COMPUTERISATION OF QUALITY ASSURANCE ACTIVITIES IN FOOD INDUSTRY. (A CASE STUDY OF ALCOHOL MANUFACTURING COMPANY)

BY

GANA NDACEKO MOHAMMED

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CERTIFICATION

I HEREBY CERTIFY THAT I HAVE Supervised, read and approved this project which I found adequate both in scope and quality for the partial fulfilment of the requirement for the award of post-graduate Diploma in Computer Science, of the Federal University of Technology, Minna.

Dr. K. R. Adeboye
(Project Supervisor)

Date

Dr. K. R. Adeboye
(HOD Maths/Computer)

Date

External Examiner

Date

DEDICATION

This project is dedicated to my brothers and children.

ACKNOWLEDGEMENT

I thank almighty Allah for making this course successful for me.

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ABSTRACT

This research work is aimed at introducing computer to the processing of Total Quality control documents in food industry to ensure production of good products. This gives an accurate, more efficient, less expensive and faster method of processing records.

A program is written in Dbase IV which provides good facilities for a more scientific approach to the solution of Quality Control problems in food industry.

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CHAPTER ONE

GENERAL INTRODUCTION

1.1 INTRODUCTION

Modern-day quality assurance now called Total quality control (TQC), has evolved out of the factory over many years. In the past quality assurance emphasised defect identification and control through inspection. This approach is very costly and inefficient. This current trend in quality assurance is to stress defect prevention rather than identification because it is more cost effective than inspection and detection..

Quality assurance covers every department of manufacturing organisation and it sets the standard for the organisation in conformity with the customers needs and wants. Quality control department is saddled with ensuring the compliance with these conditions. Therefore, quality control department in discharging its duty in ensuring quality assurance carryout test and inspection of all or a portion of the product starting from raw material to the finished/final product in a manufacturing operation to ensure that the desired quality level of product reaches the consumer. The current quality assurance philosophy that is still evolving in both manufacturing and service organisation is "build quality into the product at the source of production and service".

The Quality Control Department has the roles of testing, inspecting and evaluating every quality attribute of any product from the raw material to finished product as well as relating with other departments in the organisation to ensure that all their activities relating to the product are in conformity with specifications.

The Quality assurance makes use of Total quality conceptual model for all operations. This is an approach that integrates technical systems with the socio-cultural systems within an organisation by emphasising the importance of people in the total quality process. It encourages management to create an environment in which the desired corporate cultural change will involve. This cultural change will incorporate a quality system that is strictly customer driven and emphasise continuous improvement and reduction in process variability. The expansion of quality control from a strictly manufacturing (factory focus to the involvement of all people in an organisation that

can have effect on the quality of the product or service produced has resulted in a new title "Total Quality Control" (TQC). The total quality control is the term that is presently most frequently applied to the set of Technologies Philosophies and organisational concepts that constitute most organisations' attempts to produce products that are defect free and meet the needs of the customers.

As stated above, quality control department handles both factory activities regarding the product from raw materials to finished product as well as relating to other departments in the organisation in order to produce good report for management decision making. Most of the documents produced in both evaluation, testing and inspection of products as well as relating to other departments to ensure quality assurance are handled manually. There are many occasions for references and are often very difficult to meet. Therefore, computer facilities could be used to arrange, and store such records more efficiently. Hence this project work sets out database for quality assurance as carried out by the Quality control department.

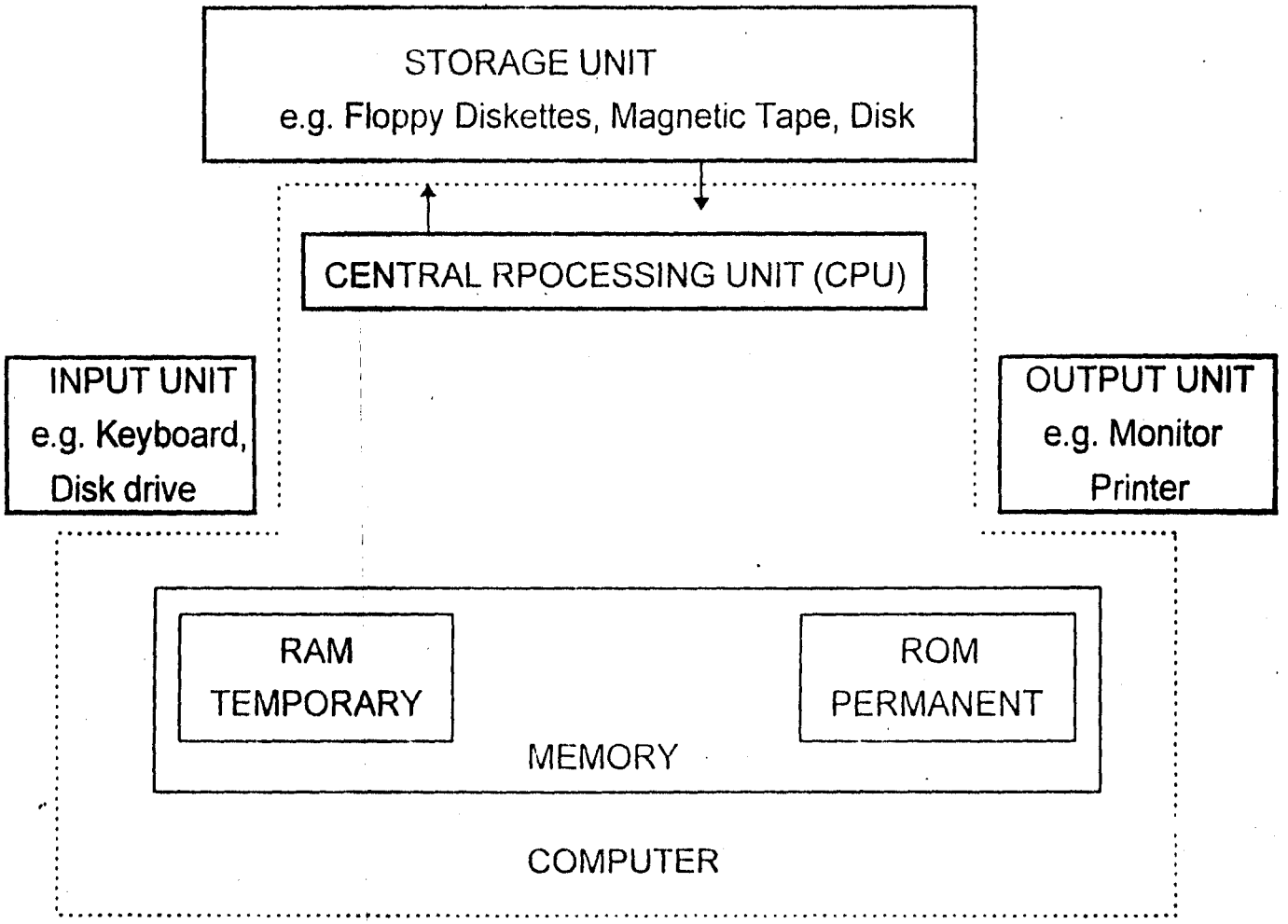
1.2 COMPUTER

A computer is an electronic device which accepts and processes data by following a set of instructions to produce an accurate and efficient result.

A computer system comprises hardware, software, and human ware. The hardware elements are the visible or tangible parts of the computer system. Examples are mouse, monitor, keyboard and printer. It is the Physical part of a computer that one can see, feel or touch. It comprises the central Processing Unit (CPU) and the Peripheral devices for in put and output operations.

The input unit is that part which serves as a means of entering data and instructions into the computer machine for necessary processing and execution so as to produce desired result.

The Central processing Unit (CPU) is often referred to a the heart of the computer. This part controls the activities and various operations taking place in the computer. The central processing unit has three units. These are the control unit, the Arithmetic/Logic Unit (ALU), and the primary memory.



ure 1.1: showing basic components of a computer system.

The control unit.

This part directs the sequence of operations, produces signals that act as commands to internal circuits, to execute set of instructions and communicate with input device, output device and the memory.

The Arithmetic/Logic Unit: This part carries out the arithmetic computations and Logical operations such as comparison, sorting, summarising etc. The primary memory is that unit that holds (that is, stores) instructions, data and intermediate and final results.

The output device is that part which serves the purpose of presenting/reporting computer result to the users. These include the Visual Display Unit (VDU) or monitor and printer

Fig. 1.1 BASIC COMPONENTS OF A COMPUTER SYSTEM

The storage Unit: This is the unit into which data can be entered, in which they can be held and from which they can be retrieved at later time. It's also referred to as any device that can store data. The storage systems (commonly called the memory) are divided into two distinct units. The immediate access mainstores otherwise called the primary storage and secondary storage. The primary storage is the principal storage and sometimes called the "Mainstorage" (Main memory) or internal storage and high speed storage, it is most frequently called Ramdom access memory (RAM). The main memory of computer comprises of the RAM and the ROM (Read only memory). This is shown in the diagram above.

The software is a collection of programmes which control the activities of a computer or it comprises the instructions that facilitate the processing of all activities of the computer system. Software is thus another term for the programmes that tell the hardware what to do. Without software, hardware is useless to anyone. A programme is a sequence of instructions or commands which a computer follows to perform a specified task. Computer software can be classified into two categories - System software and Application Software..

System software are programmes that act on the users' programme commands and activate the proper hardware circuits and devices to perform the processing. It acts as an interface between the users programme and the hardware. System software is usually purchased with the computer hardware and sometimes referred to as the operating system (OS). Examples are Disk Operating system (DOS), UNIX, CP/M – 86.

Application software is the software that applies the computer to whatever the user wants. It is the software that passes the desire of the user to the computer. It enables the user to solve a problem or Perform a useful task based on the need. It is 50 important that many informed computer users think first of the work to be done and whether the software for it, is available, ever before considering the hardware. Examples include windows, spreadsheets, data base management, etc.

The Human ware refers to the users of the computer hardware and software for solving a problem or executing a given task. It includes programmers, system analysts, operators, etc. the quality control department is headed by Quality Control Manager, followed by Quality control officer with laboratory Analysts and laboratory attendants as supporting staff.

