COMPUTER MAINTENANCE AND REPAIRS INFORMATION MANAGEMENT SYSTEM.

BY

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CERTIFICATION

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This is to certify that this project, **Mikaila Mawo Musa**, of the department of Mathematics and Computer Science, Federal University of Technology, Minna, carried out computer maintenance and repairs information management system.

Mallam Audu Isah
(Project Supervisor)

Date

Dr. S.A Reju
(H. O. D)

Date

External Examiner

Date

DEDICATION

This project is dedicated to Almighty God who gave us the will and courage to do this project.

ACKNOWLEDGEMENT

My special thanks goes to the Almighty God for His wisdom and understanding given to me in the course of my academic carrier and other areas of my life.

Great thanks especially to my supervisor in person of Mallam Audu Isah who continuously assisted, encourages and had time to go through my work and also gave necessary ideals views, meaningful contribution, then made all the necessary corrections that needed to be made. God bless you richly.

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ABSTRACT

This project is about the effective management of computer maintenance and repair information. It examines the needs for proper maintenance and repair of computers as well as effective use of the information obtained from the maintenance work.

However, a computer – based information system on maintenance and repair of the computer equipment was developed. Since these equipments consist of electronics components: capacitors, transistors, resistors and of course integrated circuit or microchips; a database of these components with their equivalent (alternative) is incorporated.

From the database, statistics of computer that developed fault and frequency of such occurrences for a given period of time can be generated from which estimated level of reliability of the computer are calculated and depicted graphically to facilitate decision making.

On the whole, this project is aimed at improving the maintenance and repair culture not only of the computer centre, Federal University of Technology, Minna but of any other establishment or organization charged with similar responsibilities.

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CHAPTER ONE - GENERAL INTRODUCTION

1.0 INTRODUCTION

The common theme through all the different uses of computers is that they are employed by public and private organizations because they can perform various tasks more effectively and more economical than other machines or human beings; in order words, they reduce costs/profits.

However, the personal computer did not become a reality until progress in microelectronics produced the microcomputers, based on microprocessors and storage chips and interfaces to cheap and small-scale terminals. The continued development of the microprocessor has led more powerful models appearing in the market, primarily from Intel, Motorola, Pentium etc. These models are described by the size of the unit of data that can be carried through the processor.

Thus, the first widely available micros were 8-bit micros; most commercial microcomputers are based on 16 – it microprocessors and the latest 32-bit microprocessor are now being used to produce single or multi-user micro systems that rival' in power and performance to smaller mainframe computers and minicomputers.

Meanwhile, the original 8 –bit micros are available at such a low cost that they can represent a potential monitoring and control components inside, many other electromechanical systems, e.g. car controls, heating systems etc.

1.1 INTRODUCTION TO COMPUTER

A computer system consists of the physical components of the computer and its peripherals. Basically, the computer unit is made up of a central processing unit (CPU), the visual display (VDU) and a keyboard. The

peripherals include; printers, modem, mouse, uninterruptible power supply (UPS) etc.

In terms of logic used, computers can be classified into the following:

I **ANALOGUE COMPUTER:** This kind of computer system performs its operation by measuring or relating physical phenomena or changes variables in the form of mathematic equation in some notable quantities. It processes data that varies continuously such as variation in temperature, speed, and current flowing through an electric conductor. They are used for variety of industrial and scientific applications that require the processing of data that are measured continuously.

Ii **DIGITAL COMPUTER:** This is the one, which performs its operation and assesses logical decisions according to instruction coded to it in advance. While analogue computer signal uses sinusoidal waveform and digital computer rectangular waveform.

iii **HYBRID COMPUTER:** This type of computer combines the characteristics of the analogue and digital computers. It is used to solve sophisticated problems such as those from the study of process control and optimization.

In terms of size, computer can be classified as

a) Super computer
b) Mainframe computer
c) Minicomputer
d) Microcomputer.

Iv **SUPER COMPUTER:** This is also known as maxi - computer or in some cases monster computer. It has the capability of performing over

ten- million arithmetic operations per second. It is the fastest class of computers. Such computers are used by scientist, for example in airflow simulation around as airplane at different speeds and altitudes.

(1) **MAINFRAME COMPUTER:** This is the largest computer commonly used in business and industry. It supports large networks of industrial terminals and remote job – entry locations among others.

(2) **MINI COMPUTER:** The minicomputer is almost like the mainframe, but less powerful-lower processing speed and supports less number of computer terminals.

(3) **MICRO COMPUTER:** The microcomputer ids the type of computers found in small ventures and homes. They are less complex, small in size and execute programs at slower speeds. The refinement of the computing concept focused on speed, size and cost and gave birth to computer generations, which is intended to suggest different development of the hardware components. These include:

a. **First Generation Computers:** The first generation computers used vacuum tubes, which control the internal operation of the system. This type of computer was mostly huge and requires cooling system.

b. **Second Generation Computers:** Solid-state transistors replaced the vacuum tubes thereby, increasing the speed and storage capacity of the system in the second generation.

c. **Third Generation Computers:** The development of integrated circuit (IC) industry emerged. In this generation, remote terminals (i.e microcomputers and minicomputers) came into existence.

d. **Fourth Generation Computer:** Introduction of large and very scale integration (VLSI) technology. Densely packed chips were developed leading to the manufacture of small home or personal computer.

e. **Fifth Generation Computer:** Development of the Japanese industrial robots as a distinct generation. This generation influenced by the advent of artificial intelligence (AI) and expects system.

Artificial intelligence is the ability of the computer to exhibit behaviors like an intelligent person. The aims were tom speak to the computer and obtain solutions through voice output. An expert system on the other hand is an application program that has the capability of making judgments and decisions like an expert in a particular field of application. For example, in the field of medicine, a computer would prescribe like a doctor after performing the necessary diagnosis.

Recent years have been the appearance of inexpensive microcomputers. The reduction in price since the mid – 70s meant that even small organization and business centers can consider the purchaser of a computer of some kind. The result has been a wide – speed use of computing power in a way, which was unforeseen a few years ago.

Indeed, computers have spread so wide that it is unlikely that anyone starting out a career today will find a job in which computers are not being used in some way or another.

Ant large volume of repetitive work can be considered as a potential task fro a computer invoicing, payroll, inventory and other accounting routines are typical clerical jobs being extensively performed by computers today.

Technical or scientific work on the other hand relies heavily on the calculating power of the computer. Engineering calculations involving stresses, complex problems in physics and other related courses all exploit this facility.

Other ways in which computer are used include forecasting- where instead of merely recording stock levels the computer can monitor demand and produce forecasts of stock required in the future; and using the computers to hold a mathematical model of the way in which a company works. This enables them to masses the effect of possible causes of action and avoid those which are likely to produce a loss.

COMPUTER HARDWARE: The term computer hardware refers to the physical components of the computer system i.e electronic device used for processing data.

Generally, the computer hardware is made up of three main parts namely:

(a) Input devices
(b) Output devices
(c) Central processing unit (CPU)

a. Input devices comprises of these devices:
   i. Keyboard
   ii. Mouse
   iii. Diskette
   iv. Card reader
b. Output devices comprises of these devices:
   i. Printer
   ii. Monitor
   iii. Speakers

c. Central Processing Unit (CPU):

Every computer system contains a unit whose primary objective is to process data. The unit is the control center of the whole computer systems; it accepts date from the various input devices, processes these data according to the instructions and sends the results to the printer or other output devices for recording. This unit performs operations in millionths of a second. The unit comprises of three functional sub-circuits.

They are:

A. CONTROL UNIT – this unit controls and coordinates the activities of a computer system much as the brain coordinates and controls the activities of human body. Some of the functions performed by the control unit include the following:

a. Determines the instruction to be executed
b. Causes the instruction to be carried out or executed.
c. Determines what data, if any are needed and where they are stored.
d. Determines the operations to be performed by the instructions.
e. Determines where any result is to be stored.

B. ARITHMETIC AND LOGIC UNIT (ALU)

This unit performs the basis functions of data transfer, arithmetic calculation and decision-making. Data transfer involves moving data from one location to another memory location within a system. Decision-making is the ability to speedily compare two quantities to evaluate a given condition.

C. INTERNAL STORAGE OR MEMORY UNIT

This is the principal storage and sometimes called the main storage, main memory or high-speed storage. It is usually referred to as Random Access Memory (RAM).

All data or instructions entering or leaving the central processing unit must pass through the primary storage. The primary storage or RAM holds all instructions and data that are currently being processed by the central processing unit.

CENTRAL PROCESSING UNIT SHOWING VARFIOUS CIRCULTS.

1.2 THE COMPUTER SYSTEM COMPONENTS

A modern PC is both simple and complicated. It is simple in the sense that over the year components used to construct a system have become integrated with other components into fewer actual parts. It is complicated in the sense that each part in a modern system performs many more functions than did the same types of parts in older systems.

Below are the components needed to assemble a basic modern computer system:

- Motherboard
- Processor
- Memory (RAM)
- Case (chassis)
- Power supply
- Floppy drive
- Hard drive
- CD –ROM drive
- Mouse
- Monitor (display)
- Speakers
- Keyboard etc.

1.3 COMPUTER MAINTENANCE IN NIGERIA

The maintenance and services of computer have not received much desired attention in Nigeria. It must not be forgotten that the computer is an important as what it does or its applications in diverse disciplines. One way of dealing with problem is to appoint permanent on site maintenance staff and equip them with appropriate maintenance test and service equipment (i.e tools and devices). This arrangement is certainly effective but it is also expensive, an installation has to be large or very large to justify it.

The problem of fault diagnosis and repair has to be faced, where fold-service Engineers have to deal with system failures as they arise. One technique that has traditionally been widely used is board swapping, based on the ideas that the field been seen to present particular problems. Maintenance and test procedures could be informal based on intuitive understanding of the computer by the quality control and maintenance department.

Even so, for a simple system, such as radio, additional performance criteria can be subjective assessment of sound quality obtained form one station each waveband. This can be augmented with objective measurements such as frequency responses.

Now, the problems become more severe when the systems that we are dealing with are intended to perform data processing, operating on data supplied to the unit from an external source.

Such systems (computer) are nowadays largely, if not entirely digital in nature. The need for maintaining and repairing arise in connection with the maintenance of faulty computers including both the results of

unsatisfactory manufacture and parts that have failed in operation in the field.

It is important to recognize that economic considerations are at the heart of all maintenance problems. Basically, repair costs money and good quality maintenance (i.e that which covers a large proportion of the unit) is preferred to poor maintenance.

However, failing to maintain or maintaining adequately also cost money in that faulty part or computer that results from non- maintenance. Will nonetheless eventually have probe put right entailing the use of diagnosis and repair routines that cannot by their nature be fully automated.

The cost of not maintaining therefore can be very high. In addition the labour cost for carrying out the actual costs involved with any form of special treatment that takes place outside the standard of normal operation process.

1.4 AIM AND OBJECTIVES

This project is aimed at achieving certain technical and management goals. Some of which is facilitating decision making as regards the type or model of computer to acquire or use. This can be achieved by determining the behaviour of various types of computers over a period of time. That is, a gradual study of these computers in the aspect of maintenance requirements, failing parts and performance would reveal some characteristics of these computers.

Therefore, the main objective of this project is to carry out study of various types of computers by keeping accurate records of their problems-failing parts and other routine maintenance. By this way, it could eventually be

necessary to compute the frequency of their respective breakdowns taking note of the components or parts that fail more often.

Such information can be used to decide on the type of computer to purchase or parts whose stock should be kept in anticipation of their failure.

Computer consultants would one time or the other be contacted to advise on the type of computer to be used or acquired by an organization apart from the processor speed, storage capacity and display etc, the Computer consultants must first put into consideration the durability of the system to recommend.

