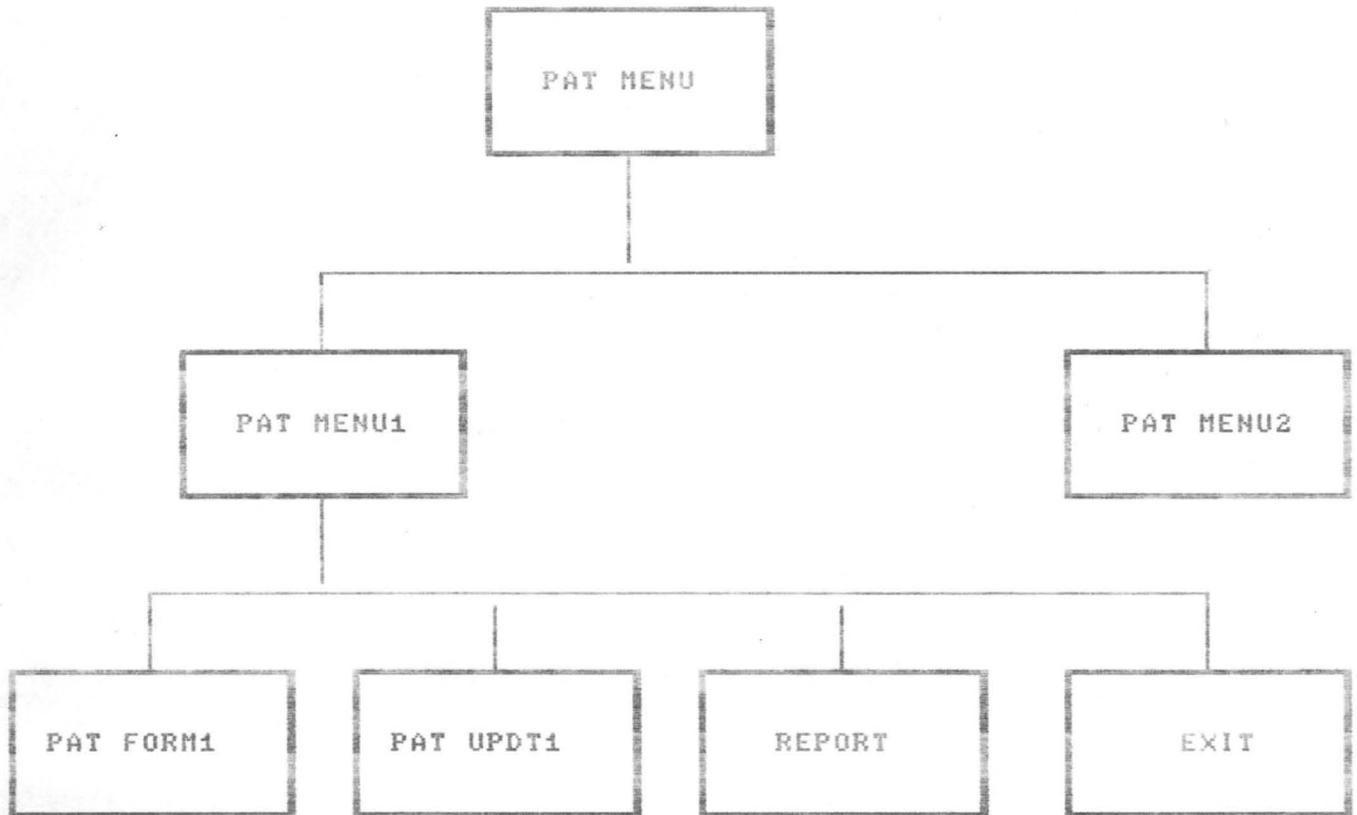
(3) A constant review of inventory is recommended so that capital tied up can be reduced without hampering customers goodwill.

(4) Finally, data processing staff should be trained for the maintenance of the system and for smooth and efficient running of the system.

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MODULAR STRUCTURE OF THE PROGRAM



*****PATPROJ*****

SET SCOREBOARD OFF

SET STATU OFF

SET TALK OFF

SET ECHO OFF

CLEAR

*****THIS IS A PROJECT SUBMITTED TO COMPUTER DEPARTMENT OF*****

*****FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA.*****

***** IN PARTIAL FULFILMENT FOR THE AWARD OF POST GRADUATE*****

***** DIPLOMA IN COMPUTER SCIENCE*****

CLEA

DO WHILE .T.