Some of the activities of the department include.

i) Specification of raw material standards
ii) Sampling and testing of raw material
iii) Scheduling of production
iv) Process control
v) Inventory of finished products
vi) Inventory of raw materials

vii) Reporting and change in production

viii) Receiving complaints and taking action

ix) Inspection and analysis of finished products

x) Reporting to the management on production level

xi) Specification for all materials (including engineering and scientific)

1.6 AIMS AND OBJECTIVES OF THE STUDY

It is to provide services that will ensure proper keeping of records and make the retrieval of necessary information very easy.

The software will have some facilities for:

a) Viewing past records

b) Editing Past records when necessary

c) Storing old and new records

d) Preparing and printing reports and

e) Creating new records.

1.7 SIGNIFICANCE OF THE STUDY

Computerization of documents processed by Quality Control Department in food industry especially Alcohol manufacturing company will speed up work and ensure accuracy. It will make retrieval of documents easier and provide appropriate information to management for decision making purpose.

1.8 SCOPE AND LIMITATIONS

This project work will concentrate on the data base management of factory activities that concern the quality Assurance of Alcohol production.

The time period of the project cannot allow computerization of every attribute of alcohol production as regards its quality but prepare documents that process the results of analysis to see its conformity with specification.

CHAPTER TWO

BACKGROUND INFORMATION ON QUALITY CONTROL IN FOOD INDUSTRY

2.1 BACKGROUND HISTORY

It is probably reasonable to assert that food processing was one of the first industries known to man (besides hunting and cultivation). In his primitive existence, in a purely rural and agricultural society, man processed his own food within his quality specifications.

Even today, with the advent of industrilization, food processing is not wanting. In Nigeria, even during the colonial era, there were food industries and since their main objective is to satisfy the need and want of the customers, government sets out laws to guide the standard of such products in order to protect the customers from exploitation and danger.

Such government legislation include food and Drugs Act of 1974. According to M. A. Ayoade Esq., Under the food and Drugs Act it is an offence to sell, advertise, import, or distribute certain food, drugs, cosmetics and devices.

Similarly, the Federal government of Nigeria, in late 1970's established food and Drugs Administration with the objective of checking quality distribution, production, and flow of food, drugs, cosmetics, chemicals and other related items in our markets.

Recently, food and Drugs Administration was put under the supervision of the National Agency for Food and Drugs Administration and control by Decree No. 15 promulgated in 1993. This Decree establishes the National Agency for Food and Drugs Administration and Control. Its functions include the regulation, controlling, the importation, manufacturing, advertisement, distribution, sale and the use of bottled water and chemicals.

The standards Organisation of Nigeria (SON) was established by Decree No. 56 of 1971 and was vested with the sole responsibility for preparing standards for products and processes and for ensuring compliance with the Federal Government's

policies on standardization and quality control of locally manufactured goods and services, imported products, etc.

The functions of the standards Organisation of Nigeria as entrenched in its enabling Decree No. 56 of 1971 and its subsequent amendments are:

i) to organise and do everything necessary to ensure compliance with standards designated and approved by council.
ii) To undertake investigations necessary into the quality of facilities and products manufactured and imported into Nigeria so as to establish a quality assurance system including certification of factories, products and laboratories.
iii) To compile Nigeria Standards Specifications etc.

In the light of the above, any food industry established must be certified by the above named agencies. The quality control department in Alcohol manufacturing company carryout among other things the compliance with standards specifications of the various products produced. The company standards of microbial content.

In Alcohol manufacturing company, various tests are carried out at different stages of process starting from raw material to finished product. The tests are applied according to a statistical design and the frequency of sampling and analytical accuracy required are related to the degree of quality control desired. On the raw materials which are mainly molasses and cassava, evaluation of fermentable sugars present is carried out to ascertain the amount of yeast to use, period of fermentation required, and quantity of alcohol realisable.

Also during fermentation, regular microscopic observation is carried out to determine the viability of Yeast. On the finished product, tests like alcoholic concentration, acidity, flavour, odour are carried out and data collected from all the observations are processed to provide information on the product.

The information is compiled and arranged in files and shelved, all done manually. The information is used to prepare report periodically or on a schedule, such as daily, weekly or monthly. This system works satisfactorily but the task of preparing the various documents in laborious, error prone and time consuming.

On many occasions, customers; lodge complains about quality standard of products purchased from the company. This requires the quality control department to find out when the product was produced, purchased and what happened. Here, the

retrieval of data could be very difficult and time consuming . Produces three different products classified as Technical, industrial and domestic products.

Documents relating to the compliance of the above products with both the customers' requirements as well as the Government Policies during the daily production are prepared and stored manually. This method makes retrieval extremely difficult especially as there are frequent customer complaints regarding changes in the quality of the product. The files used in storing these documents look bulky and make, the laboratory shelves rough. With the birth of the computer, the storage of information is more accurate, efficient and error free.

2.2 CONSTRAINTS OF PRESENT SYSTEM

If there is anything so crucial towards a good planning and decision making, it is information and data. Data (which are facts collected from measurements or observations about people, events, objects or concepts) must be processed to produce information.

The duties of Quality control department include mostly the monitoring of all processes concerning the production of food from raw material to finished product with the aim of ensuring the strict compliance with standard specifications.

These standards may reflect the manufacturers or the customers' view points. They may be based on physical properties, such as size and colour, chemical properties such as acidity, sensory attributes, such as odour and flavour; legal requirements such as package, Net weight, label, or on public health

2.3 THE PROPOSED SYSTEM/SOFTWARE

Computer was proposed as a device that will help tremendously in processing and storing data obtained from various analysis carried out in Quality Control Department of Alcohol Manufacturing Company. Computer system help in making an easier, accurate and reliable logical comparison between things. It further helps in efficiently storing, filing and processing data and information.

The software to be used ids Database management system which is a software that constructs, expands, and maintains the data contained in database. It also

provides the interface between the user and the data in such a way that it enables the user to record, organise, select, summarise, extract, report on, and otherwise manage data contained in a database.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 SYSTEM ANALYSIS

System analysis in computer environment is defined as the method of determining how best to use computers with other resources to perform tasks which meet the information needs of an organisation System analysis is also concerned with converting the objective of management as far as information and data are concerned into methods that are amenable to processing by computer.

System analysis is a link between management and software/hardware of computing. The objectives or aims of system analysis are to examine the system carefully with a view to analysing the strength and weaknesses, to determine information needs and the best method by which the weaknesses of the existing system can be resolved or achieved.

At this stage, the requirements of the system is specified and feasibility study is conducted so as to evaluate its operational, economical and Technical considerations.

After the analysis, the following points emerge:

a) The type of quality parameters which guide the wholesomeness of the product (Alcohol).
b) How and where information is needed.
c) How information is presented for processing

3.2 SYSTEM DESIGN

This is the process of Planning, replacing or complementing an existing system. The first step towards system design is the identification of system requirement and this is followed by the formulation of design alternatives; that is, the recommendation or strategies for designing a new system.

3.3 FEASIBILITY STUDY

This is to determine whether a solution to the problem is plausible. Feasibility study is important so as to prevent waste of time, effort and economic resources. It is a miniature systems analysis and design effort that entails an exploration of alternative design options and an analysis of the cost and benefits of each alternatives.

The research methodology adopted in this project work includes interview to reveal the inherent problems and weaknesses of the existing system. The second method used is the direct observation of the system. The system is assessed, the new forms and new procedures are determined.

3.4 ANALYSIS OF THE FACTS

After careful feasibility study, the following results of the analysis emerge.

i) COMPARTIBILITY: - The existing method of processing and handling of quality control records and data is incompatible with the present scientific development.

ii) ACCESSIBILITY:- During the collection of facts and data, it was observed that information required at any given time was not readily available and when available, was not accessible.

iii) ECONOMY:- The present method of recording quality control findings is un-economical. This leads to the waste of stationeries and space. Therefore a more economical method can be adopted to minimize the cost of running the system.

iv) FLEXIBILITY:- Since the establishment of Nigeria Alcohol Company, there has been increase in quality checks and control in order to conform with standards and specifications guiding its wholesomeness. The current system might not be able to meet up with the increase in the volume of work to be done, therefore there is need for adjustment.

v) EXISTING SYSTEM:- With the computerization of the quality control activities of alcohol company, it is expected that some facilities and personnel of the present system could be incorporated into the procedure.

3.5 DESIGN OF THE NEW SYSTEM

In designing the new system, the following specifications are considered.

i) Input specification
ii) Output specification
iii) File specification
iv) Processing specification

3.5.1 INPUT SPECIFICATION

In designing a computerized quality assurance record, system of Nigeria Alcohol company, the following input data or information are used.

1. DAILY LABORATORY ANALYSIS REPORT ON THE DILLUTED MOLASES

a) Date
b) Time of dilution
c) Time of Analysis
d) Raw Molasses Tank No.
e) Raw Molasses Used (L)
f) Raw Molases Brix (o)
g) Water used (L)
h) Total Volume (L)
i) Volume of Acid Used
j) Raw Molases (pH)
k) pH of Diluted Molases

l) Temp. of diluted molasses before Heat Exchanger

m) Temp. of diluted molases after Heat Exchanger

n) Percent Reducing Sugar.

2. DAILY LABORATORY ANALYSIS REPORT ON ALCOHOL

a) Date

b) Time

c) pH

d) Strength of alcohol

e) Total acidity

f) Colour

g) Odour

h) Taste

i) Remark.

3. DAILY FORMENTATION REPORT

a) Date

b) Time started

c) Tank Number

d) Viability of Yeast (Microscopic Observation)

e) Time Stopped

4. DAILY PRODUCTION REPORT

a) Date

b) Types (Technical, Industrial, and Domestic Alcohol)

c) Quantity in litres

d) pH of boiler water

e) Total ash of sludge

3.5.2 OUTPUT SPECIFICATION

In designing the new system, the following reports are required.

1) The overall quality of water used for boiler and dilution of Molases (Colour, Yaste, Hardness etc)
2. The dilution of molases report
3. The fermentation report
4. Laboratory report on Alcohol
5. Daily production report (to the top management)
6. Variation report to department concerned.

Requisition of materials (chemicals) with specification see Appendix C.