Parts that fail mostly after some time could be recommend ed to the management of the organization from the knowledge-based system to place order for such parts to enable quick replacement thereby reducing the computer down time.

1.5 PROJECT SIGNIFICANCE

Ever since manufactured computers were first introduced, it has been generally accepted without question that, before they are released to customers, the manufacture should established that it has been assembled correctly and is working as it was intended to do.

For a long time, and for very many computers, the implementation of this concept has been seen to present any particular problem: test and maintenance procedures could be informal, based on intuitive understanding of the computer by the quality control and maintenance department.

Even so, for a simple computers such as radio, additional performance criteria can be suggested on an intuitive basis; requirements
It is important to recognize that economic considerations are at the heart of all maintenance problems. Repairs costs money and good quality maintenance (i.e that which covers a large proportion of the unit) is preferred to poor maintenance.

However, failing to maintain or maintaining adequately therefore, will make the cost to be very high. In addition, the labour costs for out the actual repair, there are considerable administrative costs involved with any form of special treatment that takes place outside the standard or normal operation process.

1.6 SCOPE AND LIMITATIONS OF THE STUDY

This study focuses mainly on the aspect of how effectively they manage the information on computer maintenance and repair, so as to make meaningful use of the maintenance records in decision-making process relating to computer hardware management.

CHAPTER TWO: LITERATURE REVIEW

2.0 INTRODUCTION

Literature review involves studying and summarizing the work of recognized authorities relevant to the present study. This helps in the elimination of duplication of research works, identify the strength and weakness of previous efforts and points forward the new direction. It also helps to sharpen the focus of the current research.

2.1 SYSTEM OVERVIEW

The case study of this project, which is the Computer center, Federal University of Technology, Minna, is an organ of the University, established in the year 1984 with initial number of twenty (20) personal computers (PC XT).

The computer center is charge with various responsibilities. Some of these include the followings:

1). Provision of computer practical facilities for the students of the University
2). Offer computer services, to the university Community.
3). Provide computer training and employment for suitable Nigerians.
4). Offer Computer services to reputable organizations
5). Procure, assemble, install and repair computer equipment.

The computer center is made up of three sections namely: Operations, system development and maintenance Sections.

Director: A Director who coordinates the activities of these three sections, heads the center.

Operation Manager: The operation manager is responsible for the continuous operation of the computer peripherals, disks and book library and report to the director

Chief Computer Operator supervises the operators and the clerks, student practical and reports to the operation manager.

Operators and Library Clerks: The computer operators interact with the computer via keyboard to process the job and produce reports (output). While Library Clerks keeps documentations [books and disks] and monitor their circulation.

2.2 COMPUTER REPAIRS ECONOMICS

When an electronic part in a computer goes bad one might think it is a simple problem to identify the faulty chip, replace and go about one business. The problem is that this method takes time. The cost of the time taken to repair the system often exceeds the cost of a new part of the system most at times.

The average component repair, as opposed to replacement, takes about three hours. The time includes determining which part is bad, repair, replace and test to make sure the repair is made correctly.

2.3 INTRODUCTION TO TOUBLE SHOOTING

Integrated circuit technology is advancing rapidly. Logic gates on tiny chips of silicon are getting smaller and faster. This has been welcome by all but coming with these advances in microelectronics are more challenges to overcome. In determining whether a chipboard or computer system is functioning correctly and has been properly maintained. Faults can occur that are difficult to locate.

A fault is any physical condition that causes incorrect output when a circuit is exercised to perform a function. Solving computer system's problems requires application of the deductive technique called "Trouble shooting". A professional approach requires gathering clues and applying deductive reasoning to isolate the problem. The use of special test equipment such as logic probes, logic chips, digital millimeters, oscilloscopes and logic analyzer are the technicians tools of the trade to help speed the process.

In fact, troubleshooting and repair can be respectively simple if one knows how electronic components fail. Failures generally occur in the circuits that are used or stressed the most. These include the RAM and ROM, memory chips, central processing unit and the input/output chips between the motherboard and peripherals.

2.4 OVERVIEW OF SEMI CONDUCTOR TECHNIQUES

Today, microprocessors are available in many different technologies, but the most common processors are the cheap, single-chip, metals oxide semiconductors (MOS) devices

Many of the characteristics of a semi conductor technology affect the properties of the resulting microprocessors. Among the significant characteristics are:

i. SPEED

The delay of the gate (component) is a common measure of speed. If the delay is short, the microprocessor can decode instructions, perform arithmetic and calculate address rapidly. The speed of technology depends on switching time (i.e time required to change from one logic to another).

ii. POWER CONSUMPTION

The operating power requirement of a technology determines the size of the needed power supplies and the amount of the heat that is produced during operation. The standby power requirements determine how much power is needed to retain during periods when the microprocessor is not operating. A measure of power consumption is the power dissipated in the gate.

iii. DENSITY

The typical size of a gate is a measure of density. Very dense technologies can produce single chip – microprocessors that are cheap to manufacture small size and requires few connections or additional components.

iv. RUGGEDNESS

Ruggedness refers to the ability to withstand extreme conditions of variations in such factors as temperature, pressure, humidity, shock, torque, vibration, chemical conditions (such as acid and salt building) and nuclear radiation.

v. COST

Material costs, process complexity and length of experience all affect the cost of production. A measure of the cost is the typical cost of a gate.

vi. (TTL) COMPATIBILITY

Logic (TTL) compatibility is important because most electronic systems are built with standard TTL circuits. Thus, if the technology is TTL compatibility, the resulting microprocessor will be simple to interface and can use the same power supply and clocks as the rest of system.

Otherwise, level shifters pull – down resistors additional power supply and clocks, and other interfacing circuitry may be necessary.

2.5 GENERAL TROUBLESHOOTING RULES

Having gone through the introduction of troubleshooting in (2.3), it is pertinent to consider the steps involved in the trouble shooting proper. Troubleshooting can be described as the act of finding fault existing in a system. This fault as earlier described can be from the user, software or the hardware. These are the steps to follow in tracing out a fault in a PC.

(i) CHECK FOR EXTERNAL SIGNS

If the computer indicates lights, what does it signifies? Is the entire light showing on the modern? Does the printer indicate "ready"? is the hard disk drive squealing or grinding? Does the monitor look best?

Your drives and other peripherals produce hums, whirs and clicks. After a while, this noise becomes familiar and any variation in them signals a problem.

(ii) RUN DIAGNOSTIC PROGRAMS

May PC type machines come with diagnostic programs, which can help to pinpoint a problem (assuming of course that the computer is well enough to run them in the first place). Other PCs, like some "no names" clones, do not.

There are various good third – party diagnostic programs that can pinpoint problems, repair or proffer suggestions on how to solve some problems.

(iii) INTERPRETING PC ERROR CODES

Many PCs complains in the sense that you see messages like "floppy controller failure, drive unavailable etc" A good troubleshooter will decode

some of these basic error codes and message and apply this to correct an error/problem.

(iv) POWER ON SELF – TEST (POST)

A short diagnostic routine runs on a desktop computer any time the computer is powered. It does a check to see that the basic important hardware exists and performs memory test. This check is called the power on self-test (post) or the BIOS listing, power on diagnostic (POD)

The above tests are preliminary in nature but can solve minor problems like some users or software problems. The following steps can be applied if the problem persists:

a) Check the nuts behind the system

b) Check that monitor, mouse, keyboard power cable are plugged in.

c) Ask yourself what I am doing differently "what is new"?

d) Check the software.

e) Check external signs and take notes of them.

f) Run better diagnostic disks and when the last chips steps fail.

g) Disassemble the machine, push the socket chips into their socket, clean the connectors and put the machine back together and test again.

Having gone through the rules of general PC troubleshooting. It is pertinent to consider the steps involved in the troubleshooting proper.

Before a starting any system troubleshooting, there are basic steps that should be taken into consideration to ensure a consistent starting point and how to isolate the failed components.

1. Turn off the system and any other peripherals. Disconnect all external peripherals except for the keyboard and the video display.

2. Make sure the keyboard and video display are connected to the system. Turn on the video display and turn up the brightness and contrast control to at least two-thirds of the maximum. Some displays have screen controls that cannot be instinctive. Consult the display documentation for more information on how to adjust these settings.

3. Make sure the system is plugged in to a proper-grounded outlet (power).

4. Allow the system to boot from the hard disk, make sure that there is no floppy disk in the floppy drive or insert a known bootable floppy with DOS or diagnostics on it in the floppy drive for testing.

5. Turn on the system. Observe the power supply and chassis fan (if any) and the light on either the system front panel or power supply. If the fans don't spin and the light does not come on, the power of the supply or the motherboard is defective.

6. Observe the power on self test (POST). If no errors are detected, the system beeps and boot up. Errors are displayed on the screen (non-fatal errors), which do not lock up the system displays a text message that varies according to BIOS type and version.

7. Confirm that the operating system loads successfully.

2.6 MEASURES TO ADOPT FOR A HEALTHY PC.

One of the best measures to adopt is to make the PC environment friendly.

This involves the followings:

- **CHECK POWER CONSIDERATION:** There should be no other heating element like heater, iron etc in the same outlet with a PC. There should also not be large electric motors (refrigerators, air conditioners) on the same line or any kind of power noise protection.

- **CHECK TEMPERATURE RANGES:** Temperature range in PC environment should be between 65 degrees F (18 degrees C) maximum.
- **PREVENT DUST BUILDS UP:** Power supplies with filtered fan that suck air in through the back should be preferred rather than the one that pull through the front.
- **MAKE SURE THAT THERE IS NO VIBRATION:** Source like impact printer on the same as the hard disk.
- **BE FAMILIAR WITH THE FOLLOWING:**

a. Packing hard disk

b. Leaving the machine on all the time.

c. Keeping cables screwed in and out of the way

d. Basic "don't do this" on things in DOS, like formatting the hard disk.

- **PROTECT AGAINST STATIC ELECTRICITY**
- **PREVENTIVE MAINTENANCE:** This takes the machine off a person's desk at regular intervals, as in every six months.

The following preventive maintenance procedures are considered important for a continued healthy condition of a PC.

(A) Pickup the PC at it delivered to your work place, but you will learn a lot. Examine:

- Are the connectors screwed in?
- Have screws disappeared from the back of the machine?
- What else is plugged into the PC outlet?
- Is the PC near a window; is it in a location that can get direct sun at some points in the day?

(B) Ask if the machine is doing anything strange

(C) Ensure that the hard disk is backed up.

(D) Pack the hard disk and take the machine to repair.

(E) Run the machines diagnostics. It is a good ideal to scan disk or chkdsk to see what percentage of the users drive consist of "lost cluster"

(F) Examine Auto EXEC. BAT and configures system for any obvious problems. Lack of BUFERS command, for example. If it is a window machine, look at the INIS for obvious tempering. If running windows 95/98 or NT, just run the computer a bit it is not obviously misconfigured.

(G) Remark the head, if the drive is not self-packing

(H) Disassemble the PC.

(I) Clean the edge connectors with connector cleaner and a tint free cloth or a hard white artists eraser

(J) Push the chips back into their sockets.

(K) Use canned air to remove dust from circuit board do not forget the circuit board under the hard disk.

(L) Reassemble the PC. Ensure that all the cables are securely in place.

(M) Ensure that all screws are present. If they are not, add screws.

(N) If the drive support a low –level format, then format the disk with a non-destructive-reform after programs like Disk Technician (prime solution), SPINRITE (Gilison research), OPTUNE, or the like.

CHAPTER THREE: SYSTEM ANALYSIS AND DESIGN

3.0 INTRODUCTION

System analysis is the process or activities involved in examining an already existing system for the new system to be introduced. The analysis was carried out with the primary aim of obtaining an arithmetic information, which will provide a real knowledge of the prevailing situation so that the feasibility of designing an effective Computerised system can be known.

