COMPUTERISATION OF THE RECORD KEEPING SYSTEM OF A MAINTENANCE WORKKSHOP (A CASE STUDY OF NIGER STATE AGRICULTURE DEVELOPMENT PROJECT MINNA)

BY

RUFAI AUDU
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CERTIFICATION

This is to certify that this project has been read and approved as meeting the requirement for the award of Post-Graduate Diploma in Computer Science in the Department of Maths and Computer Science. Federal University of Technology, Minna, Niger State.

SIGNATURE (SUPERVISOR)
MR. L.N. EZEAKO

DATE

SIGNATURE (H.O.D.)
DR. K. R. ADEBOYE

DATE

SIGN. (EXTERNAL EXAMINTER)

DATE

DEDICATION

This project is dedicated to my beloved mother Hajiya Fati Adamu Audu and my Father Alhaji Adamu Audu Bida.

ACKNOWLEDGEMENT

I wish to express my profound gratitude to my Supervisor Mr. L.N. Ezeako for giving the necessary guidance on how to carry out this project and the Head of Department Maths and Computer Science Dr. K. R. Adeboye, the course co-ordinator Prince R. O. Badamosi, my Project and all the lecturers in the department who helped me in one way or the other throughout the period of my study, but most especially while I was writing this project.

My profound appreciation also goes to the Deputy Director Engineering Services, Niger State Agricultural Development Project Minna, Alhaji Abubakar Bima Nagya for enabling me collect vital information and data for this study, and to all my friends and course mates for the discussion and sharing of ideas we had which helped me in writing this project.

Lastly, I would like to record my appreciation to my father and mother for giving the moral and financial support which made this work to be possible. My profound gratitude also goes to the Almighty Allah for sparing my life and guiding me throughout the period of this programme, and to all who contributed to the successful completion of this projeect work and course, I say thank you and God bless you all.

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ABSTRACT

This project work is on the computerization of the record keeping system of a maintenance workshop a case study of Niger State Agricultural Development Project, Minna. The research was carried out by the research student in order to find out problems that arise as a result of using the manual system of record keeping in the workshop of the organisation.

From the review of literature issues concerning the research work were studied and discussed to provide the necessary insight on the study.

However, feasibility study was carried out to findout problems that are inherent with the existing system of operation in the workshop and a new system was designed to find solution to the problems with the existing system of operation.

Programs were written and explained, the operation of the software developed was also explained so as to enable users to know how to operate the new system. Based on the findings, conclusions were drawn and certain recommendations made.

CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND OF STUDY

A computer is an electronic machine which is capable of processing data in a wide variety of ways with an extremely high degree of speed and accuracy. A computer can receive data, store it, process the data and give the output in the required format based on the specification by the user. The storage capability of the computer allows for automatic processing of data which subsequently eliminates manual interference between data input and information output.

Computers first appeared in the 1940s. The early inventions were bulky, cumbersome to use and performed computations, rather slowly in comparison to modern digital computers. They advanced from mechanical relays to vacuum tubes to transistors and to silicon chips. Computers today are more compact, faster and less expensive than their predecessors. Today, some micro-computers can handle the computations of early day mainframes. Technological advances in this field have been truly dramatic.

The application areas of computers have grown rapidly, computers are widely used in the fields of engineering, medicine, education, automobile technology, agriculture, statistical work, economic planning. However, the most spectacular growth has been in the field of business application.

The use of computers in these application areas will however, depend on a number of criteria which include the volume of data to be processed, speed and ability to access data from remote locations, complex calculation or computations which can be programmed.

Similarly, tasks such as record keeping that require repetition for various sets of data are ideally suited for computer system.

Computers were initially developed for scientific and engineering applications. Today, computer technology affects almost every aspect of our daily lives. Our water electricity and telephone bills are prepared by computers, our magazine subscriptions are processed by computers, banks and savings and loans associations routinely use computers for more efficient record keeping.

The computer is a tool, perhaps our most powerful tool. It extends our ability to calculate and process data. The computer is directed by a program stored in it that enables the computer to perform certain tasks and make specific decisions. The program itself is stored within the computer, it can modify itself. This capability of self-modification gives the computer through its stored program, the ability to perform complex logical tasks.

files. The offices are filled to the beam and the store rooms sometimes cannot contain any more files. In line with this, the research student realizes that there are many problems associated with the existing system of keeping records in the workshop of the organization. Therefore, the need for a faster cheaper, efficient and reliable method keeping records in the organisation, which necessitate the use of computer.

1.1 PURPOSE/OBJECTIVES OF STUDY

i. To development a program that will ease the storage and retrieval of information.
ii. To reduce the problem of misplaced information.
iii. To reduce data storage redundancy.
iv. To provide accurate method of updating records.
v. To make work more efficient and reliable.
vi. To investigate for alternative, cost effective and efficient method of keeping records.