The appropriate medium to be used for the output is Laserjet printer for printing reports referred to as "hardcopy" and a visual display Unit (VDU) or Monitor for on-line viewing. The Quality Control Unit should therefore be able to display information concerning the production of Alcohol through printed sheets and visual display unit (VDU).

3.5.3 FILE DESIGN/SPECIFICATION

File creation. The quality control department deals with different parameters that involves evaluation, observation and assessment of various stages in the production of Alcohol with a view to conforming with standards and specifications.

Records obtained from parameters are grouped together in files; each file holding record of the same type. The functions of a file in a data processing system depends on the role of its records within the operational environment and also on the inter-relationship of the file with any other file in the system.

In developing this system, both transaction and master files were created.

3.5.4 Transaction file

This is a file containing daily activities used to periodically update the master file. The daily data/activities conducted on the quality of the alcohol is used to update the master file from time to time (daily, weekly or monthly).

In this system, the transaction file created contains observations and analysis made from the raw material to the finished product with reference to the standards and specifications.

3.5.5 MASTER FILE

This is the file containing records for the running of the system. This file contains information about vital activities that promote the achievement of set objectives. Reports from this file are used to furnish the management about how specified standards are being met. In case of Government agents (NAFDAC) (NSO) paying periodic visit to ensure conformity with standards, information contained in Master file are presented. The master file can be updated and maintained from time to time thus ensuring that accuracy of data in the file. The operation of changing a master file to reflect the latest information contained in the Database is known as updating of a master file.

Data files are created in order to facilitate data input, process and output.

CHAPTER FOUR

SOFTWARE DEVELOPMENT AND IMPLEMENTATION

4.1 SOFTWARE DEVELOPMENT

The purpose of software development is to design a new system that helps to achieve the goals and objectives of the organisation, and to overcome the shortcomings and limitations of the existing system. In developing the new system, the major consideration is the requirements of the end users. The personnel to handle the software are those responsible for analysing work methods and procedures in order to simplify work and to improve work flow. Also need to be considered is the much more detailed specification (input and output), file processing in terms of system development and communication link between the users and the computers for good understanding by persons who are not knowledgeable enough about computers.

4.2 SYSTEM IMPLEMENTATION

This is the process of coding, testing and documenting programmes in the system. It takes major part of the overall systems development effort. It involves development of quality assurance. Procedures, including data security, backups and recovery, and system controls. It also involves testing programmes with both artificial and live data and training users and operating personnel.

4.3 CONVERSION

This involves the conversion of the old file data into the form required by the new system, and is usually a very expensive stage in the whole project. The changeover may be achieved in a number of ways. The most common methods are direct, parallel running, pilot running and staged changeover.

Here, in the new system parallel running conversion was introduced in which current data is processed by both the old and new systems to cross check the results.

Its main attraction is that the old system is kept alive and operational until the new system has been proved for at least one system cycle. It allows the results of the new system to be compared with the old system before acceptance by the user, thereby promoting user confidence.

4.4 DBASE IV

This is an advanced version of dBASE that provides a full relational database environment to users. It has many facilities which include the control center that offers a significant improvement. Through the control center and without the use of command language, one can design databases, manipulate and edit records and files, generate reports, perform database query, design labels, and browse databases. Data can be verified automatically as they are entered into fields.

Dbase IV organises data into a database file and a database file is a collection of related records. It is in a form of a two dimensional table consisting of a number of rows and columns.

Database is a centrally located, consolidated file which holds data relating to either the whole of an organisation's operations or data relating to a major operational area. They are known as data banks and they utilize the concept of integrated files. In data base, each item is held once and needs updating once only when it changes, and can be retrieved. Access can be made to database which is held on a direct access storage medium using terminals.

In an environment which supports a large data base, certain file processing operations are performed and they include:

ii) File validation (checking entries to ensure its error free)
iii) File maintenance (insertion, deletion, replacement of files without arithmetic operations involved).
iv) Sorting of records according to specified key field.
v) Generate formatted reports.

One of the major attractions of a database language is the ease with which management can obtain specific information from the database through terminals. Request can be made and can also make combination of keys in the retrieval process.

4.5 SYSTEM TESTING

This involves the detection of errors in programmes, and systems popularly known as debbugging. It is important to detect errors in programmes and systems as early as possible, so as to reduce the cost of correcting them. Many users have great confidence in systems which have been thoroughly tested.

To test a newly written system, dummy data which contains correct and invalid items should be used and the expected results determined.

The following personnel should be involved in the creation of test data.

i) The user department (unit)
ii) The systems analyst
iii) The programmer
iv) The auditors.

Areas to be examined in testing the system include.

1. Details of all input files both transactions and master files.
2. Details of all output files
3. Printed reports from all stages of the processing
4. Screen displays or (VDU)

All output must be thoroughly checked against anticipated results, to ensure that the system is working exactly as required. Any discrepancies will need to be identified and corrected. Consequently the documentation has to be altered to reflect the charges. When the systems analyst and his group are satisfied with the result of systems testing and believed that the system is robust, the process then terminates.

4.6 CHOICE OF FILE ORGANISATION AND PROCESSING TECHNIQUE

A file is a collection of related information or data organised into records in such a way that specific items of data or records can be retrieved and accommodated into the main storage when required for processing.

The way a file is organised depends on the storage medium used and the way the file is to be processed. Criteria that affect the choice of a file organisation are operations that are to be performed on the stored data, such as storing, updating and retrieving, and also operational constraints, such as how fast a record needs to be retrieved.

The file's organisation can either be serial, sequential, random or indexed sequential. For the purpose of this project work, sequential file organisation would be used.

Sequential file organisation is simply a serialfile with records sorted in a certain order, depending on a sort key. Like serial files, records in sequential files are stored physically one after the other, but in this case, they are logically ordered on a key, sequential files impose the condition of some ordering of records, this ordering depending on a sort key, normally the key field.

Sequential file organisation is mostly used when master files are to be stored and updated by transaction files. Sequential file organisation has a quicker access time than the serial organisation.

4.6.1 SYSTEM FLOW CHART

This gives an overall view of a data processing system. It does this by showing.

i) The tasks carried out within a system, either by manual means or by computer.
ii) The devices and media used to hold the files entered and output from the system, as well as working files within the system. See Appendix A Fig. 1.2

4.6.2 PROGRAM FLOW CHART

This represents the programme symbolically. Programme flow chart can be represented by the following.

a) Raw material
b) Water supply
c) Dilution record
d) Fermentation record
e) Distillation report
f) Finished product report

The program flow chart is based on the concept of modular programming, in which a complex database management system is designed around several small, simple functional module. It shows how to integrate these program modules with a menu driven structure since each module performs a specific task. The integration is done by setting a menu design program after each of the modules has been tested and found working correctly. The menu design program is then used to activate each of the program modules based on the choice entered. See Fig. 1.3 Appendix A.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 ANALYSIS OF RESULTS

The new system (that is, computerized Quality control activities in alcohol industry) has facility for security back up files against unauthorised users more especially as this concerned the top secrete of the organisation. This also allows for more especially as this concerned the top secrete of the organisation. This also allows for more than one copy of a file or a program, that is files on hard disks are copied to a floppy disk to serve as backups so that the other copies can still be accessed.

The new system (program) has logging facility through the use of a "password" which protects/data stored in the computer memory from being tampered with by other users. The password is only known to the program users. All computerized stored information have separate "passwords" with which to access their information or records from a file.

As the program is menu-driven, the modules are based on the choice A, B and C. Choice "A" display Dilution results which determines whether it conform with the required standard or not. Choice "B" displays fermentation results which present the activities that took place in the fermentation stage. The choice "C" reports on the Distillation which determines whether the product obtained conformed with the specified standard or not. This also gives the information about the final product and if not acceptable, it is recirculated for distillation again.

The program also has the facility which makes it possible for data base file to be encrypted so that the data in it is converted to coded values.

The records are arranged serially and this makes it easy to maintain the file in physical sequence by merging, sorting or doing any other manipulation, either when new file is created or later on when new records are added to the end of the file.

5.2 CONCLUSION AND RECOMMENDATION

The basic idea behind the use of computer for quality assurance in food industry is the need for increase in speed, accuracy and reliability. The process frees man from simple routine jobs of repetitive nature by providing computing power. Furthermore, use of computer in food industry is necessary because of the huge transactions and accuracy desired especially in the data processing environment where the bulk of the job is either sorting, merging files, updating information, searching for a particular key in a large volume of data etc., all these the computer does with ease and accurately.

This new process is designed to handle effectively and economically all insertions and deletions into all files maintained in the system. The system also requires adequate security which encompasses the security of all the information assets that constitute the system. Managers should see security measures beyond just physical access and passwords. It should be noted that if hardware fails than the information system has failed. Therefore adequate measures should be taken regarding both the software and hardware sub-systems. Security involves the need to protect the corporate information data base, its integrity and accessibility as well as prohibiting an infringement on stored files. This is quite essential because this new system is the top secret of any food industry. This needed security could be achieve through physical safeguards, procedural controls, recovery plan and insurance.

There must be clearly laid down personnel policies and procedures by the computer centre management.. These policies are such that should prevent operational error that may lead to data program files destruction. Files should be labelled for the operator to know the file contents.

Similarly, recovery plans are provided against accidental loss of files. This is done by retaining the source document until the master file has been updated with the transaction file.

Users of the system should be well trained in the operational and procedural methods and there must be restriction on outsiders.

With this system, further expansion could be carried out to transform it into Network system in which management could easily be shown the result of process in the production section.