During the stage answer were collected to the process and method of the system under investigation to be able to ascertain effectively how it works. Preliminary investigation, fact-finding, analysis/system design, staggered implementation and finally the documentation were taken.

3.1 METHODOLOGY

Primary data can be collected through the following principal methods:

1. DIRECT PERSONAL OBSERVATION: This is a method by which the researcher makes his observation or takes measurements in the field with or without the participation of the object of investigation be it animate or inanimate.

ADVANTAGES

- ✓ Ensures accuracy.
- ✓ Enhances confidence of the influenced by the researcher in the quality of the data.
- ✓ Observations may be not being influenced by the observed.
- ✓ Disadvantages
- ✓ Not all methods are available to this method.
- ✓ The observer may influence the respondent.

2. **ORAL INTERVIEW:** the respondents are asked questions or are engaged in verbal discussions to extract information.

ADVANTAGES

- Detailed information can be gathered.
- The respondents cannot misinterpret questions.

DISADVANTAGES

- Data coding and analysis will be difficult.
- Response may be influenced by the presence of the interviewer.

3. **TELEPHONE CONVERSATION:** interview conducted on telephone.

ADVANTAGES

- It is faster.
- Anonymity of respondents preserved.
- Higher response rate.
- Response may be influenced.

DISADVANTAGES

- It is costly.
- Not suitable for long questions.
- Efficiency may be hindered by inefficient telephone services.
- It could lead to biased sampling through the exclusion of people without telephones
- Wrong person may be interviewed.

4. **QUESTIONAIRE METHOD:** Prepared questions are asked from printed pages. There are two methods of administering questionnaires.

a. Personal interview.

b. Self administered questionnaires.

(a) **Personal Interview:** Thereby the researcher asks respondents questions from the questionnaires and responses recorded.

ADVANYAGES

- ✓ It ensures higher returns.
- ✓ Interpretation of questions (for clearer explanation to respondents is possible i.e. misinterpretation of questions will be minimized.)
- ✓ Further (physical on the spot) observations can be made which could enhance better interpretation of information collected.

DISADVANTAGES

- ✓ Interviewer could influence the interview's response.
- ✓ Anonymity of interviewee cannot be preserved.

(b) Self administered questionnaires: Questionnaires are deposited with the respondent to be collected later or post-paid questionnaires sent out when on-the spot survey is not possible.

ADVANTAGES

- ✓ It gives respondents enough time to fill the questionnaires.
- ✓ Particularly useful for certain surveys that cannot be done on –the spot e.g. origin, destination survey of passengers.
- ✓ It preserves anonymity – respondents may not have cause to be suspicious of anything since he is not known.

DISADVANTAGES

- ✓ Could be costly (cost of stamps).
- ✓ Questions could be misinterpreted.
- ✓ Response rate could be very low.

However, the techniques employed during fact finding of this study were interview and self administered questionnaires.

3.1.2 FEASIBILITY STUDY

This is the systematic way of carrying out a study of any given system to uncover its procedural, technical and operational bottlenecks with a view to proffering solutions to such problems.

(A) PROCEDURE

The techniques used to collect data during investigation are personal interview and observation. These methods of data collection although expensive are the most effective way of gathering information. Hence, they provide reliable first hand data. This is the main reason why the methods were chosen for the purpose of data collection during investigation.

(B) FINDING

From the two fact-finding techniques employed, the following information about the present system was gathered during the investigation.

Observation:

1. Computers are usually bought to the section to the section for maintenance and repairs almost every week.
2. Maintenance personnel are sometimes invited to carry out maintenance and repair in other departments or even outline the University community.
3. Records on these maintenance activities are being kept in notebooks.

Personal Interview:

4. Question: Question: was there anything that happened to these notebooks?

Answer: when notebooks are used over a long period of they do get form or misplaced.

5. Question: How useful are the records been kept?

Answer: Only to document maintenance activities. The how strict is access to records 6.

6.Question: How strict is access to records of maintenance?

Answer: whoever comes across the record book accesses it

7.Question: Does that mean that anyone can alter these data?

Answer: Perhaps that could be possible by chance.

(c) CONCLUSION

From the investigation one can conclude that the maintenance section caries out a lot of maintenance and repair works, the system had suffered bad records keeping.

Besides, access to the records has no control and they have not devised any meaningful way of using the information being recorded.

(d) RECOMMENDATION

Based on the conclusion drawn, it is recommended that a computer-based information management system be developed to improve or facilitate records keeping and also serve as a decision support system.
In addition, quality, speed, and volume of information to be supported by proposed system will definitely be helpful.

Finally, proper access of data will definitely be mounted to ensure data security and integrity thereby enhancing system reliability.

3.2 ANALYSIS OF THE EXISTING SYSTEM

In studying the already existing system, it was discovered that the use of manual method is in operation. Manual method however has the following defeats.

1. It doesn't allow for easy and quick gathering of information.
2. Errors and ommission may occur ion manual methods.
3. The manual operation is more prone to fraud.

3.3 FEATURES OF THE PROPOSED SYSTEM.

1. Computerization of the system will enhance efficient and effective handling of data of any size.
2. It will lead to easy storage and retrieval of data thereby eliminating misplacements.
3. Data will be more reliable, since errors and ommission will be at the minimum.
4. It saves the technician memorizing all the faults and their causes with solutions on their causes with solution on the past maintenance incurred on the PC.
5. It gives the skill to diagnose and repair. Making intelligent repairs and update decisions about computers.

3.4 SYSTEM DESIGN.

Increasingly, in transaction processing systems, forms and document are being replaced by some layouts for visual display units. The design considerations, however, are often similar, the major concern being the reactions of users to particular formats.

James Martin in his book "design of different types of on-line computer interaction\s with the applications. The major design consideration is which format will be convenient for the users and will make it as simple as possible to enter the data correctly.

Monitor – S.V.G.A

Keyboard – 102 enhanced

Printer – Epson LQ 1170 or similar.

Paper size – 80 column listing paper (2 parts)

Power source – Uninterruptible power supply (UPS)

SOFTWARE REQUIREMENTS

Since the proposed system is designed to operate in Window environment, below is the system software required to facilitate the operation of the new system.

a) Operating system software (Windows '98 or 2000).

b) Designed software

c) Other application software such as

1. MS word
2. MS excel
3. MS publisher
4. Visual FoxPro. 6.0 etc.

3.4.2 INPUT FORMS/ DESIGN.

The defination of the information that appears on the systems output {visual or printed} enabled one to design the input data required for their preparation. The number of characters a file holds can be found by multiplying the record size by the number of records in the file.

For example, if we expect the files to be used by this system, we would have approximately two thousand items then each of these files will hold almost three million characters of data. If the record site is about 1,500 character each.

To design a model that best describes an effective way of managing information on "computer maintenance and repair", in such a way that meaningful ideas could be deduced or derived from the information managed by the system.

Although, there are certain constraints, some of which include time available for the completion of the project and the cost of executing the project.

However, it must be ensured that an efficient and reliable system is designed and implemented by the end of this project. The technical and operational feasibility of the proposed system does not constitute any problem in this project, hence the equipment used and manpower required are readily available as such no extra cost be incurred in that regard.

3.4.1 SYSTEM REQUIREMENTS SPECIFICATION

For the proposed system to work efficiently and with high level of reliability, the following computer configuration would be required for the new system.

The choice of selection is purely based on the needs of the system objectives with respect to the volume and nature of data to be processed as to meet up with the challenges ahead.

HARDWARE REQUIREMENTS

The hardware configuration for the proposed system is as follows:

Machine – IBM or compatible

Microprocessor – Pentium III 733 Mhz

RAM – 128Mb

Hard disk – 20Gb

Floppy disk drive – 1.44Mb

In that case, we will maintain three of such files as master files. Temporary (report) files will be required by the system in each case; this surely doubles the storage capacity required.

Therefore, if the six files of the three million characters each are envisioned, and then the system must have minimum secondary storage of six million bytes (60Mb).

As such an optional secondary storage capacity of 1 billion bytes (10Gb) was earlier recommended for the system under system configuration in system requirement specification (see section 3.4.1).

This is because other programs like operating system and Visual FoxPro 6.0 would be used along with the new system, which will occupy storage among other programs.

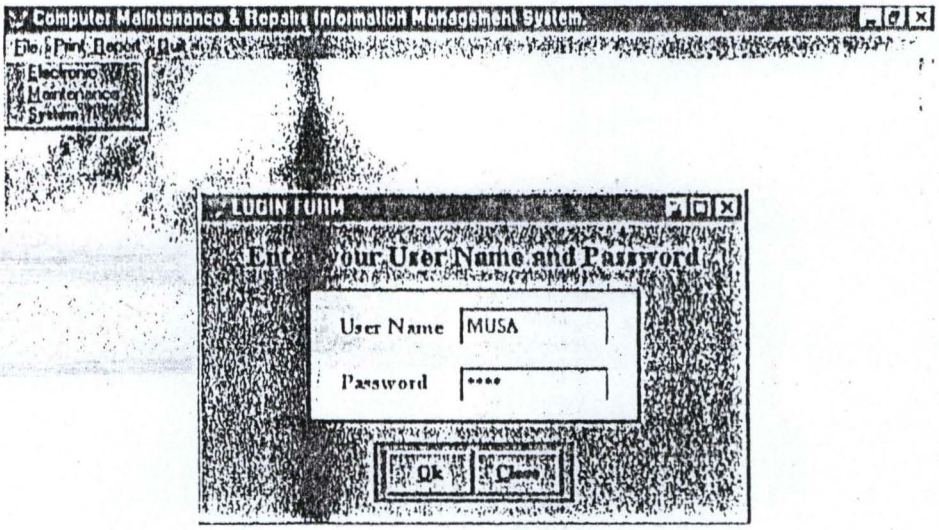
a. FORMS DESIGN

The form design, describes the pattern of various types of computer forms to be used in the most acceptable fashion to facilitate file conversion process.

Below are the various forms designed to be used by new system, which are:

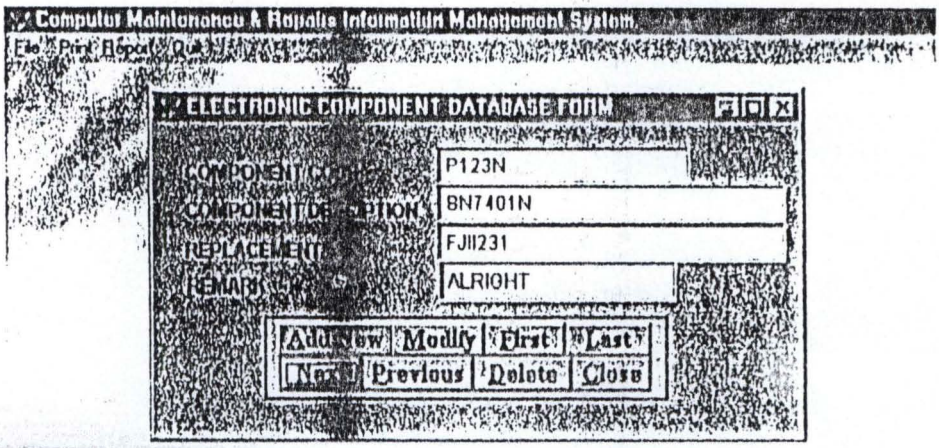
1. Maintenance data input form
2. Repair data input form
3. Electronics components data input form4.
4. System (computer) Information data input form.