CLEA

CHOICE=" "

@5,15 SAY "This is G.B.O. Nig. Records"

@10,15 say "MASTER FILE"

@12,15 SAY "TRANSACTION FILE"

@14,15 SAY "QUIT DATABASE"

SET COLO TO R*

@10,15 SAY "M"

@12,15 SAY "T"

@14,15 SAY "Q"

SET COLO TO

@20,15 SAY "ENTER FIRST LETTER OF YOUR CHOICE" GET CHOICE

READ

DO CASE

CASE UPPER(CHOICE)="M"

DO PATMENU1

CASE UPPER(CHOICE)="T"

DO PATMENU2

CASE UPPER(CHOICE)="Q"

CLEA

exit

ENDCASE

ENDDO

RETURN

SET SCOREBOARD ON

SET STATU ON

SET TALK ON

SET ECHO ON

```
*****PATMENU1*****
*****PROGRAM ID:  MAIN PROGRAM MENU.PRG*****
*****PROJECT TITLE:-  INVENTORY CONTROL ON SOME PRODUCTS  *****
*****                   ( A COMPUTER PERSPECTIVE )          *****
*****                   A CASE STUDY OF U.A.C, BIDA BRANCH *****
*****DATE WRITTEN:....1ST MARCH; 1996
*****AUTHOR:.....PAT IWUCHUKWU
*****-----SET ENVIRONMENTAL PARAMETERS-----
SET TALK OFF
SET ECHO OFF
SET SAFETY OFF
SET STATUS OFF
SET DATE BRITISH
USE MASTER
DO WHILE .T.
  CLEA
  SET COLD TO GR
  @5,10 TO 19,65
*-----BUILD THE SCREEN-----
  @5,33 SAY "MAIN MENU"
  @7,20 SAY "TASK CODE          TASK DESCRIPTION"
  @9,22 SAY "[A]          ENTER NEW ORDER"
  @11,22 SAY "[B]         UPDATE AN ORDER"
  @13,22 SAY "[C]         INVOICES"
  @15,22 SAY "[D]         SALES REPORT"
  @17,22 SAY "[E]         EXIT"
  SET COLD TO G/B
*-----GET INPUT FROM THE USER-----
  CHOICE = " "
  @21,13 SAY "ENTER YOUR CHOICE (TYPE IN TASK CODE):" GET CHOICE
  READ
*-----EVALUATE THE USER'S RESPONSE-----
  SET COLD TO
  DO CASE
    CASE UPPER(CHOICE) = "A"
      DO PATFORM1
    CASE UPPER(CHOICE) = "B"
      DO PATUPDT1
    CASE UPPER(CHOICE) = "C"
      DO INVPRIN
    CASE UPPER(CHOICE) = "D"
      DO MR
    CASE UPPER(CHOICE) = "E"
      CLEA
      EXIT
  OTHERWISE
    LOOP
  ENDCASE
ENDDO
CLOSE DATABASE
*-----PROGRAM CLOSING-----
SET SAFETY ON
SET STATUS ON
SET TALK ON
SET ECHO ON
RETURN
```

```
*****PATFORM1.PRG*****
*****NEW ORDER ENTRY*****
*****FILE NAME: MASTER.DBF*****
USE MASTER
CLEA
DO WHILE .t.
  MDATE=CTOD(" / / ")
  ITEM_NO=SPACE(8)
  ITEMDES=SPACE(20)
  QUANSTK=0
  MCOST=0
  QUANSOLD=0
  BRANCH=SPACE(15)
  MSTATE=SPACE(10)
  MCOUNTRY=SPACE(15)
  REORD_PT=0
  ORD_QUAN=0
  @ 1,25 SAY "INPUT SCREEN"
  @ 2,5 TO 18,60 doub
  @ 4,8 SAY "DATE" GET MDATE
  @ 4,30 SAY "ITEM NUMBER" GET ITEM_NO
  @ 6,8 SAY "ITEM DESCRIPTION" GET ITEMDES
  @ 8,8 SAY "COST/CARTON" GET MCOST PICT '999999.99'
  @ 8,33 SAY "QUANTITY IN STOCK" GET QUANSTK PICT '99999999'
  @ 10,8 SAY "QUANTITY SOLD" GET QUANSOLD PICT '99999999'
  @ 10,35 say "ANNUAL DEMAND" GET ANN_DD PICT '99999999'
  @ 12,8 SAY "BRANCH MAKING THE SALE" GET BRANCH
  @ 14,8 SAY "STATE" GET MSTATE
  @ 14,35 SAY "COUNTRY" GET MCOUNTRY
  @ 16,8 SAY "REORDER POINT" GET REORD_PT PICT '99999999'
  @ 16,35 SAY "ORDER QUANTITY" GET ORD_QUAN PICT '9999999999'
  READ
  ANS=" "
  @20,20 SAY "ARE THESE ENTRY CORRECT? (Y/N)" GET ANS PICT "!"
  READ
  IF UPPER(ANS)="N"
    CLEA
    LOOP
  ENDIF
  IF UPPER(ANS)="Y"
    APPEND BLANK
    REPL DATE WITH MDATE
    REPL ITEM_NUM WITH ITEM_NO
    REPL ITEM_DES WITH ITEMDES
    REPL QUAN_STK WITH QUANSTK
    REPL COST WITH MCOST
    REPL QUAN_SOLD WITH QUANSOLD