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APPENDIX A

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COMPUTERISED FOOD QUALITY ASSESSMENT SYSTEM

                    MAIN MENU

          A ..... DILLUTION

          B ..... FERMENTATION

          C ..... DISTILLATION

          D ..... FINISHED PRODUCT

          E ..... WATER ANALYSIS

          F ..... RAW MATERIAL

          Q ..... QUIT

       PICK CHOICE [A, B, C, D, E, F, or Q]:
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COMPUTERISED FOOD QUALITY ASSESSMENT SYSTEM

                  DILUTION UNIT

                 SYSTEM SUBMENU

          A ..... ENTER NEW RECORD

          B ..... VIEW OLD RECORD

          C ..... CHANGE OLD RECORD

          D ..... DELETE OLD RECORD

          E ..... PRINTING RECORDS

          Q ..... QUIT

       PICK CHOICE [A, B, C, D, E, or Q]:
```

DATA ENTRY FORM - DILUTION

ter ANALYSIS NO (Press "9999" To Exit): 444

TE OF DILUTION	TIME OF DILUTION	TIME OF ANALYSIS
04/03/98	12:05	01:55

W MOLASSES (TANK NO)	123	RAW MOLASSES USED (L)	90
W MOLASSES BRIX (o)	22.5	WATER USED (L)	300
TAL VOLUME (L)	390	VOLUME OF ACID USED	20
W MOLASSES (PH)	4.5	PH OF DILUTED MOLASSES	6.5
MPERATURE BEFORE HEAT	28	TEMPERATURE AFTER HEAT	40
RCENTAGE R. S.	55		

REMARK: ACCEPTABLE

TO SAVE DATA (Y/N):

DATA VIEWING FORM - DILUTION

er ANALYSIS NO (Press "9999" To Exit): 444

E OF DILUTION	TIME OF DILUTION	TIME OF ANALYSIS
04/03/98	12:05	01:55

MOLASSES (TANK NO)	123	RAW MOLASSES USED (L)	90
MOLASSES BRIX (o)	23.0	WATER USED (L)	300
AL VOLUME (L)	390	VOLUME OF ACID USED	20
MOLASSES (PH)	4.5	PH OF DILUTED MOLASSES	6.5
PERATURE BEFORE HEAT	28	TEMPERATURE AFTER HEAT	40
CENTAGE R. S.	55		

REMARK: ACCEPTABLE

PRESS ANY KEY TO CONTINUE !

DATA EDITING FORM - DILUTION

ter ANALYSIS NO (Press "9999" To Exit): 444

TE OF DILUTION	TIME OF DILUTION	TIME OF ANALYSIS
04/03/98	12:05	01:55

W MOLASSES (TANK NO)	123	RAW MOLASSES USED (L)	90
W MOLASSES BRIX (o)	23.0	WATER USED (L)	300
TAL VOLUME (L)	390	VOLUME OF ACID USED	20
W MOLASSES (PH)	4.5	PH OF DILUTED MOLASSES	6.5
MPERATURE BEFORE HEAT	28	TEMPERATURE AFTER HEAT	40
RCENTAGE R. S.	55		

REMARK: ACCEPTABLE

TO SAVE DATA (Y/N):

DATA DELETING FORM - DILUTION

er ANALYSIS NO (Press "9999" To Exit): 444

E OF DILUTION	TIME OF DILUTION	TIME OF ANALYSIS
04/03/98	12:05	01:55

MOLASSES (TANK NO)	123	RAW MOLASSES USED (L)	90
MOLASSES BRIX (o)	23.0	WATER USED (L)	300
AL VOLUME (L)	390	VOLUME OF ACID USED	20
MOLASSES (PH)	4.5	PH OF DILUTED MOLASSES	6.5
PERATURE BEFORE HEAT	28	TEMPERATURE AFTER HEAT	40
CENTAGE R. S.	55		

REMARK: ACCEPTABLE

TO DELETE RECORD (Y/N):

DATA ENTRY FORM - FERMENTATION

Enter ANALYSIS NO (Press "9999" To Exit): 444

TIME OF FERMENTATION: 12:30 TANK NO: 123

YEAST VIABILITY (Enter "V" for VIABLE or "D" for DEAD): V

DISTRIBUTION (IS IT EVENLY DISTRIBUTED (Y/N)): Y

PERCENTAGE REDUCING SUGAR: 45

REMARKS: ACCEPTABLE

TO SAVE DATA (Y/N):

DATA VIEWING FORM - FERMENTATION

Enter ANALYSIS NO (Press "9999" To Exit): 444

TIME OF FERMENTATION: 12:30 TANK NO: 123

YEAST VIABILITY (Enter "V" for VIABLE or "D" for DEAD): V

DISTRIBUTION (IS IT EVENLY DISTRIBUTED (Y/N)): Y

PERCENTAGE REDUCING SUGAR: 45

REMARKS: ACCEPTABLE

PRESS ANY KEY TO CONTINUE !

DATA EDITING FORM - FERMENTATION

Enter ANALYSIS NO (Press "9999" To Exit): 444

TIME OF FERMENTATION: 12:30 TANK NO: 123

YEAST VIABILITY (Enter "V" for VIABLE or "D" for DEAD): V

DISTRIBUTION (IS IT EVENLY DISTRIBUTED (Y/N)): Y

PERCENTAGE REDUCING SUGAR: 45

REMARKS: ACCEPTABLE

TO SAVE DATA (Y/N):

DATA DELETING FORM - FERMENTATION

Enter ANALYSIS NO (Press "9999" To Exit): 444

TIME OF FERMENTATION: 12:30 TANK NO: 123

YEAST VIABILITY (Enter "V" for VIABLE or "D" for DEAD): V

DISTRIBUTION (IS IT EVENLY DISTRIBUTED (Y/N)): Y

PERCENTAGE REDUCING SUGAR: 45

REMARKS: ACCEPTABLE

TO DELETE RECORD (Y/N):

DATA ENTRY FORM - DISTILLATION

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF DISTILLATION: 04/03/98

TIME OF DISTILLATION: 03:00 SAMPLE CODE: A

PH CONTENT: 4 STRENGTH: 85 TOTAL ACIDITY: 4.5

COLOUR [IS IT OKAY (Y/N)]: Y

ODOUR [IS IT OKAY (Y/N)]: Y

TASTE [IS IT OKAY (Y/N)]: Y

REMARK (IS IT ACCEPTABLE (Y/N): Y

TO SAVE DATA (Y/N):

DATA VIEWING FORM - DISTILLATION

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF DISTILLATION: 04/03/98

TIME OF DISTILLATION: 03:00 SAMPLE CODE: A

PH CONTENT: 4 STRENGTH: 85 TOTAL ACIDITY: 4.5

COLOUR [IS IT OKAY (Y/N)]: Y

ODOUR [IS IT OKAY (Y/N)]: Y

TASTE [IS IT OKAY (Y/N)]: Y

REMARK (IS IT ACCEPTABLE (Y/N): Y

PRESS ANY KEY TO CONTINUE !

DATA EDITING FORM - DISTILLATION

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF DISTILLATION: 04/03/98

TIME OF DISTILLATION: 03:00 SAMPLE CODE: A

PH CONTENT: 4 STRENGTH: 85 TOTAL ACIDITY: 4.5

COLOUR [IS IT OKAY (Y/N)]: Y

ODOUR [IS IT OKAY (Y/N)]: Y

TASTE [IS IT OKAY (Y/N)]: Y

REMARK (IS IT ACCEPTABLE (Y/N): Y

TO SAVE DATA (Y/N):

DATA DELETING FORM - DISTILLATION

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF DISTILLATION: 04/03/98

TIME OF DISTILLATION: 03:00 SAMPLE CODE: A

PH CONTENT: 4 STRENGTH: 85 TOTAL ACIDITY: 4.5

COLOUR [IS IT OKAY (Y/N)]: Y

ODOUR [IS IT OKAY (Y/N)]: Y

TASTE [IS IT OKAY (Y/N)]: Y

REMARK (IS IT ACCEPTABLE (Y/N): Y

TO DELETE RECORD (Y/N):

DATA ENTRY FORM - FINISHED PRODUCT

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF ANALYSIS: 04/03/98

BRAND OF FINISHED PRODUCT
(Enter "T" - TECHNICAL "D" - DOMESTIC "I" - INDUSTRIAL): D

QUANTITY: 9000

REMARKS: ACCEPTABLE

TO SAVE DATA (Y/N):

DATA VIEWING FORM - FINISHED PRODUCT

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF ANALYSIS: 04/03/98

BRAND OF FINISHED PRODUCT
(Enter "T" - TECHNICAL "D" - DOMESTIC "I" - INDUSTRIAL): D

QUANTITY: 9000

REMARKS: ACCEPTABLE

PRESS ANY KEY TO CONTINUE !

DATA EDITING FORM - FINISHED PRODUCT

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF ANALYSIS: 04/03/98

BRAND OF FINISHED PRODUCT
(Enter "T" - TECHNICAL "D" - DOMESTIC "I" - INDUSTRIAL): D

QUANTITY: 9000

REMARKS: ACCEPTABLE

TO SAVE DATA (Y/N):

DATA DELETING FORM - FINISHED PRODUCT

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF ANALYSIS: 04/03/98

BRAND OF FINISHED PRODUCT
(Enter "T" - TECHNICAL "D" - DOMESTIC "I" - INDUSTRIAL): D

QUANTITY: 9000

REMARKS: ACCEPTABLE

TO DELETE RECORD (Y/N):

DATA ENTRY FORM - WATER ANALYSIS

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF ANALYSIS: 04/03/98

SOURCE OF WATER
(Enter "W" - WELL, "S" - SURFACE, or "B" - BOREHOLE): S

PH VALUE: 6.5 TEMPORARY HARDNESS: 25 ALKALINITY: 7.2

REMARKS: ACCEPTABLE

TO SAVE DATA (Y/N):

DATA VIEWING FORM - WATER ANALYSIS

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF ANALYSIS: 04/03/98

SOURCE OF WATER
(Enter "W" - WELL, "S" - SURFACE, or "B" - BOREHOLE): S

PH VALUE: 6.5 TEMPORARY HARDNESS: 25 ALKALINITY: 7.2

REMARKS: ACCEPTABLE

PRESS ANY KEY TO CONTINUE !

DATA EDITING FORM - WATER ANALYSIS

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF ANALYSIS: 04/03/98

SOURCE OF WATER
(Enter "W" - WELL, "S" - SURFACE, or "B" - BOREHOLE): S

PH VALUE: 6.5 TEMPORARY HARDNESS: 25 ALKALINITY: 7.2

REMARKS: ACCEPTABLE

TO SAVE DATA (Y/N):

DATA DELETING FORM - WATER ANALYSIS

Enter ANALYSIS NO (Press "9999" To Exit): 444

DATE OF ANALYSIS: 04/03/98

SOURCE OF WATER
(Enter "W" - WELL, "S" - SURFACE, or "B" - BOREHOLE): S

PH VALUE: 6.5 TEMPORARY HARDNESS: 25 ALKALINITY: 7.2

REMARKS: ACCEPTABLE

TO DELETE RECORD (Y/N):

DATA ENTRY FORM - RAW MATERIAL

Enter ANALYSIS NO (Press "9999" To Exit): 444

TANK NO: 123 BRIX (in degree) 25

VOLUME: 250 PH (Potential Hydrogen): 4

REMARKS: ACCETABLE

TO SAVE DATA (Y/N):

DATA VIEWING FORM - RAW MATERIAL

Enter ANALYSIS NO (Press "9999" To Exit): 444

TANK NO: 123 BRIX (in degree) 25

VOLUME: 250 PH (Potential Hydrogen): 4

REMARKS: ACCETABLE

PRESS ANY KEY TO CONTINUE !

DATA EDITING FORM - RAW MATERIAL

Enter ANALYSIS NO (Press "9999" To Exit): 444

TANK NO: 123 BRIX (in degree) 25

VOLUME: 250 PH (Potential Hydrogen): 4

REMARKS: ACCETABLE

TO SAVE DATA (Y/N):

DATA DELETING FORM - RAW MATERIAL

Enter ANALYSIS NO (Press "9999" To Exit): 444

TANK NO: 123 BRIX (in degree) 25

VOLUME: 250 PH (Potential Hydrogen): 4

REMARKS: ACCETABLE

TO DELETE RECORD (Y/N):

APPENDIX B