The Password Validation Form

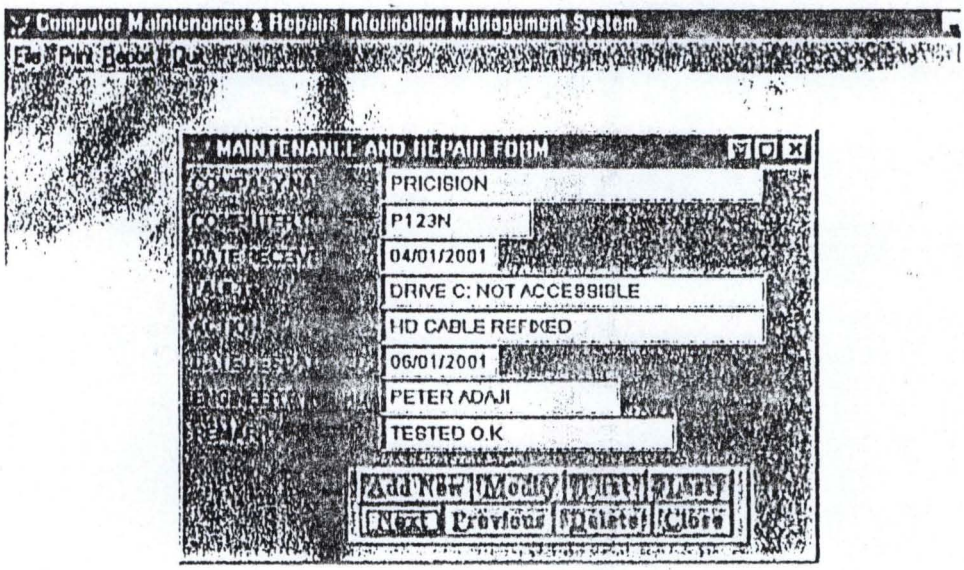


Program Introductory form

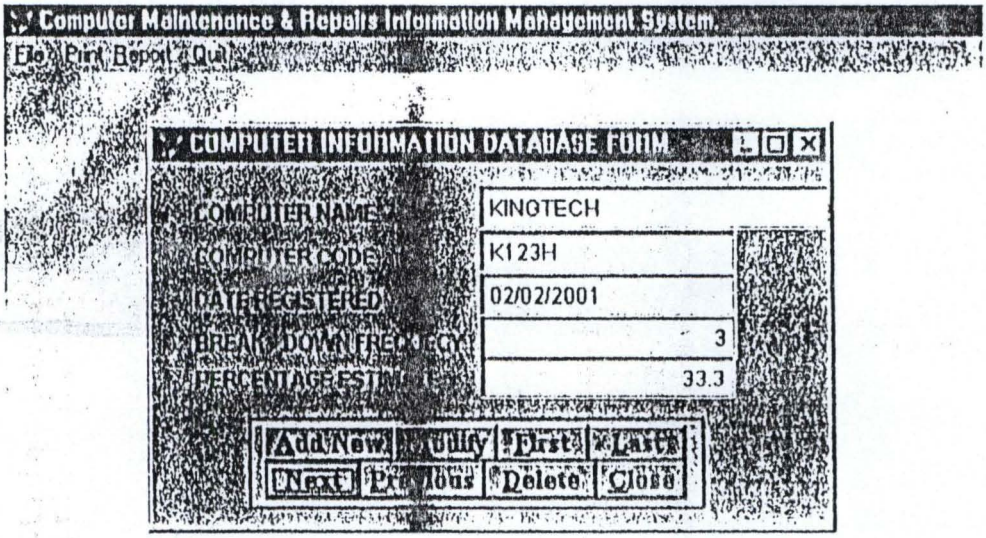
Electronic Components data input form



Maintenance and Repairs data input form



System (Computer) Information data input form



b. FILES DESIGN

For any database system, the definition of database files structure is of paramount important. These definitions anew based on the information to be kept by the new systems in various database files.

Below are the components of different types of database files used by the new system.

a. Maintenance& Repair Database File

FIELD NUMBER	FIELD DESCRIPTION	FIELD TYPE	FIELD SIZE
1	Computer code	Character	10
2	Faulty	Character	30
3	Action	Character	30
4	Date received	Date	8
5	Date dispatched	Date	8
6	Engineers initial	Character	15
7	Remark	Character	20
8	Computer name	Character	30

b. Electronic components database file.

FIELD NUMBER	FIELD DESCRIPTION	FIELD TYPE	FIELD SIZE
1	Component code	Character	10
2	Component description	Character	30
3	Replacement	Character	30
4	Remark	Character	20

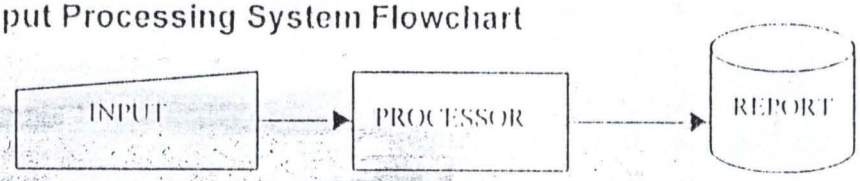
c. System (computer) Information database File.

FIELD NUMBER	FIELD DESCRIPTION	FIELD TYPE	FIELD SIZE
1	Computer code	Character	10
2	Computer name	Character	30
3	Date registered	Date	8
4	Breakdown frequency	Numeric	5
5	Percentage Estimate	Numeric	4

3.4.3 PROCESS DESIGN

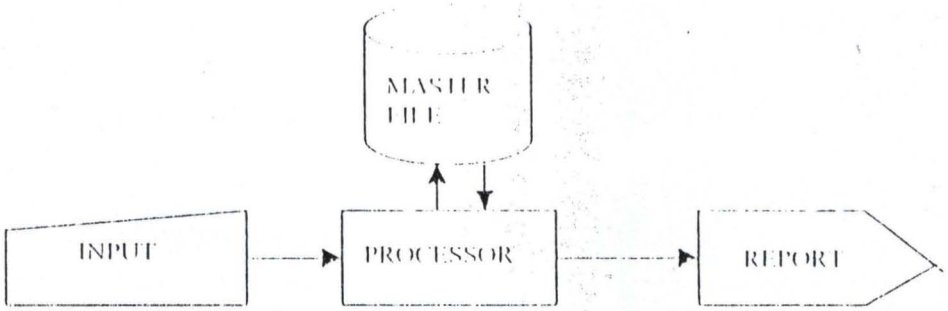
The processing here includes input, enquiry statistical computation and reports. It is pertinent to establish relationship between files as used by the system. The technique employed to accomplished this task i.e establishment of relationship between files is the system flowchart approach.

i. Input Processing System Flowchart



In the above flowchart, keyboard is the input device through which data are entered into the computer and stored on a disk.

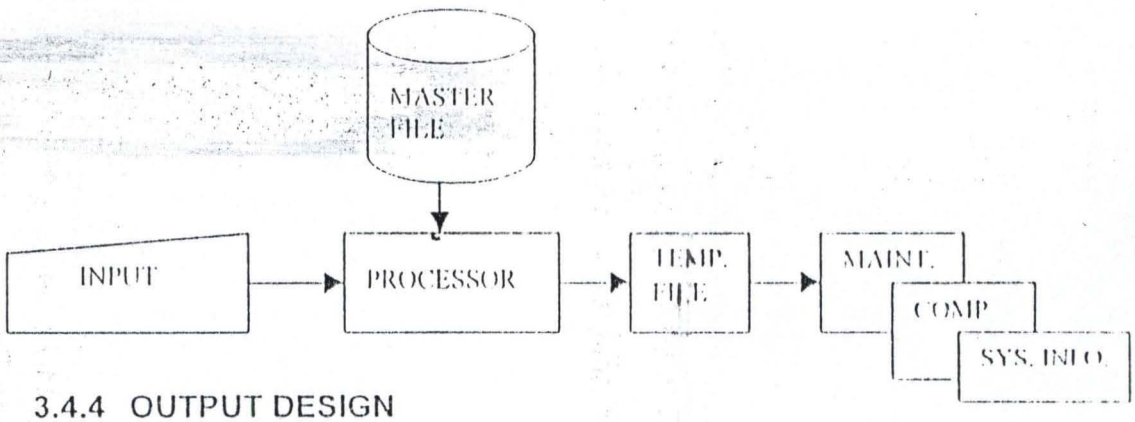
ii. Enquiries Processing System Flowchart



Enquires are made via keyboard to the computer, which obtains information from the master file and sends the same to the screen.

iii. Reports Processing System Flowchart

To obtain or print report in any case, request is made via keyboard to the computer (processor) and the information obtained from master or preference file (or both) directed to a temporary file then printed.



3.4.4 OUTPUT DESIGN

Different reports are expected at different levels from the system. These reports although may be produced on the screen or printer which include the below list.

i. Maintenance report
ii. Electronic component data report
iii. System information report

However, the reports menu of the system will provides room for producing hard copies of the reports. The reports are documented in Appendix iii.

3.5 COSTAND BENEFIT ANALYSIS

The cost/benefit analysis, which establishes relationship between the cost of developing a system and the benefits derivative from the implementation of the new system, is shown below. It portrays at a glance estimates of the proposed system.

System development cost

	N K
Equipment cost	400,000.00
Installation cost	100,000.00
Personnel cost	
Staff training	45,000.00
Staff salary	50,000.00
Operational cost	
Maintenance cost	100,000.00
Furniture cost	50,000.00
Stationeries (diskettes & others)	200,000.00
New software & system analysis cost	250,000.00
Stand arrangement	200,000.00

Total analysis cost = Development cost + Operational cost

= 1,365,000.00

3.6 CHOICE OF PRAGRAMMING LANGUAGE USED

From the previous analysis, it is important to say that the proposed system is going to be used to store large number of data/information and time-to-time retrieval of record. Due to this fact, the choice of the programming language chosen for the development of the system is database Management System (DBMS) Package with special preference for Visual FoxPro.

3.7 FEATURES OF THE PRAGRAMMING LANGUAGE USED

The choice of Visual Fox pro arose because of the following reasons and features posed by the application software.

i. It easy to write an interactive user interface program and also simple to understand.
ii. It is users friendly.
iii. It reduces data redundancy.
iv. Data integrity can be maintained.
v. Provides easy and greater access to information
vi. Individual database file can be designed to meet specification requirement of a particular functional unit of an organization.
vii. The Visual FoxPro allows the source program to be compiled to an executable file thereby allowing the program to be run independent of the application software that was used in coding the program for example, Visual FoxPro.
viii. It has quality graphical users interface.
ix. It is easy to maintain and to debug; it has debugging tools.

CHAPTER FOUR

4.0 INTRODUCTION

The software development is a process of transforming the newly designed system into a computer program using a high level language of software development package.

The choice of software development package or high-level language to use for coding was oriented towards database management software.

This is as a result of the fact that the proposed system involves a lot of record keeping and not much of scientific computations.

Hence, Visual FoxPro was used as the choice of software development package proposed system.

4.1 DATABASE MANAGEMENT SYSTEM (DBMS)

The database management system is a software system capable of supporting and managing and managing an integrated database. It handles all access to database.

For instance, when an application program reads a record by means of a Database Management System; the database Management System examines the physical database description, issues a command to the operating system instructing it to read the requested record; transfers the data or record from the system buffer (where the operating system places the data) to the work area of the application program providing error messages (if any); and the application program on then operate with the record or data in the work area. Similar operation applies to storage, retrieval and updating procedures.

4.1.1 DATABASE

This is a collection logically related data elements that may be structured in various ways to meet the processing and retrieval needs of people and organizations. Microsoft Visual Fox 6.0 provides a full relational database environment to users.

4.1.2 ADVANTAGES OF DATABASE SYSTEM

1. **Database integrity control:** The purpose of this is to see that all input data are comely recorded, all transactions are processed without additions or omission, and all output are accurate, timely and distributed only to those authorized to receive them.

2. **Data independence:** This means the isolation or independency of the application grogram from a wide variety of changes in the specific logical organization, physical organization and storage consideration of the computerised database

3. **Data security:** It involves ensuring that the only means of access to database is through the proper channel.