    REPL BRAN_SALE WITH BRANCH
    REPL STATE WITH MSTATE
    REPL COUNTRY WITH MCOUNTRY
    REPL REORDER_PT WITH REORD_PT
    REPL ORDER_QUAN WITH ORD_QUAN
  ENDIF
  REP=" "
  @23,20 SAY "ENTER ANOTHER RECORD (Y/N)?" GET REP
  READ
  IF UPPER(REP) = "Y"
    CLEA
    LOOP
```

```
ELSE  
  exit  
ENDIF  
enddo
```

```
*****PATUPDT.PRG*****  
*****FILE NAME: MASTER.DBF*****  
*****UPDATE PROGRAM*****
```

```
USE MASTER
```

```
DO WHILE .NOT. EOF()
```

```
  CLEA
```

```
  SET COLO TO 6
```

```
  ITEMDES=SPACE(20)
```

```
  @10,7 SAY RECCOUNT()
```

```
  @10,10 SAY "REC:"
```

```
  @10,48 SAY LUPDATE()
```

```
  @10,33 SAY "LAST UPDATE"
```

```
  @15,10 SAY "ENTER ITEM DESCRIPTION" GET ITEMDES
```

```
  READ
```

```
  LOCATE FOR UPPER(TRIM(ITEM_DES))=UPPER(TRIM(ITEMDES))
```

```
  IF .NOT. FOUND()
```

```
    CLEA
```

```
    ?"          YOU ENTERED",ITEMDES
```

```
    @15,15 SAY "THIS RECORD DOES NOT EXIST"
```

```
    WAIT " "
```

```
    CLEA
```

```
    LOOP
```

```
  ELSE
```

```
    CLEA
```

```
    @ 2,10 TO 18,65 doub
```

```
    SET COLO TO RB
```

```
    @ 2,27 say "RECORD UPDATE SCREEN"
```

```
    SET COLO TO
```

```
    @ 4,13 SAY "DATE" GET DATE
```

```
    @ 4,35 SAY "ITEM NUMBER" GET ITEM_NUM
```

```
    @ 6,13 SAY "ITEM DESCRIPTION" GET ITEM_DES
```

```
    @ 8,13 SAY "COST PER CARTON" GET COST
```

```
    @ 10,13 SAY "QUANTITY IN STOCK" GET QUAN_STK
```

```
    @ 10,42 SAY "QUANTITY SOLD" GET QUAN_SOLD
```

```
    @ 12,13 SAY "BRANCH MAKING THE SALE" GET BRAN_SALE
```

```
    @ 14,13 SAY "STATE" GET STATE
```

```
    @ 14,40 SAY "COUNTRY" GET COUNTRY
```

```
    @ 16,13 SAY "REORDER POINT" GET REORDER_PT
```

```
    @ 16,40 SAY "ORDER QUANTITY" GET ORDER_QUAN
```

```
    @20,14 SAY RECNO()
```

```
    @20,8 SAY "RECORD NUMBER"
```

```
    READ
```

```
  ENDIF
```

```
  ANS=" "
```

```
  set colo to r*
```

```
  @20,30 SAY "SAVE THESE CHANGES ? (Y/N)" GET ANS;
```

```
  PICT "Y"
```

```
  set colo to
```

```
  READ
```

```
  IF ANS="N"
```

```
    CLEA
```

```
    EXIT
```

```
  ELSE
```

```
    REPL DATE WITH DATE
```

```
    REPL ITEM_NUM WITH ITEM_NUM
```

```
    REPL ITEM_DES WITH ITEM_DES
```

```
    REPL QUAN_STK WITH QUAN_STK
```

```
    REPL COST WITH COST
```

```
    REPL QUAN_SOLD WITH QUAN_SOLD
```

```
    REPL BRAN_SALE WITH BRAN_SALE
```

```
REPL STATE WITH STATE
REPL COUNTRY WITH COUNTRY
REPL REORDER_PT WITH REORDER_PT
REPL ORDER_QUAN WITH ORDER_QUAN
```

```
ENDIF
```

```
REP=" "
```

```
@23,20 SAY "UPDATE ANOTHER RECORD (Y/N)?" GET REP
```

```
READ
```

```
IF UPPER(REP) = "Y"
```

```
  CLEA
```

```
  LOOP
```

```
ELSE
```

```
  EXIT
```

```
endif
```

```
enddo
```

```
RETURN
```

MAIN MENU

TASK CODE	TASK DESCRIPTION
[A]	ENTER NEW ORDER
[B]	UPDATE AN ORDER
[C]	INVOICES
[D]	SALES REPORT
[E]	EXIT

ENTER YOUR CHOICE (TYPE IN TASK CODE):

RECORD UPDATE SCREEN

DATE 25/02/92	ITEM NUMBER LQ92/002		
ITEM DESCRIPTION PEAK EVA. MILK			
COST PER CARTON	650.54		
QUANTITY IN STOCK	1000	QUANTITY SOLD	450
BRANCH MAKING THE SALE BIDA			
STATE NDALUMA	COUNTRY NIGERIA		
REORDER POINT	1500	ORDER QUANTITY	1600

RECORD NUMBER 2