```
set talk off
set stat off
set scor off
set bell off
set date brit
set proc to food
do whil .t.
  clear
  @ 0,15 to 2,64 doub
  @ 3,15 to 22,64 doub
  @ 20,16 to 20,63 doub
  @ 1,18 say 'COMPUTERISED FOOD QUALITY ASSESSMENT SYSTEM'
  @ 4,33 to 6,45 doub
  @ 5,35 say 'MAIN MENU'
  @ 7,24 say 'A'+' ..... '+'DILLUTION'
  @ 9,24 say 'B'+' ..... '+'FERMENTATION'
  @ 11,24 say 'C'+' ..... '+'DISTILLATION'
  @ 13,24 say 'D'+' ..... '+'FINISHED PRODUCT'
  @ 15,24 say 'E'+' ..... '+'WATER ANALYSIS'
  @ 17,24 say 'F'+' ..... '+'RAW MATERIAL'
  @ 19,24 say 'Q'+' ..... '+'QUIT'
  @ 21,20 say 'PICK CHOICE [A, B, C, D, E, F, or Q]:'
  do whil .t.
    reply=' '
    @ 21,58 get reply pict '!'
    read
    if reply $ 'ABCDEFQ'
      exit
    endi
  endd
  do case
    case reply='A'
      do dil
    case reply='B'
      do fer
    case reply='C'
      do dis
    case reply='D'
      do fin
    case reply='E'
      do wat
```

```
    case reply = 'F'
      do raw
    othe
      exit
  endc
endd
clea
retu


PROC SUBMENU
  @ 1,15 to 3,64 doub
  @ 1,15 to 22,64 doub
  @ 20,16 to 20,63 doub
  @ 2,18 say 'COMPUTERISED FOOD QUALITY ASSESSMENT SYSTEM'
  @ 5,31 to 7,48 doub
  @ 6,33 say 'SYSTEM SUBMENU'
  @ 9,24 say 'A'+' ..... '+'ENTER NEW RECORD'
  @ 11,24 say 'B'+' ..... '+'VIEW OLD RECORD'
  @ 13,24 say 'C'+' ..... '+'CHANGE OLD RECORD'
  @ 15,24 say 'D'+' ..... '+'DELETE OLD RECORD'
  @ 17,24 say 'E'+' ..... '+'PRINTING RECORDS'
  @ 19,24 say 'Q'+' ..... '+'QUIT'
  @ 21,22 say 'PICK CHOICE [A, B, C, D, E, or Q]:'
  do whil .t.
    reply=' '
    @ 21,57 get reply pict '!'
    read
    if reply $ 'ABCDEQ'
      exit
    endi
  endd
  retu


PROC DIL1
use dil
do whil .t.
  clea
  @ 1,2 to 24,77 doub
  @ 8,3 to 8,76 doub
  @ 22,3 to 22,76 doub
  @ 1,26 say ' DATA ENTRY FORM - DILUTION '
  @ 0,25 to 2,54 doub
```

```
numb=spac(4)
@ 4,4 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
read
if numb='9999'
  exit
endi
mdate=ctod('  /  /  ')
stor spac(5) to mtime1,mtime2
stor 0 to mtankno,mtvol,mmused,mbrix,mwused,mvacid,mrmola,mdmola
stor 0 to mrs,mtempb,mtempa
mremark=spac(50)
@ 6,4 say 'DATE OF DILUTION'
@ 6,30 say 'TIME OF DILUTION'
@ 6,57 say 'TIME OF ANALYSIS'
@ 7,7 get mdate
@ 7,36 get mtime1 pict '99:99'
@ 7,63 get mtime2 pict '99:99'
@ 9,40 to 19,40 doub
@ 9,4 say 'RAW MOLASSES (TANK NO)'
@ 9,42 say 'RAW MOLASSES USED (L)'
@ 11,4 say 'RAW MOLASSES BRIX (o)'
@ 11,42 say 'WATER USED (L)'
@ 13,4 say 'TOTAL VOLUME (L)'
@ 13,42 say 'VOLUME OF ACID USED'
@ 15,4 say 'RAW MOLASSES (PH)'
@ 15,42 say 'PH OF DILUTED MOLASSES'
@ 17,4 say 'TEMPERATURE BEFORE HEAT'
@ 17,42 say 'TEMPERATURE AFTER HEAT'
@ 19,4 say 'PERCENTAGE R. S.'
@ 9,30 get mtankno pict '9999'
@ 9,68 get mmused pict '999'
@ 11,30 get mbrix pict '999.9'
@ 11,68 get mwused pict '999'
@ 13,30 get mtvol pict '9999'
@ 13,68 get mvacid pict '99'
@ 15,30 get mrmola pict '99.9'
@ 15,68 get mdmola pict '99.9'
@ 17,30 get mtempb pict '99'
@ 17,68 get mtempa pict '99'
@ 19,30 get mrs pict '99'
@ 21,12 say 'REMARK:' get mremark pict '@!'
read
@ 23,29 say 'TO SAVE DATA (Y/N):'
do whil .t.
```

```
    reply=' '
    @ 23,49 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    appe blan
    repl number with numb,rmola with mrmola
    repl time1 with mtime1,time2 with mtime2,tankno with mtankno
    repl tvol with mtvol,mused with mmused,brix with mbrix
    repl wused with mwused,vacid with mvacid,dmola with mdmola
    repl rs with mrs,tempb with mtempb,tempa with mtempa
    repl remark with mremark,number with numb,date with mdate
  endi
endd
retu


PROC DIL2
use dil
do whil .t.
  clea
  @ 1,2 to 24,77 doub
  @ 8,3 to 8,76 doub
  @ 22,3 to 22,76 doub
  @ 1,25 say ' DATA VIEWING FORM - DILUTION '
  @ 0,24 to 2,55 doub
  numb=spac(4)
  @ 4,4 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mdate=date
  mtime1=time1
  mtime2=time2
  mtankno=tankno
  mtvol=tvol
  mmused=mused
  mbrix=brix
  mwused=wused
```

```
 mvacid=vacid
 mrmola=rmola
 mdmola=dmola
 mrs=rs
 mtempb=tempb
 mtempa=tempa
 mremark=remark
 @ 6,4 say 'DATE OF DILUTION'
 @ 6,30 say 'TIME OF DILUTION'
 @ 6,57 say 'TIME OF ANALYSIS'
 @ 7,7 get mdate
 @ 7,36 get mtime1 pict '99:99'
 @ 7,63 get mtime2 pict '99:99'
 @ 9,40 to 19,40 doub
 @ 9,4 say 'RAW MOLASSES (TANK NO)'
 @ 9,42 say 'RAW MOLASSES USED (L)'
 @ 11,4 say 'RAW MOLASSES BRIX (o)'
 @ 11,42 say 'WATER USED (L)'
 @ 13,4 say 'TOTAL VOLUME (L)'
 @ 13,42 say 'VOLUME OF ACID USED'
 @ 15,4 say 'RAW MOLASSES (PH)'
 @ 15,42 say 'PH OF DILUTED MOLASSES'
 @ 17,4 say 'TEMPERATURE BEFORE HEAT'
 @ 17,42 say 'TEMPERATURE AFTER HEAT'
 @ 19,4 say 'PERCENTAGE R. S.'
 @ 9,30 get mtankno pict '9999'
 @ 9,68 get mmused pict '999'
 @ 11,30 get mbrix pict '999.9'
 @ 11,68 get mwused pict '999'
 @ 13,30 get mtvol pict '9999'
 @ 13,68 get mvacid pict '99'
 @ 15,30 get mrmola pict '99.9'
 @ 15,68 get mdmola pict '99.9'
 @ 17,30 get mtempb pict '99'
 @ 17,68 get mtempa pict '99'
 @ 19,30 get mrs pict '99'
 @ 21,12 say 'REMARK:' get mremark pict '@!'
 @ 23,26 say 'PRESS ANY KEY TO CONTINUE !'
 set cons off
 wait
 set cons on
endd
retu
```

```
PROC DIL3
use dil
do whil .t.
  clea
  @ 1,2 to 24,77 doub
  @ 8,3 to 8,76 doub
  @ 22,3 to 22,76 doub
  @ 1,25 say ' DATA EDITING FORM - DILUTION '
  @ 0,24 to 2,55 doub
  numb=spac(4)
  @ 4,4 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mdate=date
  mtime1=time1
  mtime2=time2
  mtankno=tankno
  mtvol=tvol
  mmused=mused
  mbrix=brix
  mwused=wused
  mvacid=vacid
  mrmola=rmola
  mdmola=dmola
  mrs=rs
  mtempb=tempb
  mtempa=tempa
  mremark=remark
  @ 6,4 say 'DATE OF DILUTION'
  @ 6,30 say 'TIME OF DILUTION'
  @ 6,57 say 'TIME OF ANALYSIS'
  @ 7,7 get mdate
  @ 7,36 get mtime1 pict '99:99'
  @ 7,63 get mtime2 pict '99:99'
  @ 9,40 to 19,40 doub
  @ 9,4 say 'RAW MOLASSES (TANK NO)'
  @ 9,42 say 'RAW MOLASSES USED (L)'
  @ 11,4 say 'RAW MOLASSES BRIX (o)'
  @ 11,42 say 'WATER USED (L)'
  @ 13,4 say 'TOTAL VOLUME (L)'
  @ 13,42 say 'VOLUME OF ACID USED'
```