4. **Data redundancy:** Storing the same data in more than one file leads to wastage of storage space. This is greatly reduced in database system thereby saving memory space.

5. **Standardization:** With centrally controlled database, it is possible to ensure that the installations and industrial standards are followed in representation of data. This simplifies problem of maintenance and data interchange between installations.

4.2 PROGRAM ALGORITHM

The next challenge is to translate the system design and specification into instructions that can be interpreted into programs and executed by the computer. This of course is the programming phase of the system development process; through which database is formulated in the last chapter.

An Algorithm is a finite set of instructions or operations for carrying out a specific task or solving specific problems. In other word, it is a crude set of instructions from which programs (That is, an algorithm specifically expressed in a high level language capable of execution by a computer) are developed.

An algorithm is valid if it possesses the following characteristics:

a) **Finiteness of instructions**: There must be finite number of steps of instructions in an algorithm.
b) **Precisions:** Steps or instructions must be void of obstruction or vagueness but rather explicit.
c) **Effectiveness**: Execution of impossible tasks must be avoided in an algorithm.
d) **Termination**: There must be stopping criteria for terminating algorithm, especially in the case of instructions having repeated execution.
e) **Experimentation**: An algorithm should provide output of experimentation as required.

Algorithm used for this system is documented in Appendix II.

4.3 PROGRAM CODING, TESTING AND DEBUGGING.

Once the algorithm or flowchart of the program is completed, the next stage is to code, test and debug the programs.

4.3.1 CODING

The narrative (algorithm) design was translated into machine-readable instructions or program.

4.3.2 SYSETM TESTING

Once the program was entered into the computer, and test data prepared; individual program modules were tested with these data until found satisfactory.

4.3.3 DEBUGGING

The elimination of errors (bugs) from a program is known as debugging. A bug is either syntax error (violation of one of those rules for writing instructions) or a logic error.

The test data were judiciously compiled so that all programs and validation routines are tested. The several of the people who will eventually use the system did the second stage of system testing with live-data. The exercise provided an extra level of assurance that the system will work satisfactorily.

4.4 SYSTEM CONVERSION

Finally, after all aspect of the system were checked and verified to ensure its operational accuracy and solid results were obtained from use of test data and live data; the entire system was re-initialized to handle 'live' data.

Since less paper work is required to run the new system, it is more economical and safer to adopt parallel method of changeover.

Therefore, the parallel method is recommended and adopted whereby the new system runs concurrently with the old system, processing exactly the same data and producing identical results. This procedure continued until the user is satisfied and feels comfortable with new system.

4.5 OPERATIONAL MANUAL

The operational manual is a guide on the operation of the system. It gives step-wise refinement of how to use the new system.

4.5.1 ESTABLISHING CONTACT WITH THE COMPUTER

The computer cover and the peripherals cover are removed (if applicable). Then, the mains from the power supply is switched on and the power protector (stabilizer). When the stabilizer is energized one can switch on the system and finally the monitor {i.e visual Display unit}.

4.5.2 PROGRAM INSTALLATION

This is the process of transferring the developed floppy disk to a permanent storage device called the hard disk.

However, the procedure is as follows:

STEPS	PROCEDURE	RESULT
1. Go to start	Click	Start popup menu is displayed.
2. Run submenu	Click	Run dialog box displayed
3. Insert REPAIR S/W diskette into A:\	-	-
	Browse	
4.Type the source drive (A:\)		Content of A:\ displayed
	Double – click	
5. Select set-up		Installation begins
	Click	
6.Follow the instruction that Follows.		Installation in progress
	-	
7.Destination		Software installed C:\ successfully

BRINGING THE SOFTWARE FROM C:\ TO WINDOW PROGRAM SUBMENU

STEPS	PROCEDURE	RESULT
1. Go to start	Click	Start popup menu displayed
2. Setting submenu	Click	-
3. Choose taskbar & start menu	Click	Taskbar dialog box
4. Select start menu program	Click	-
5. Browse to select REPAIR software	Double - click	-
6. Select folder (program)	Click	-
7. Destination	Click	REPAIR software copied into program submenu successfully.

4.5.3 ADDING RECORDS TO DATABASE

Move the pointer to the option desired, highlight new and press enter key. Press (down) arrow key and letter Y. The new data is now entered. One ensured that the enter key is pressed at the last field of the last record entered.

Forms for modify, delete and enquiry are usually superimposed on the system main-menu using window. This does not cause any problem to the system, but rather an exploration of window facilities provided by Visual Fox 6.0.

4.5.4 MODIFYING RECORDS IN THE DATABASE

Move pointer to the option desired, highlight MODIFY and press enter key. Then move the pointer through the file until record to be modified is found. Effect appropriate changes on the record and press enter key when you are through.

4.5.5 DELETING RECORDS FROM THE DATABASE.

Move the pointer to the option desired, highlight DELETE, and press enter key. Then move the pointer through the file to the record to be deleted and press enter key to select the record. The message wanting to delete? (Y/N) will appear. Press Y if the record is to be deleted or N to leave it intact.

4.5.6 PRINTING REPORTS

Move the pointer to REPORTS, highlight the option desired and press enter key.

4.5.7 SIGNING OFF

To one the program run or terminate the session (i.e close down the system), move the pointer to the EXIT, highlight YES and press enter key, or highlight NO and press enter key to resume work.

Note: Switch off the monitor, the system unit, and the peripherals and cover them up when finally for the day to protect the computer from effect of dust, water, insects etc. on the circuitry.

CHAPTER FIVE

5.0 SYSTEM DOCUMENTATION, CONCLUSION AND RECOMMENDATION.

5.1 SYSTEM DOCUMENTATION

This is referred to as the proper keeping of records for future use. The program used in computerizing the Maintenance and Repairs Information Management System needs to be properly documented.

Documentation is also important because where there is proper record the initial programmer is not available any other programmer can get into the source code to make any necessary amendment.

Proper documentation will make the work of a programmer easier. Sample of work done and the installation diskette should be properly kept as well.

The main importance of the installation diskette is to enable one to introduce a particular program into a system that does not have the programming language in use; documentation allows proper reference to be made.

However, this program is documented as follows:

- Organisational Structure - Appendix I
- Program Algorithms - Appendix II
- Program output (reports) -- Appendix III.
- Program source code (i.e program listing). -- Appendix IV.

5.2 CONCLUSION

Computer hardware maintenance is almost always performed under contract by Engineers working either for the equipment manufacturer or retailers or from specialists maintenance companies or scale department like the computer centre, Federal University of Technology Minna, Niger State. Their function is derived between repairs, for which they must be on call and preventive maintenance carried out on a repair basis.

Reliability of a system (computer) is freedom from failure. Unfortunately, every man-made object is subject to failure in operation, either as a result of component or as a result of consequence things happening outside the system. Things suddenly fail at random, and things eventually wear out. Operation without Failure is of interest to every computer user and totally essential to real-time and life-support and engineered into computer systems both in their original manufacturer and during their use, hence the aim of the project.

In reliability engineering, reliable hardware can be sought in the following ways:

a) Using good quality and well-tested components.

b) Good design that eliminates potential areas of failure, e.g. moving parts, friction, stress, heat etc.

c) Providing extra capacity that can be used to check the correctness of an operation.

d) Providing spare units, which can continue in use if the first unit fails.

It is through a combination of these methods that small groups of computer manufacturers are able to offer " non stop" computer systems. Although. Non-stop systems will experience failures. Internally, these failures will not stop the system from working-such systems are called "fault-tolerant" system.

5.3 RECOMMENDATIONS

Since most hardware wears out with use and age, the most essential precaution is testing hardware regularly either in time or by use, and replacing defective parts. This is known as preventive maintenance, and should reduce random or wear-out failures to a minimum, the effect of which can be further controlled by holding spares and by arranging a rapid and guarantee able repair service.

With modern electronic solid-state technology, the greater number of failures is likely to be caused by errors in software, so that reliable software and similar software maintenance procedures are equally essential, both for application and for system software.

Ultimately, and perhaps unfortunately, all computer systems rely on electrical power. The power supply to business premises, school, and homes is from time to time, affected by situations outside our control-total failure, a planned shut-off for repairs. It is therefore necessary to back-up power supply either a battery which provides enough life to enable a computer system to shut down in an orderly fashion, or in extreme, a standby generator which is immediately switched on when a failure of the main supply is detected.

Similarly, physical security measures should be mounted to prevent access and use of computers by unauthorized personal, by means of:

a) Restricted access-locking room when not in use.
b) Restricted use- use only by authorized names.
c) Precautions against theft or storage with burglars and other anti-theft devices;
d) Installing sprinkler systems or inert gas emitters should anticipate precautions against fire.

Finally, this work can be improved upon by introducing an automatic circuit fault detection device, with the system software programs developed in this project serving as a knowledge-based system to the device, from which description of faults detected and actions to be taken to correct the problems can be obtained.

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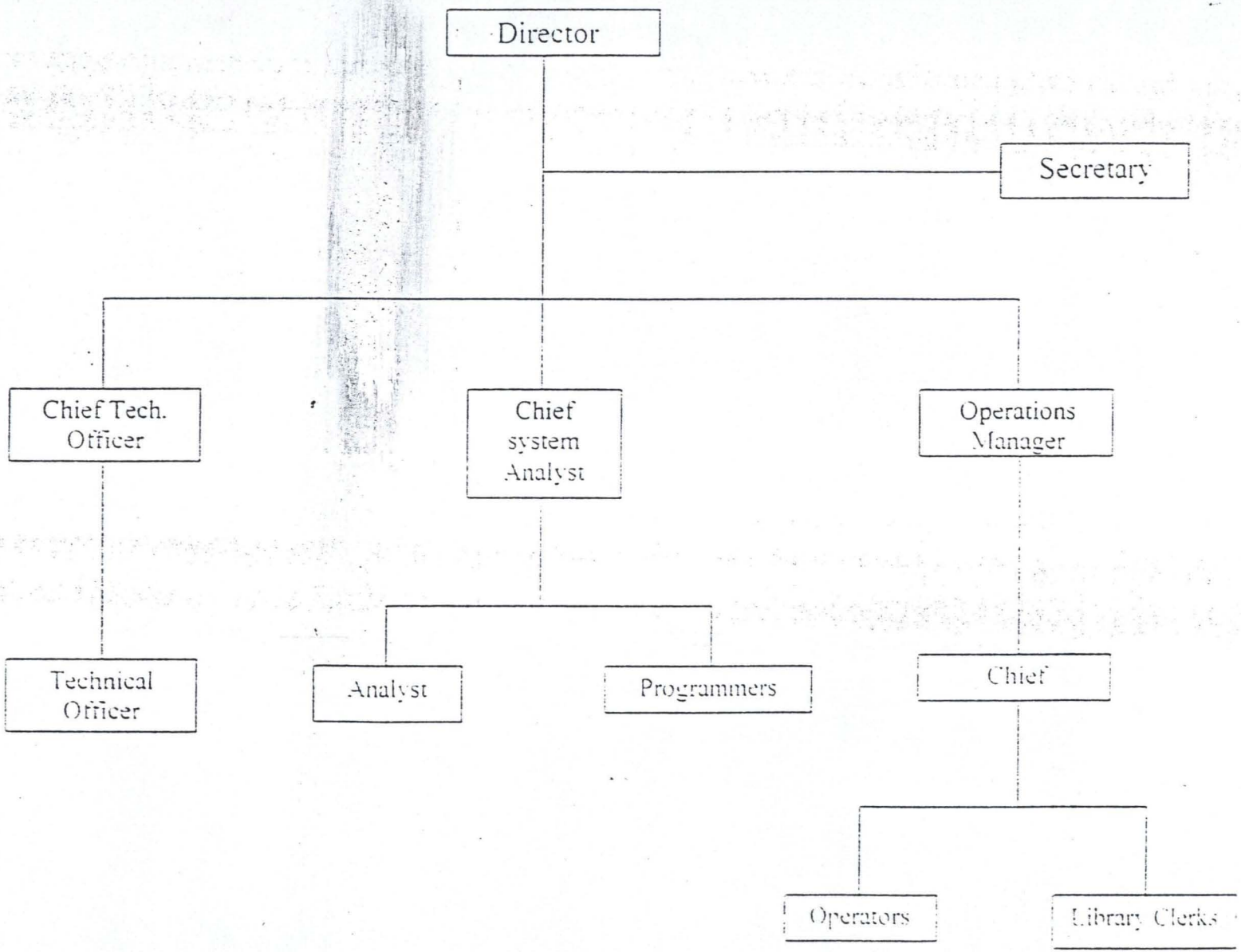
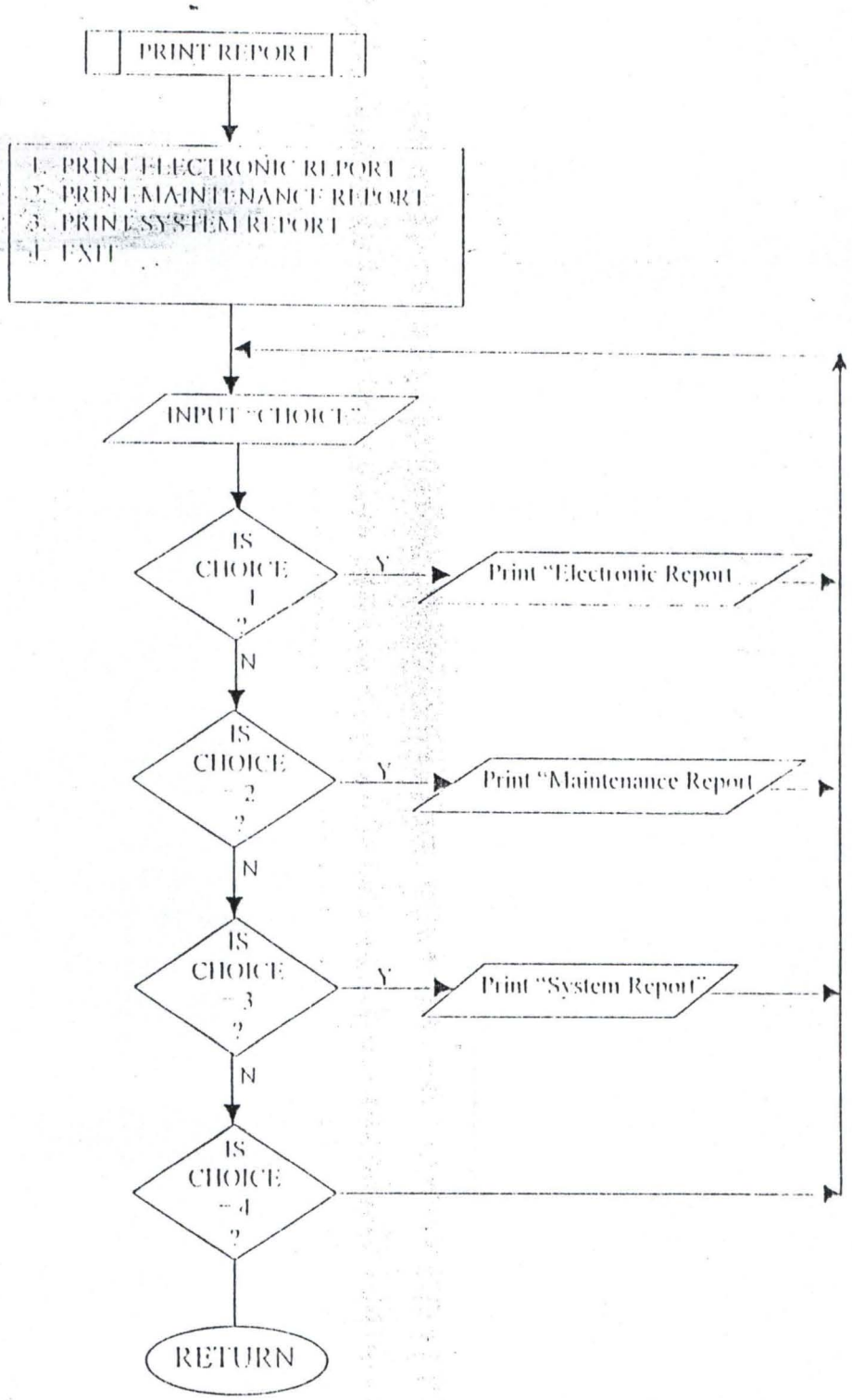
APPENDIX I

THE ORGANISATIONAL STRUCTURE OF THE COMPUTER CENTRE, F. U. T. MINNA.