```
 @ 15,4 say 'RAW MOLASSES (PH)'
 @ 15,42 say 'PH OF DILUTED MOLASSES'
 @ 17,4 say 'TEMPERATURE BEFORE HEAT'
 @ 17,42 say 'TEMPERATURE AFTER HEAT'
 @ 19,4 say 'PERCENTAGE R. S.'
 @ 9,30 get mtankno pict '9999'
 @ 9,68 get mmused pict '999'
 @ 11,30 get mbrix pict '999.9'
 @ 11,68 get mwused pict '999'
 @ 13,30 get mtvol pict '9999'
 @ 13,68 get mvacid pict '99'
 @ 15,30 get mrmola pict '99.9'
 @ 15,68 get mdmola pict '99.9'
 @ 17,30 get mtempb pict '99'
 @ 17,68 get mtempa pict '99'
 @ 19,30 get mrs pict '99'
 @ 21,12 say 'REMARK:' get mremark pict '@!'
 read
 @ 23,29 say 'TO SAVE DATA (Y/N):'
 do whil .t.
   reply=' '
   @ 23,49 get reply pict '!'
   read
   if reply $ 'YN'
     exit
   endi
 endd
 if reply='Y'
   repl time1 with mtime1,time2 with mtime2,tankno with mtankno
   repl tvol with mtvol,mused with mmused,brix with mbrix
   repl wused with mwused,vacid with mvacid,dmola with mdmola
   repl rs with mrs,tempb with mtempb,tempa with mtempa
   repl remark with mremark,date with mdate,rmola with mrmola
 endi
endd
retu


PROC DIL4
use dil
do whil .t.
  clea
  @ 1,2 to 24,77 doub
  @ 8,3 to 8,76 doub
```

```
@ 22,3 to 22,76 doub
@ 1,24 say ' DATA DELETING FORM - DILUTION '
@ 0,23 to 2,55 doub
numb=spac(4)
@ 4,4 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
read
if numb='9999'
  exit
endi
loca for number=numb
mdate=date
mtime1=time1
mtime2=time2
mtankno=tankno
mtvol=tvol
mmused=mused
mbrix=brix
mwused=wused
mvacid=vacid
mrmola=rmola
mdmola=dmola
mrs=rs
mtempb=tempb
mtempa=tempa
mremark=remark
@ 6,4 say 'DATE OF DILUTION'
@ 6,30 say 'TIME OF DILUTION'
@ 6,57 say 'TIME OF ANALYSIS'
@ 7,7 get mdate
@ 7,36 get mtime1 pict '99:99'
@ 7,63 get mtime2 pict '99:99'
@ 9,40 to 19,40 doub
@ 9,4 say 'RAW MOLASSES (TANK NO)'
@ 9,42 say 'RAW MOLASSES USED (L)'
@ 11,4 say 'RAW MOLASSES BRIX (o)'
@ 11,42 say 'WATER USED (L)'
@ 13,4 say 'TOTAL VOLUME (L)'
@ 13,42 say 'VOLUME OF ACID USED'
@ 15,4 say 'RAW MOLASSES (PH)'
@ 15,42 say 'PH OF DILUTED MOLASSES'
@ 17,4 say 'TEMPERATURE BEFORE HEAT'
@ 17,42 say 'TEMPERATURE AFTER HEAT'
@ 19,4 say 'PERCENTAGE R. S.'
@ 9,30 get mtankno pict '9999'
```

```
  @ 9,68 get mmused pict '999'
  @ 11,30 get mbrix pict '999.9'
  @ 11,68 get mwused pict '999'
  @ 13,30 get mtvol pict '9999'
  @ 13,68 get mvacid pict '99'
  @ 15,30 get mrmola pict '99.9'
  @ 15,68 get mdmola pict '99.9'
  @ 17,30 get mtempb pict '99'
  @ 17,68 get mtempa pict '99'
  @ 19,30 get mrs pict '99'
  @ 21,12 say 'REMARK:' get mremark pict '@!'
  @ 23,27 say 'TO DELETE RECORD (Y/N):'
  do whil .t.
    reply=' '
    @ 23,51 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    dele
    pack
  endi
endd
retu


PROC FER1
use fer
do whil .t.
  clea
  @ 4,8 to 21,71 doub
  @ 19,9 to 19,70 doub
  @ 4,24 say ' DATA ENTRY FORM - FERMENTATION '
  @ 3,23 to 5,56 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  mtime=spac(5)
  mtankno=spac(4)
```

```
  stor spac(1) to mviab,mdis
  stor 0 to mrs
  mremark=spac(50)
  @ 9,10 say 'TIME OF FERMENTATION:' get mtime pict '99:99'
  @ 9,45 say 'TANK NO:' get mtankno
  @ 11,10 say 'YEAST VIABILITY (Enter "V" for VIABLE or "D" for DEAD):' get mviab
pict '!'
  @ 13,10 say 'DISTRIBUTION (IS IT EVENLY DISTRIBUTED (Y/N)):' get mdis pict '!'
  @ 15,10 say 'PERCENTAGE REDUCING SUGAR:' get mrs pict '99'
  @ 17,10 say 'REMARKS:' get mremark pict '@!'
  read
  @ 20,29 say 'TO SAVE DATA (Y/N):'
  do whil .t.
    reply=' '
    @ 20,49 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    appe blan
    repl number with numb
    repl time with mtime,tankno with mtankno,viab with mviab
    repl dis with mdis,rs with mrs,remark with mremark
  endi
endd
retu


PROC FER2
use fer
do whil .t.
  clca
  @ 4,8 to 21,71 doub
  @ 19,9 to 19,70 doub
  @ 4,23 say ' DATA VIEWING FORM - FERMENTATION '
  @ 3,22 to 5,57 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
```

```
  loca for number=numb
  mtime=time
  mtankno=tankno
  mviab=viab
  mdis=dis
  mrs=rs
  mremark=remark
  @ 9,10 say 'TIME OF FERMENTATION:' get mtime pict '99:99'
  @ 9,45 say 'TANK NO:' get mtankno
  @ 11,10 say 'YEAST VIABILITY (Enter "V" for VIABLE or "D" for DEAD):' get mviab
pict '!'
  @ 13,10 say 'DISTRIBUTION (IS IT EVENLY DISTRIBUTED (Y/N)):' get mdis pict '!'
  @ 15,10 say 'PERCENTAGE REDUCING SUGAR:' get mrs pict '99'
  @ 17,10 say 'REMARKS:' get mremark pict '@!'
  clear gets
  @ 20,26 say 'PRESS ANY KEY TO CONTINUE !'
  set cons off
  wait
  set cons on
endd
retu


PROC FER3
use fer
do whil .t.
  clea
  @ 4,8 to 21,71 doub
  @ 19,9 to 19,70 doub
  @ 4,23 say ' DATA EDITING FORM - FERMENTATION '
  @ 3,22 to 5,57 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mtime=time
  mtankno=tankno
  mviab=viab
  mdis=dis
  mrs=rs
  mremark=remark
```

```
  @ 9,10 say 'TIME OF FERMENTATION:' get mtime pict '99:99'
  @ 9,45 say 'TANK NO:' get mtankno
  @ 11,10 say 'YEAST VIABILITY (Enter "V" for VIABLE or "D" for DEAD):' get mviab
pict '!'
  @ 13,10 say 'DISTRIBUTION (IS IT EVENLY DISTRIBUTED (Y/N)):' get mdis pict '!'
  @ 15,10 say 'PERCENTAGE REDUCING SUGAR:' get mrs pict '99'
  @ 17,10 say 'REMARKS:' get mremark pict '@!'
  read
  @ 20,29 say 'TO SAVE DATA (Y/N):'
  do whil .t.
    reply=' '
    @ 20,49 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    repl time with mtime,tankno with mtankno,viab with mviab
    repl dis with mdis,rs with mrs,remark with mremark
  endi
endd
retu


PROC FER4
use fer
do whil .t.
  clea
  @ 4,8 to 21,71 doub
  @ 19,9 to 19,70 doub
  @ 4,22 say ' DATA DELETING FORM - FERMENTATION '
  @ 3,21 to 5,57 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mtime=time
  mtankno=tankno
  mviab=viab
  mdis=dis
```

```
  mrs=rs
  mremark=remark
  @ 9,10 say 'TIME OF FERMENTATION:' get mtime pict '99:99'
  @ 9,45 say 'TANK NO:' get mtankno
  @ 11,10 say 'YEAST VIABILITY (Enter "V" for VIABLE or "D" for DEAD):' get mviab
pict '!'
  @ 13,10 say 'DISTRIBUTION (IS IT EVENLY DISTRIBUTED (Y/N)):' get mdis pict '!'
  @ 15,10 say 'PERCENTAGE REDUCING SUGAR:' get mrs pict '99'
  @ 17,10 say 'REMARKS:' get mremark pict '@!'
  read
  @ 20,27 say 'TO DELETE RECORD (Y/N):'
  do whil .t.
    reply=' '
    @ 20,51 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    dele
    pack
  endi
endd
retu


PROC DIS1
use dis
do whil .t.
  clea
  @ 2,8 to 23,71 doub
  @ 21,9 to 21,70 doub
  @ 2,24 say ' DATA ENTRY FORM - DISTILLATION '
  @ 1,23 to 3,56 doub
  numb=spac(4)
  @ 5,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  mdate=ctod('  /  /  ')
  stor ' ' to msample,mcolour,modour,mtaste,mremark
  mtime=spac(5)
```