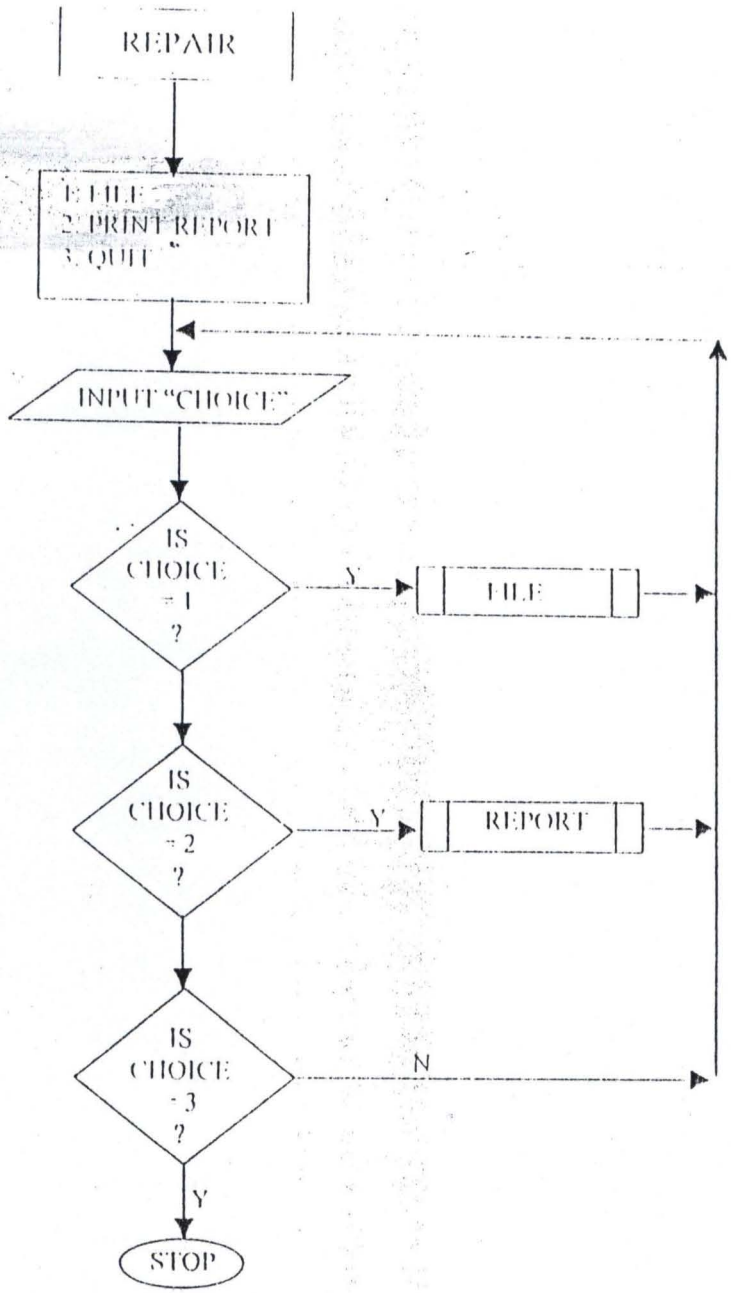


APPENDIX II

REPORT SUBMENU

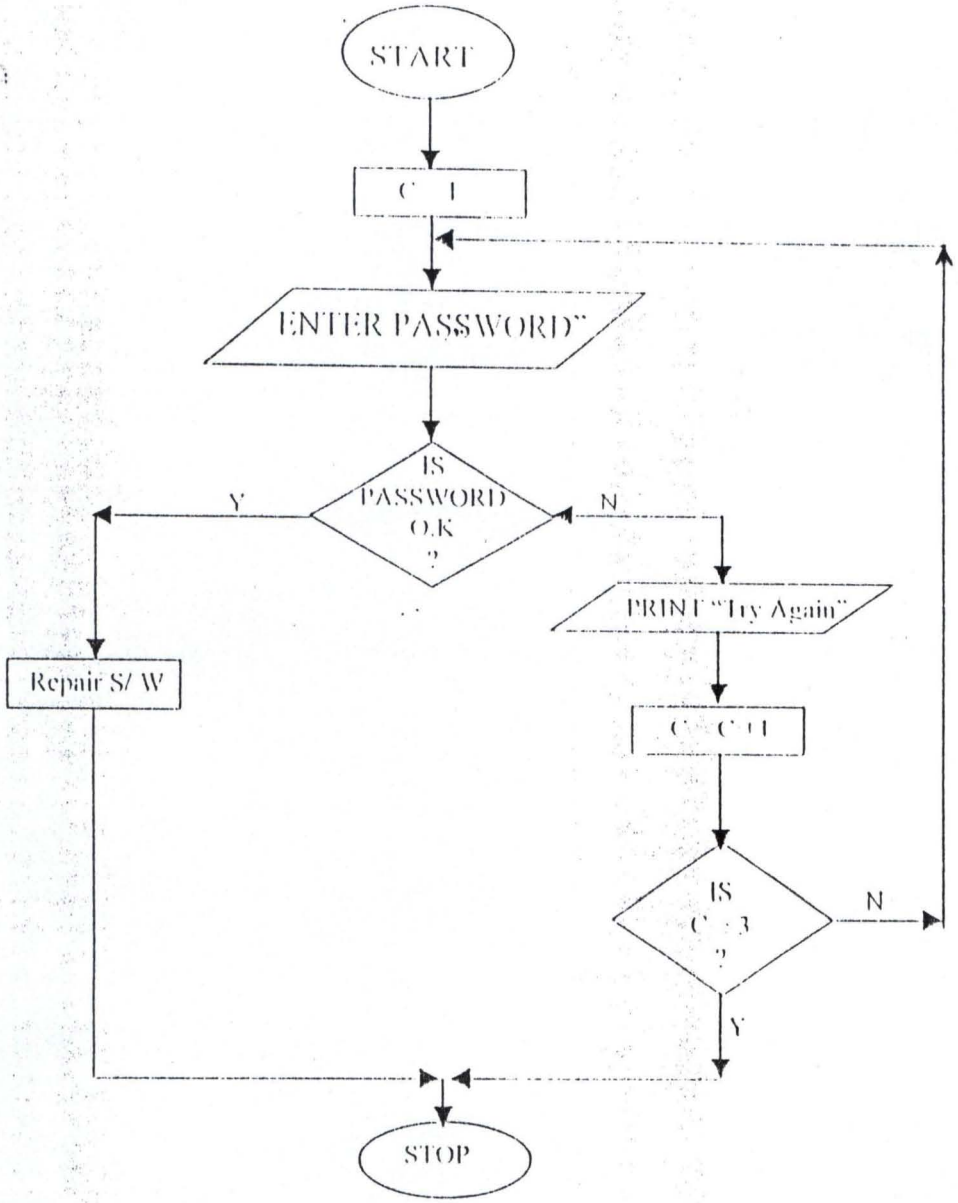


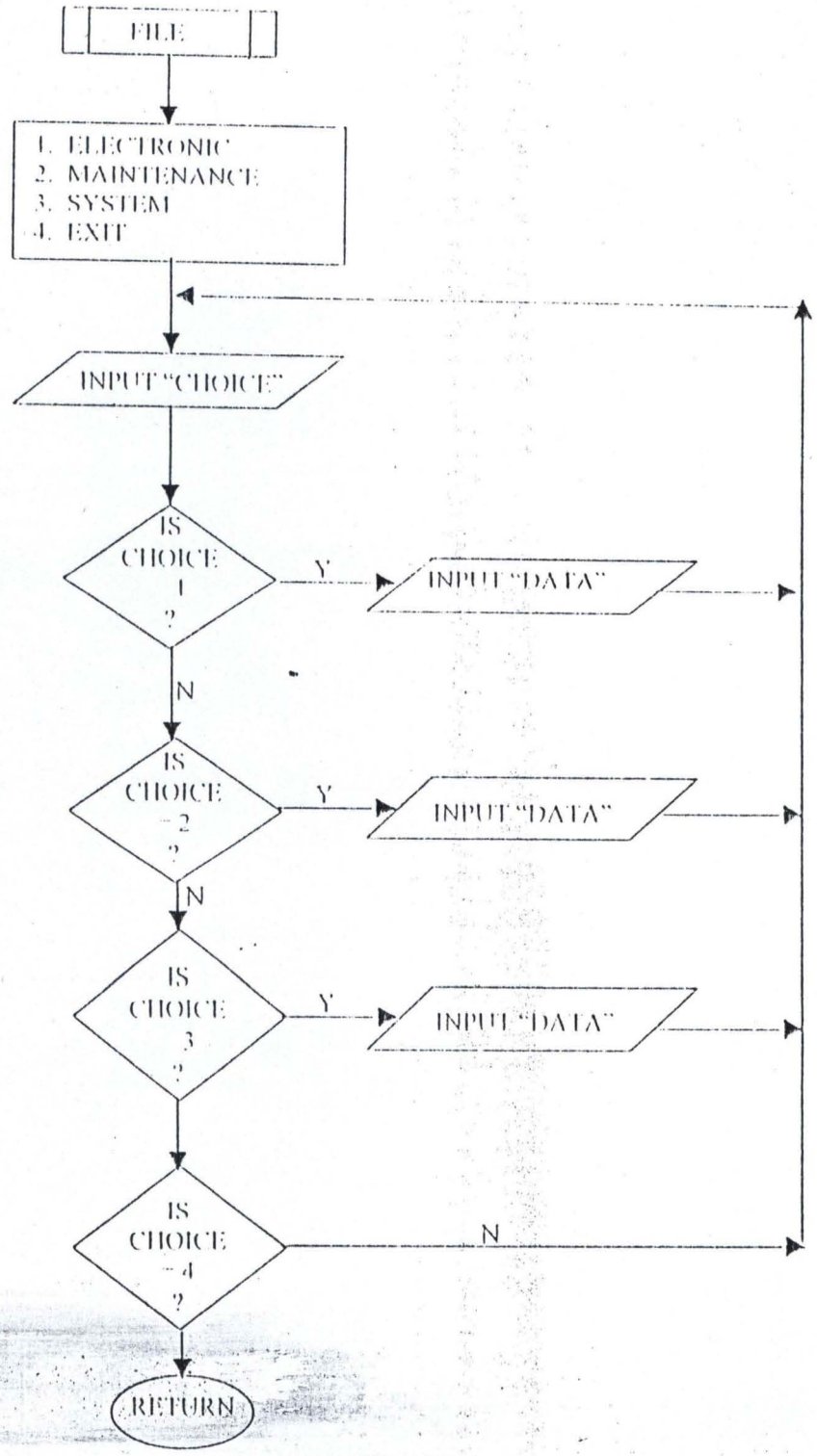
AINMENU


REPAIR
1. FILE
2. PRINT REPORT
3. QUIT
INPUT "CHOICE"
IS CHOICE = 1 ?
Y
FILE
IS CHOICE = 2 ?
Y
REPORT
IS CHOICE = 3 ?
N
Y
STOP

ALGORITHM OF THE PROGRAM

ASSWORD FLOWCHART




FILE
1. ELECTRONIC
2. MAINTENANCE
3. SYSTEM
4. EXIT
INPUT "CHOICE"
IS CHOICE = 1 ?
Y
INPUT "DATA"
N
IS CHOICE = 2 ?
Y
INPUT "DATA"
N
IS CHOICE = 3 ?
Y
INPUT "DATA"
IS CHOICE = 4 ?
N
RETURN

APPENDIX III

COMPUTER MAINTENANCE AND REPAIRS INFORMATION MANAGEMENT SYSTEM

ELECTRONIC COMPONENTS REPORT.

7/01

MPONENT CODE	COMPONENT DESCRIPTION	REPLACEMENT	REMARK
3Q	SN7400N	FJII131	O.K
3N	SN7401N	FJII231	ALRIGHT
23E	SN7403F	JII221	O.K
234Q	SN7404	FJII291	O.K
23H	SN7405N	FJII111	O.K
234Q	SN7406N	FJII123	ALRIGHT
234N	SN7407K	FJII145G	O.K

COMPUTER MAINTENANCE AND REPAIRS
INFORMATION MANAGEMENT SYSTEM

SYSTEM (COMPUTER) INFORMATION REPORT.

06/2001

COMPUTER NAME	COMPUTER CODE	DATE REGISTERED	PERCENTAGE ESTIMATE	BREAK - DOWN FREQ
OMPAQ	C123Q	08/02/2001	76	
NGTECH	K123H	02/02/2001	33	
RECISION	P1234N	17/04/2001	13	
OYALE	R123E	05/06/2001	14	
NGTECH	K1235H	04/01/2001	13	
OMPAQ	C1235Q	01/04/2001	15	
RECISION	P1236N	05/05/2001	15	

COMPUTER MAINTENANCE AND REPAIRS INFORMATION MANAGEMENT SYSTEM

MAINTENANCE AND REPAIR REPORT.

7/05/2001

COMPANY NAME	COMPUTER CODE	DATE RECEIVED	ACTION	FAULT	ENGINEER'S INITIAL	DATE DESPATCHED	REMARK
COMPAQ	C123Q	01/01/2001	DRIVE A:	DRIVE 'A' NOT	MIKE OZOR	02/01/2001	TESTED O.K
PRICISION	P123N	04/01/2001	HD CABLE REFIXED	DRIVE C: NOT	PETER ADAJI	06/01/2001	TESTED O.K
KINGTECH	K123H	01/02/2001	POWER UNIT FUSE	NO POWER	BAWA MUSA	03/02/2001	O.K
ROYALE	R123E	05/02/2001	COMMUNICATION	SCREEN IS BLANK	YEMISI FAITH	05/02/2001	WORKING FIN
PRICISION	P123N	03/03/2001	KB INTERFACE CABLE	KEYBOARD NOT	PETER ADAJI	04/03/2001	O.K
COMPAQ	C1234Q	12/04/2001	SYSTEM FILES	NO BOOTING	MIKE OZOR	12/04/2001	WORKING FINE.
ROYALE	R1234E	15/05/2001	HD CABLE FIRMLY	CONTROLLER	MIKE OZOR	18/05/2001	O.K

APPENDIX IV

```
        ENDIF

        IF NOT EOF()
                SKIP 1
                THISFORM.cmdfirst.ENABLED = .T.
                SCATTER MEMVAR MEMO
                THISFORM.REFRESH
        ELSE
                THISFORM.cmdlast.ENABLED = .F.
                MESSAGEBOX("This is the Last Record", 0 + 64, "Warning")
                THIS.ENABLED = .F.
        ENDIF
        THISFORM.cmdprevious.ENABLED = .T.
    ENDPROC


ENDDEFINE
*
*-- EndDefine: form1
**************************************************
```

```
                SKIP
            ELSE
                SKIP -1
            ENDIF
        ENDIF
        THISFORM.REFRESH
ENDPROC


PROCEDURE cmdmodify.Click
        THISFORM.SETALL("Readonly",.F.,"Textbox")
        THISFORM.SETALL("Readonly",.F.,"combobox")
        THISFORM.SETALL("Readonly",.F.,"EDITbox")


        IF USED("tmaintenance")
            SELE tmaintenance
        ELSE
            SELE 0
            USE tmaintenance
        ENDIF
        IF THIS.CAPTION = "\<Modify"
            THIS.CAPTION = "\<Save"
            THISFORM.SETALL("Readonly",.F.,"Textbox")

            THIS.CAPTION = "\<
THISFORM.SETALL("enabled",.F.,"commandbutton")
            THIS.ENABLED = .T.
            THISFORM.cmdclose.ENABLED = .T.
        ELSE
            GATHER MEMVAR MEMO Modify"
            THISFORM.SETALL("Readonly",.T.,"combobox")
            THISFORM.SETALL("Readonly",.T.,"EDITbox")
            THISFORM.SETALL("Readonly",.T.,"Textbox")
            THISFORM.SETALL("enabled",.T.,"commandbutton")
            THISFORM.REFRESH
        ENDIF
ENDPROC


PROCEDURE cmdnext.Click
        IF USED("tmaintenance")
            SELE tmaintenance
        ELSE
            SELE 0
            USE tmaintenance
```

```
            SCATTER MEMVAR MEMO BLANK
            *THISFORM.txtacctno.SETFOCUS
            THISFORM.SETALL("enabled",.F.,"commandbutton")
            THIS.ENABLED = .T.
            THISFORM.cmdclose.ENABLED = .T.
            THISFORM.REFRESH
            THIS.CAPTION = "\<Save"
        ELSE
            THISFORM.SETALL("Readonly",.T.,"Textbox")
            THISFORM.SETALL("Readonly",.T.,"combobox")
            THISFORM.SETALL("Readonly",.T.,"editbox")
            THISFORM.SETALL("enabled",.T.,"commandbutton")

            IF USED("tmaintenance")
                SELE tmaintenance
            ELSE
                SELE 0
                USE tmaintenance
            ENDIF

            GO TOP
            *LOCATE FOR acctno = m.acctno
            IF FOUND()
                MESSAGEBOX("This Record Already Exists!",
"Warning.")
                THISFORM.REFRESH
            ELSE
                INSERT INTO tmaintenance FROM MEMVAR
                THISFORM.REFRESH
            ENDIF
            THIS.CAPTION = "\<Add New"
        ENDIF
    ENDPROC


    PROCEDURE cmddelete.Click

        USE tmaintenance EXCLUSIVE
        STORE 0 TO ans
        ans = MESSAGEBOX("This record will be deleted. Proceed?", 4 +
2,"Warning")
        IF ans = 6
            DELETE
            PACK
            IF !EOF()
```

```
        IF NOT BOF()
                SKIP -1
                SCATTER MEMVAR MEMO
                THISFORM.REFRESH
                ThisForm.cmdlast.ENABLED = .T.
        ELSE
                ThisForm.cmdfirst.ENABLED = .F.
                MESSAGEBOX("This is the First Record",0 + 64, "Warning")
                THIS.ENABLED = .F.
        ENDIF
        THISFORM.cmdnext.ENABLED = .T.
ENDPROC


PROCEDURE cmdlast.Click
        IF USED("tmaintenance")
                SELE tmaintenance
        ELSE
                SELE 0
                USE tmaintenance
        ENDIF
        IF      !EOF()
                GO BOTTOM
                SCATTER MEMVAR MEMO
                THISFORM.REFRESH
        ELSE
                MESSAGEBOX("This is the Last Record", 0 + 64, "Warning")
        ENDIF
        THIS.ENABLED = .F.
        THISFORM.cmdfirst.ENABLED = .T.
                                ENDPROC


PROCEDURE cmdaddnew.Click
        IF THIS.CAPTION = "\<Add New"

                THISFORM.SETALL("Readonly",.F.,"Textbox")
                THISFORM.SETALL("Readonly",.F.,"ComboBox")
                THISFORM.SETALL("Readonly",.F.,"EDITbox")

                IF USED("tmaintenance")
                        SELE tmaintenance
                ELSE
                        SELE 0
                        USE tmaintenance
                ENDIF
```

```
        Height = 21, ;
        Width = 53, ;
        FontBold = .T., ;
        FontItalic = .F., ;
        FontName = "Times New Roman", ;
        FontSize = 11, ;
        FontUnderline = .F., ;
        Caption = "\<Next", ;
        TabIndex = 13, ;
        SpecialEffect = 0, ;
        ForeColor = RGB(0,0,160), ;
        DisabledForeColor = RGB(128,128,128), ;
        Name = "cmdnext"


PROCEDURE cmdfirst.Click
        IF USED("tmaintenance")
                SELE tmaintenance
        ELSE
                SELE 0
                USE tmaintenance
        ENDIF
        IF !BOF()
                GO TOP
                SCATTER MEMVAR MEMO
                THIS.ENABLED = .F.
        ELSE
                MESSAGEBOX("This is the First Record", "Warning")
        ENDIF
                THISFORM.REFRESH
                THISFORM.cmdlast.ENABLED = .T.
                                ENDPROC


PROCEDURE cmdclose.Click
        THISFORM.RELEASE
ENDPROC


PROCEDURE cmdprevious.Click
        IF USED("tmaintenance")
                SELE tmaintenance
        ELSE
                SELE 0
                USE tmaintenance
        ENDIF
```

```
        DisabledForeColor = RGB(128,128,128), ;
        Name = "cmdaddnew"


ADD OBJECT cmddelete AS commandbutton WITH ;
        AutoSize = .F., ;
        Top = 225, ;
        Left = 231, ;
        Height = 21, ;
        Width = 62, ;
        FontBold = .T., ;
        FontItalic = .F., ;
        FontName = "Times New Roman", ;
        FontSize = 11, ;
        FontUnderline = .F., ;
        Caption = "\<Delete", ;
        TabIndex = 15, ;
        SpecialEffect = 0, ;
        ForeColor = RGB(0,0,160), ;
        DisabledForeColor = RGB(128,128,128), ;
        Name = "cmddelete"


ADD OBJECT cmdmodify AS commandbutton WITH ;
        AutoSize = .F., ;
        Top = 204, ;
        Left = 180, ;
        Height = 21, ;
        Width = 58, ;
        FontBold = .T., ;
        FontItalic = .F., ;
        FontName = "Times New Roman", ;
        FontSize = 11, ;
        FontUnderline = .F., ;
        Caption = "\<Modify", ;
        TabIndex = 10, ;
        SpecialEffect = 0, ;
        ForeColor = RGB(0,0,160), ;
        DisabledForeColor = RGB(128,128,128), ;
        Name = "cmdmodify"


ADD OBJECT cmdnext AS commandbutton WITH ;
        AutoSize = .F., ;
        Top = 225, ;
        Left = 109, ;
```

```
        BackColor = RGB(196,156,142), ;
        Name = "Container2"


ADD OBJECT cmdfirst AS commandbutton WITH ;
        AutoSize = .F., ;
        Top = 204, ;
        Left = 238, ;
        Height = 21, ;
        Width = 51, ;
        FontBold = .T., ;
        FontItalic = .F., ;
        FontName = "Times New Roman", ;
        FontSize = 11, ;
        FontUnderline = .F., ;
        Caption = "\<First", ;
        TabIndex = 11, ;
        SpecialEffect = 0, ;
        ForeColor = RGB(0,0,160), ;
        DisabledForeColor = RGB(128,128,128), ;
        Name = "cmdfirst"


ADD OBJECT cmdclose AS commandbutton WITH ;
        AutoSize = .F., ;
        Top = 225, ;
        Left = 294, ;
        Height = 21, ;
        Width = 49, ;
        FontBold = .T., ;
        FontItalic = .F., ;
        FontName = "Times New Roman", ;
        FontSize = 11, ;
        FontUnderline = .F., ;
        Caption = "\<Close", ;
        TabIndex = 16, ;
        SpecialEffect = 0, ;
        ForeColor = RGB(0,0,160), ;
        DisabledForeColor = RGB(128,128,128), ;
        Name = "cmdclose"


DD OBJECT cmdprevious AS commandbutton WITH ;
        AutoSize = .F., ;
        Top = 225, ;
        Left = 162, ;
```

```
        FontBold = .T., ;
        WordWrap = .T., ;
        BackStyle = 0, ;
        Caption = "REMARK", ;
        Left = 5, ;
        Top = 173, ;
        Width = 49, ;
        TabIndex = 23, ;
        ForeColor = RGB(128,0,128), ;
        Name = "lblRemark"


ADD OBJECT txtcompname AS textbox WITH ;
        Comment = "", ;
        ControlSource = "m.compname", ;
        Format = "!", ;
        Height = 23, ;
        Left = 124, ;
        MaxLength = 35, ;
        TabIndex = 1, ;
        Top = 0, ;
        Width = 238, ;
        Name = "txtCompname"


ADD OBJECT lblcompname AS label WITH ;
        AutoSize = .T., ;
        FontBold = .T., ;
        WordWrap = .T., ;
        BackStyle = 0, ;
        Caption = "COMPANY NAME", ;
        Left = 5, ;
        Top = 5, ;
        Width = 94, ;
        TabIndex = 24, ;
        ForeColor = RGB(128,0,128), ;
        Name = "lblCompname"


ADD OBJECT container2 AS container WITH ;
        Top = 200, ;
        Left = 100, ;
        Width = 253, ;
        Height = 51, ;
        TabIndex = 25, ;
        ForeColor = RGB(134,134,121), ;
```

```
ADD OBJECT txtenginit AS textbox WITH ;
        Comment = "", ;
        Alignment = 0, ;
        ControlSource = "m.enginit", ;
        Format = "!", ;
        Height = 23, ;
        Left = 123, ;
        MaxLength = 20, ;
        TabIndex = 7, ;
        Top = 144, ;
        Width = 149, ;
        Name = "txtEnginit"


ADD OBJECT lblenginit AS label WITH ;
        AutoSize = .T., ;
        FontBold = .T., ;
        WordWrap = .T., ;
        BackStyle = 0, ;
        Caption = "ENGINEER'S INITIAL", ;
        Left = 5, ;
        Top = 149, ;
        Width = 109, ;
        TabIndex = 22, ;
        ForeColor = RGB(128,0,128), ;
        Name = "lblEnginit"


ADD OBJECT txtremark AS textbox WITH ;
        Comment = "", ;
        Alignment = 0, ;
        ControlSource = "m.remark", ;
        Format = "!", ;
        Height = 23, ;
        Left = 123, ;
        MaxLength = 25, ;
        TabIndex = 8, ;
        Top = 168, ;
        Width = 184, ;
        Name = "txtRemark"


ADD OBJECT lblremark AS label WITH ;
        AutoSize = .T., ;
```

```
        Left = 123, ;
        TabIndex = 3, ;
        Top = 48, ;
        Width = 73, ;
        Name = "txtDateree"


ADD OBJECT lbldateree AS label WITH ;
        AutoSize = .T., ;
        FontBold = .T., ;
        WordWrap = .T., ;
        BackStyle = 0, ;
        Caption = "DATE RECEIVED", ;
        Left = 5, ;
        Top = 53, ;
        Width = 89, ;
        TabIndex = 20, ;
        ForeColor = RGB(128,0,128), ;
        Name = "lblDateree"


ADD OBJECT txtdatedesp AS textbox WITH ;
        Comment = "", ;
        Alignment = 0, ;
        ControlSource = "m.datedesp", ;
        Format = "E", ;
        Height = 23, ;
        Left = 123, ;
        TabIndex = 6, ;
        Top = 120, ;
        Width = 73, ;
        Name = "txtDatedesp"


ADD OBJECT lbldatedesp AS label WITH ;
        AutoSize = .T., ;
        FontBold = .T., ;
        WordWrap = .T., ;
        BackStyle = 0, ;
        Caption = "DATE DESPATCHED", ;
        Left = 5, ;
        Top = 125, ;
        Width = 110, ;
        TabIndex = 21, ;
        ForeColor = RGB(128,0,128), ;
        Name = "lblDatede
```

```
        FontBold = .T., ;
        WordWrap = .T., ;
        BackStyle = 0, ;
        Caption = "FAULT", ;
        Left = 5, ;
        Top = 75, ;
        Width = 36, ;
        TabIndex = 18, ;
        ForeColor = RGB(128,0,128), ;
        Name = "lblFault"


ADD OBJECT txtaction AS textbox WITH ;
        Comment = "", ;
        Alignment = 0, ;
        ControlSource = "m.action", ;
        Format = "!", ;
        Height = 23, ;
        Left = 123, ;
        MaxLength = 35, ;
        TabIndex = 5, ;
        Top = 96, ;
        Width = 241, ;
        Name = "txtAction"


ADD OBJECT lblaction AS label WITH ;
        AutoSize = .T., ;
        FontBold = .T., ;
        WordWrap = .T., ;
        BackStyle = 0, ;
        Caption = "ACTION", ;
        Left = 5, ;
        Top = 101, ;
        Width = 43, ;
        TabIndex = 19, ;
        ForeColor = RGB(128,0,128), ;
        Name = "lblAction"


ADD OBJECT txtdateree AS textbox WITH ;
        Comment = "", ;
        Alignment = 0, ;
        ControlSource = "m.dateree", ;
        Format = "E", ;
        Height = 23, ;
```

```
Name = "Form1"

ADD OBJECT txtcompcode AS textbox WITH ;
        Comment = "", ;
        Alignment = 0, ;
        ControlSource = "m.compcode", ;
        Height = 23, ;
        Left = 124, ;
        MaxLength = 12, ;
        TabIndex = 2, ;
        Top = 24, ;
        Width = 94, ;
        Name = "txtCompcode"

ADD OBJECT lblcompcode AS label WITH ;
        AutoSize = .T., ;
        FontBold = .T., ;
        WordWrap = .T., ;
        BackStyle = 0, ;
        Caption = "COMPUTER CODE", ;
        Left = 5, ;
        Top = 29, ;
        Width = 100, ;
        TabIndex = 17, ;
        ForeColor = RGB(128,0,128), ;
        Name = "lblCompcode"

ADD OBJECT txtfault AS textbox WITH ;
        Comment = "", ;
        Alignment = 0, ;
        ControlSource = "m.fault", ;
        Format = "!", ;
        Height = 23, ;
        Left = 123, ;
        MaxLength = 35, ;
        TabIndex = 4, ;
        Top = 72, ;
        Width = 241, ;
        Name = "txtFault"

ADD OBJECT lblfault AS label WITH ;
        AutoSize = .T., ;
```

```
**********************
*Menu Section
**********************
set device to screen
clear
SET SYSMENU OFF
CLOSE ALL
CLEAR
set date to brit
set safety off
set color to w/b
set exclusive o
set date to bri
set century on
set status off
set talk off


clear
set path to d:\repair
set defa to d:\repair


PUBLIC MY, mycar,trail
store space(9) to mycar

_screen.icon = "entimet.ico"
_screen.caption = "Computer Maintenance & Repairs Information Management System."
_screen.picture = "bank.jpg"


my =0
do form frmlogin
do mainmenu.mpr
read events
return

DEFINE CLASS form1 AS form


        Top = 0
        Left = 0
        Height = 259
        Width = 410
        DoCreate = .T.
        Caption = "MAINTENANCE AND REPAIR FORM"
```