```
 stor 0 to mph,mstren,macid
 @ 7,10 say 'DATE OF DISTILLATION:' get mdate
 @ 9,10 say 'TIME OF DISTILLATION:' get mtime pict '99:99'
 @ 9,50 say 'SAMPLE CODE:' get msample
 @ 11,10 say 'PH CONTENT:' get mph pict '99'
 @ 11,30 say 'STRENGTH:' get mstren pict '99'
 @ 11,50 say 'TOTAL ACIDITY:' get macid pict '99.9'
 @ 13,10 say 'COLOUR [IS IT OKAY (Y/N)]:      ' get mcolour
 @ 15,10 say 'ODOUR [IS IT OKAY (Y/N)]:       ' get modour
 @ 17,10 say 'TASTE [IS IT OKAY (Y/N)]:       ' get mtaste
 @ 19,10 say 'REMARK (IS IT ACCEPTABLE (Y/N):' get mremark
 read
 @ 22,29 say 'TO SAVE DATA (Y/N):'
 do whil .t.
   reply=' '
   @ 22,49 get reply pict '!'
   read
   if reply $ 'YN'
     exit
   endi
 endd
 if reply='Y'
   appe blan
   repl number with numb
   repl time with mtime,date with mdate,sample with msample
   repl ph with mph,stren with mstren,acid with macid,remark with mremark
   repl colour with mcolour,odour with modour,taste with mtaste
 endi
endd
retu


PROC DIS2
use dis
do whil .t.
 clea
 @ 2,8 to 23,71 doub
 @ 21,9 to 21,70 doub
 @ 2,23 say ' DATA VIEWING FORM - DISTILLATION '
 @ 1,22 to 3,57 doub
 numb=spac(4)
 @ 5,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
 read
 if numb='9999'
```

```
   exit
  endi
  loca for number=numb
  mdate=date
  msample=sample
  mcolour=colour
  modour=odour
  mtaste=taste
  mremark=remark
  mtime=time
  mph=ph
  mstren=stren
  macid=acid
  @ 7,10 say 'DATE OF DISTILLATION:' get mdate
  @ 9,10 say 'TIME OF DISTILLATION:' get mtime pict '99:99'
  @ 9,50 say 'SAMPLE CODE:' get msample
  @ 11,10 say 'PH CONTENT:' get mph pict '99'
  @ 11,30 say 'STRENGTH:' get mstren pict '99'
  @ 11,50 say 'TOTAL ACIDITY:' get macid pict '99.9'
  @ 13,10 say 'COLOUR [IS IT OKAY (Y/N)]:      ' get mcolour
  @ 15,10 say 'ODOUR [IS IT OKAY (Y/N)]:       ' get modour
  @ 17,10 say 'TASTE [IS IT OKAY (Y/N)]:       ' get mtaste
  @ 19,10 say 'REMARK (IS IT ACCEPTABLE (Y/N):' get mremark
  read
  @ 22,26 say 'PRESS ANY KEY TO CONTINUE !'
  set cons off
  wait
  set cons on
endd
retu


PROC DIS3
use dis
do whil .t.
  clea
  @ 2,8 to 23,71 doub
  @ 21,9 to 21,70 doub
  @ 2,23 say ' DATA EDITING FORM - DISTILLATION '
  @ 1,22 to 3,57 doub
  numb=spac(4)
  @ 5,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
```

```
  exit
 endi
 loca for number=numb
 mdate=date
 msample=sample
 mcolour=colour
 modour=odour
 mtaste=taste
 mremark=remark
 mtime=time
 mph=ph
 mstren=stren
 macid=acid
 @ 7,10 say 'DATE OF DISTILLATION:' get mdate
 @ 9,10 say 'TIME OF DISTILLATION:' get mtime pict '99:99'
 @ 9,50 say 'SAMPLE CODE:' get msample
 @ 11,10 say 'PH CONTENT:' get mph pict '99'
 @ 11,30 say 'STRENGTH:' get mstren pict '99'
 @ 11,50 say 'TOTAL ACIDITY:' get macid pict '99.9'
 @ 13,10 say 'COLOUR [IS IT OKAY (Y/N)]:      ' get mcolour
 @ 15,10 say 'ODOUR [IS IT OKAY (Y/N)]:       ' get modour
 @ 17,10 say 'TASTE [IS IT OKAY (Y/N)]:       ' get mtaste
 @ 19,10 say 'REMARK (IS IT ACCEPTABLE (Y/N):' get mremark
 read
 @ 22,29 say 'TO SAVE DATA (Y/N):'
 do whil .t.
   reply=' '
   @ 22,49 get reply pict '!'
   read
   if reply $ 'YN'
     exit
   endi
 endd
 if reply='Y'
   repl number with numb
   repl time with mtime,date with mdate,sample with msample
   repl ph with mph,stren with mstren,acid with macid,remark with mremark
   repl colour with mcolour,odour with modour,taste with mtaste
 endi
endd
retu
```

```
PROC DIS4
use dis
do whil .t.
  clea
  @ 2,8 to 23,71 doub
  @ 21,9 to 21,70 doub
  @ 2,22 say ' DATA DELETING FORM - DISTILLATION '
  @ 1,21 to 3,57 doub
  numb=spac(4)
  @ 5,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mdate=date
  msample=sample
  mcolour=colour
  modour=odour
  mtaste=taste
  mremark=remark
  mtime=time
  mph=ph
  mstren=stren
  macid=acid
  @ 7,10 say 'DATE OF DISTILLATION:' get mdate
  @ 9,10 say 'TIME OF DISTILLATION:' get mtime pict '99:99'
  @ 9,50 say 'SAMPLE CODE:' get msample
  @ 11,10 say 'PH CONTENT:' get mph pict '99'
  @ 11,30 say 'STRENGTH:' get mstren pict '99'
  @ 11,50 say 'TOTAL ACIDITY:' get macid pict '99.9'
  @ 13,10 say 'COLOUR [IS IT OKAY (Y/N)]:      ' get mcolour
  @ 15,10 say 'ODOUR [IS IT OKAY (Y/N)]:       ' get modour
  @ 17,10 say 'TASTE [IS IT OKAY (Y/N)]:       ' get mtaste
  @ 19,10 say 'REMARK (IS IT ACCEPTABLE (Y/N):' get mremark
  read
  @ 22,27 say 'TO DELETE RECORD (Y/N):'
  do whil .t.
    reply=' '
    @ 22,51 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
```

```
  endd
  if reply='Y'
    dele
    pack
  endi
endd
retu


PROC FIN1
use fin
do whil .t.
  clea
  @ 4,8 to 20,71 doub
  @ 18,9 to 18,70 doub
  @ 4,22 say ' DATA ENTRY FORM - FINISHED PRODUCT '
  @ 3,21 to 5,58 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  mdate=ctod('  /  /  ')
  stor spac(1) to mbrand
  stor 0 to mqty
  mremark=spac(50)
  @ 9,10 say 'DATE OF ANALYSIS:' get mdate
  @ 11,10 say 'BRAND OF FINISHED PRODUCT'
  @ 12,11 say '(Enter "T" - TECHNICAL "D" - DOMESTIC "I" - INDUSTRIAL):' get
mbrand pict '!'
  @ 14,10 say 'QUANTITY:' get mqty pict '9999'
  @ 16,10 say 'REMARKS:' get mremark pict '@!'
  read
  @ 19,29 say 'TO SAVE DATA (Y/N):'
  do whil .t.
    reply=' '
    @ 19,49 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
```

```
    appe blan
    repl date with mdate,brand with mbrand,qty with mqty
    repl remark with mremark,number with numb
  endi
endd
use
clea
retu


PROC FIN2
use fin
do whil .t.
  clea
  @ 4,8 to 20,71 doub
  @ 18,9 to 18,70 doub
  @ 4,21 say ' DATA VIEWING FORM - FINISHED PRODUCT '
  @ 3,20 to 5,59 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mdate=date
  mbrand=brand
  mqty=qty
  mremark=remark
  @ 9,10 say 'DATE OF ANALYSIS:' get mdate
  @ 11,10 say 'BRAND OF FINISHED PRODUCT'
  @ 12,11 say '(Enter "T" - TECHNICAL "D" - DOMESTIC "I" - INDUSTRIAL):' get
mbrand pict '!'
  @ 14,10 say 'QUANTITY:' get mqty pict '9999'
  @ 16,10 say 'REMARKS:' get mremark pict '@!'
  clea gets
  @ 19,26 say 'PRESS ANY KEY TO CONTINUE !'
  set cons off
  wait
  set cons on
endd
use
clea
retu
```

```
PROC FIN3
use fin
do whil .t.
  clea
  @ 4,8 to 20,71 doub
  @ 18,9 to 18,70 doub
  @ 4,21 say ' DATA EDITING FORM - FINISHED PRODUCT '
  @ 3,20 to 5,59 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mdate=date
  mbrand=brand
  mqty=qty
  mremark=remark
  @ 9,10 say 'DATE OF ANALYSIS:' get mdate
  @ 11,10 say 'BRAND OF FINISHED PRODUCT'
  @ 12,11 say '(Enter "T" - TECHNICAL "D" - DOMESTIC "I" - INDUSTRIAL):' get
mbrand pict '!'
  @ 14,10 say 'QUANTITY:' get mqty pict '9999'
  @ 16,10 say 'REMARKS:' get mremark pict '@!'
  read
  @ 19,29 say 'TO SAVE DATA (Y/N):'
  do whil .t.
    reply=' '
    @ 19,49 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    repl date with mdate,brand with mbrand,qty with mqty
    repl remark with mremark,number with numb
  endi
endd
use
clea
retu
```

```
PROC FIN4
use fin
do whil .t.
  clea
  @ 4,8 to 20,71 doub
  @ 18,9 to 18,70 doub
  @ 4,20 say ' DATA DELETING FORM - FINISHED PRODUCT '
  @ 3,19 to 5,59 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mdate=date
  mbrand=brand
  mqty=qty
  mremark=remark
  @ 9,10 say 'DATE OF ANALYSIS:' get mdate
  @ 11,10 say 'BRAND OF FINISHED PRODUCT'
  @ 12,11 say '(Enter "T" - TECHNICAL "D" - DOMESTIC "I" - INDUSTRIAL):' get
mbrand pict '!'
  @ 14,10 say 'QUANTITY:' get mqty pict '9999'
  @ 16,10 say 'REMARKS:' get mremark pict '@!'
  clea gets
  @ 19,27 say 'TO DELETE RECORD (Y/N):'
  do whil .t.
    reply=' '
    @ 19,51 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    dele
    pack
  endi
endd
retu
```

```
PROC WAT1
use wat
do whil .t.
  clea
  @ 4,8 to 21,71 doub
  @ 19,9 to 19,70 doub
  @ 4,23 say ' DATA ENTRY FORM - WATER ANALYSIS '
  @ 3,22 to 5,57 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  mdate=ctod('  /  /  ')
  stor spac(1) to msource
  stor 0 to mph,mhard,malkal
  mremark=spac(50)
  @ 9,10 say 'DATE OF ANALYSIS:' get mdate
  @ 11,10 say 'SOURCE OF WATER'
  @ 12,13 say '(Enter "W" - WELL, "S" - SURFACE, or "B" - BOREHOLE):' get
msource pict '!'
  @ 14,10 say 'PH VALUE:' get mph pict '9.9'
  @ 14,26 say 'TEMPORARY HARDNESS:' get mhard pict '99'
  @ 14,52 say 'ALKALINITY:' get malkal pict '9.9'
  @ 17,10 say 'REMARKS:' get mremark pict '@!'
  read
  @ 20,29 say 'TO SAVE DATA (Y/N):'
  do whil .t.
    reply=' '
    @ 20,49 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    appe blan
    repl number with numb
    repl date with mdate,source with msource,ph with mph
    repl hard with mhard,alkal with malkal,remark with mremark
  endi
endd
retu
```

```
PROC WAT2
use wat
do whil .t.
 clea
 @ 4,8 to 21,71 doub
 @ 19,9 to 19,70 doub
 @ 4,22 say ' DATA VIEWING FORM - WATER ANALYSIS '
 @ 3,21 to 5,58 doub
 numb=spac(4)
 @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
 read
 if numb='9999'
  exit
 endi
 loca for number=numb
 mdate=date
 msource=source
 mph=ph
 mhard=hard
 malkal=alkal
 mremark=remark
 @ 9,10 say 'DATE OF ANALYSIS:' get mdate
 @ 11,10 say 'SOURCE OF WATER'
 @ 12,13 say '(Enter "W" - WELL, "S" - SURFACE, or "B" - BOREHOLE):' get
msource pict '!'
 @ 14,10 say 'PH VALUE:' get mph pict '9.9'
 @ 14,26 say 'TEMPORARY HARDNESS:' get mhard pict '99'
 @ 14,52 say 'ALKALINITY:' get malkal pict '9.9'
 @ 17,10 say 'REMARKS:' get mremark pict '@!'
 read
 @ 20,26 say 'PRESS ANY KEY TO CONTINUE !'
 set cons off
 wait
 set cons on
endd
use
retu


PROC WAT3
use wat
do whil .t.
 clea
 @ 4,8 to 21,71 doub
```

```
 @ 19,9 to 19,70 doub
 @ 4,22 say ' DATA EDITING FORM - WATER ANALYSIS '
 @ 3,21 to 5,58 doub
 numb=spac(4)
 @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
 read
 if numb='9999'
   exit
 endi
 loca for number=numb
 mdate=date
 msource=source
 mph=ph
 mhard=hard
 malkal=alkal
 mremark=remark
 @ 9,10 say 'DATE OF ANALYSIS:' get mdate
 @ 11,10 say 'SOURCE OF WATER'
 @ 12,13 say '(Enter "W" - WELL, "S" - SURFACE, or "B" - BOREHOLE):' get
msource pict '!'
 @ 14,10 say 'PH VALUE:' get mph pict '9.9'
 @ 14,26 say 'TEMPORARY HARDNESS:' get mhard pict '99'
 @ 14,52 say 'ALKALINITY:' get malkal pict '9.9'
 @ 17,10 say 'REMARKS:' get mremark pict '@!'
 read
 @ 20,29 say 'TO SAVE DATA (Y/N):'
 do whil .t.
   reply=' '
   @ 20,49 get reply pict '!'
   read
   if reply $ 'YN'
     exit
   endi
 endd
 if reply='Y'
   repl number with numb
   repl date with mdate,source with msource,ph with mph
   repl hard with mhard,alkal with malkal,remark with mremark
 endi
endd
use
retu
```

```
PROC WAT4
use wat
do whil .t.
  clea
  @ 4,8 to 21,71 doub
  @ 19,9 to 19,70 doub
  @ 4,21 say ' DATA DELETING FORM - WATER ANALYSIS '
  @ 3,20 to 5,58 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mdate=date
  msource=source
  mph=ph
  mhard=hard
  malkal=alkal
  mremark=remark
  @ 9,10 say 'DATE OF ANALYSIS:' get mdate
  @ 11,10 say 'SOURCE OF WATER'
  @ 12,13 say '(Enter "W" - WELL, "S" - SURFACE, or "B" - BOREHOLE):' get
msource pict '!'
  @ 14,10 say 'PH VALUE:' get mph pict '9.9'
  @ 14,26 say 'TEMPORARY HARDNESS:' get mhard pict '99'
  @ 14,52 say 'ALKALINITY:' get malkal pict '9.9'
  @ 17,10 say 'REMARKS:' get mremark pict '@!'
  clea gets
  @ 20,27 say 'TO DELETE RECORD (Y/N):'
  do whil .t.
    reply=' '
    @ 20,51 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    dele
    pack
  endi
endd
```

```
use
retu


PROC RAW1
use raw
do whil .t.
  clea
  @ 4,8 to 20,71 doub
  @ 18,9 to 18,70 doub
  @ 4,24 say ' DATA ENTRY FORM - RAW MATERIAL '
  @ 3,23 to 5,56 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  mtankno=spac(4)
  stor 0 to mbrix,mvolume,mph
  mremark=spac(50)
  @ 10,10 say 'TANK NO:' get mtankno
  @ 10,30 say 'BRIX (in degree)' get mbrix pict '99'
  @ 13,10 say 'VOLUME:' get mvolume pict '9999'
  @ 13,25 say 'PH (Potential Hydrogen):' get mph pict '9999'
  @ 16,10 say 'REMARKS:' get mremark pict '@!'
  read
  @ 19,29 say 'TO SAVE DATA (Y/N):'
  do whil .t.
    reply=' '
    @ 19,49 get reply pict '!'
    read
    if reply $ 'YN'
      exit
    endi
  endd
  if reply='Y'
    appe blan
    repl tankno with mtankno,brix with mbrix,volume with mvolume
    repl ph with mph,remark with mremark,number with numb
  endi
endd
use
clea
```

```
retu


PROC RAW2
use raw
do whil .t.
  clea
  @ 4,8 to 20,71 doub
  @ 18,9 to 18,70 doub
  @ 4,23 say ' DATA VIEWING FORM - RAW MATERIAL '
  @ 3,22 to 5,57 doub
  numb=spac(4)
  @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
  read
  if numb='9999'
    exit
  endi
  loca for number=numb
  mtankno=tankno
  mbrix=brix
  mvolume=volume
  mph=ph
  mremark=remark
  @ 10,10 say 'TANK NO:' get mtankno
  @ 10,30 say 'BRIX (in degree)' get mbrix pict '99'
  @ 13,10 say 'VOLUME:' get mvolume pict '9999'
  @ 13,25 say 'PH (Potential Hydrogen):' get mph pict '9999'
  @ 16,10 say 'REMARKS:' get mremark pict '@!'
  clea gets
  @ 19,26 say 'PRESS ANY KEY TO CONTINUE !'
  set cons off
  wait
  set cons on
endd
use
clea
retu


PROC RAW3
use raw
do whil .t.
  clea
  @ 4,8 to 20,71 doub
```

```
@ 18,9 to 18,70 doub
@ 4,23 say ' DATA EDITING FORM - RAW MATERIAL '
@ 3,22 to 5,57 doub
numb=spac(4)
@ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
read
if numb='9999'
  exit
endi
loca for number=numb
mtankno=tankno
mbrix=brix
mvolume=volume
mph=ph
mremark=remark
@ 10,10 say 'TANK NO:' get mtankno
@ 10,30 say 'BRIX (in degree)' get mbrix pict '99'
@ 13,10 say 'VOLUME:' get mvolume pict '9999'
@ 13,25 say 'PH (Potential Hydrogen):' get mph pict '9999'
@ 16,10 say 'REMARKS:' get mremark pict '@!'
read
@ 19,29 say 'TO SAVE DATA (Y/N):'
do whil .t.
  reply=' '
  @ 19,49 get reply pict '!'
  read
  if reply $ 'YN'
    exit
  endi
endd
if reply='Y'
  repl tankno with mtankno,brix with mbrix,volume with mvolume
  repl ph with mph,remark with mremark,number with numb
endi
endd
use
clea
retu


PROC RAW4
use raw
do whil .t.
  clea
```

```
 @ 4,8 to 20,71 doub
 @ 18,9 to 18,70 doub
 @ 4,22 say ' DATA DELETING FORM - RAW MATERIAL '
 @ 3,21 to 5,57 doub
 numb=spac(4)
 @ 7,10 say 'Enter ANALYSIS NO (Press "9999" To Exit):' get numb pict '9999'
 read
 if numb='9999'
   exit
 endi
 loca for number=numb
 mtankno=tankno
 mbrix=brix
 mvolume=volume
 mph=ph
 mremark=remark
 @ 10,10 say 'TANK NO:' get mtankno
 @ 10,30 say 'BRIX (in degree)' get mbrix pict '99'
 @ 13,10 say 'VOLUME:' get mvolume pict '9999'
 @ 13,25 say 'PH (Potential Hydrogen):' get mph pict '9999'
 @ 16,10 say 'REMARKS:' get mremark pict '@!'
 clea gets
 @ 19,27 say 'TO DELETE RECORD (Y/N):'
 do whil .t.
   reply=' '
   @ 19,51 get reply pict '!'
   read
   if reply $ 'YN'
     exit
   endi
 endd
 if reply='Y'
   dele
   pack
 endi
endd
retu
```