1.2 SIGNIFICANCE OF STUDY

The significance of this study can not be over emphasized. However, the study will be useful to anybody who wishes to carry out further research on the same subject, this is to say that it will serve as a reference material to that person.

Furthermore, the study will help the organisation in checking

1.5 DEFINITION OF TERMS

Ambient:- On all sides, to go round the air

Chips:- Miniaturized wafer as silicon on which an integrated circuit is printed.

Corrosive:- Substance which wears away the surface of a solid as result of chemical action on the surface of the solid material e.g. metal.

CUMBERSOME:- Burdensome, heavy and awkward to carry.

DATA:- Raw information, That have not been processed.

DISC:- Thin flat round plate that appears to be to flat which operates when a flat plate is brought into contact with another (rotating). plate at the center of a car wheel.

ENCLAVE:- Territory wholly within the boundaries of another.

HECTARE:- Measure of area in the metric system 10,000sq meters or 2.471 acres

HOIST:- Lift with an apparatus of ropes and pulleys,cranes etc

HYDRAULIC:- Water moving through pipes worked by pressure of fluid, which the braking force is transmitted by compressed fluid.

LINING:- Material which lines an inner surface which are used for reinforcement.

MAINFRAME:- Central processing unit of a computer containing the control unit and the circuits for input, output and storage.

MANOMETER:- An instrument used for measuring gases or vapour pressure

ii. Provision of tractor hiring services, crop protection services and credit facilities.

iii. Construction and maintenance of low cost feeder roads.

iv. Intensive extension services to farmers.

v. Massive training efforts for both project staff and farmers backed up by on-farm adaptive research and trials on improved farming methods, crop variety and equipment.

vi. Development of rehabilitation of a target 7,300 hectares or irrigation scheme.

(b) Sub-Programmes Objective

The objective of the sub-programmes is to provide and maintain an effective management and administrative system that would support and ensure the smooth and successful operation of the Niger State Agricultural Development Project in accordance with the approved policy guidelines and programmes of activities.

2.2 MANUAL RECORD KEEPING

The keeping of records in every organisation is very important in the smooth running of the organisation, this will also help the organisation to realize how far it is achieving its aims and objectives. However, right from time the manual system of record keeping is characterized by so many problems. Such problems are:

(i) Cumbersome: Records that are kept manually are sometimes

fire, water etc by storage in metal cabinets, the space taken up by these cabinets must also be rented.

(ii) How to find these documents when needed. It takes time before such documents are seen.
(Davies D. Information Technology at Work).

In view of these statements. It is seen that where information processing is done manually, frauds are committed and the organisation can be set ablaze and the whole documents are burnt and destroyed and nobody is able to detect exactly who committed such fraud. Like what happened in **NITEL HOUSE** that was engulfed by fire and also the **DEFENCE HOUSE** at Lagos where so many important documents were lost as a result of the fire incident.

However, in our ministries or government parastatals, some people use the manual system to make money. When your file is being processed, some clerks retrieve these files and hide them causing delayment in processing the files. The clerks have to be bribed before such files are released. In fact so much have been said concerning the problems associated with the manual system of information processing. The record keeping system of the maintenance workshop of the organisation cannot be free from such problems if the recording system is not computerized.

maintenance was defined and the types of maintenance were listed and explained. Safety precautions to be observed in the maintenance workshop were also listed. However, the advantages of computerising the record keeping system of a maintenance workshop was also highlighted.

Chapter three deals with system analysis and design. The problems with the existing of operation were listed and feasibility study was also conducted, facts gathered from the feasibility study were analysed so as to find out the strength and weakness of the existing system; so as to design a new system. Input and output were specified in the data base structure and file defined. The techniques used in finding facts were listed and explained various tests in testing the project feasibility were also listed and explained. The capabilities of the new system were also highlighted. The change over procedures were also listed and discussed where the parallel system of change over was recommended. The cost benefit of the new system was also analysed. The reasons why the system has to be maintained periodically were also explained.

Chapter four has to do with software and programming development. Software was defined and types of software were listed and explained. Programming was also defined and types of programming languages were discussed where DBASE IV was

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i. Decreased elapse time

ii. Ensure consistent procedures

iii. Automated tedious task

iv. Capture system date.

(Senn J.A. - Analysis And Designed Information System (1989).

In a similar observation by Fuori W.M. - Regardless of whether the system used to process the data is manual mechanical or electronic, certain fundamental operations must be performed. These operations are:

i. Recording

ii. Summarizing

iii. Classifying

iv. Sorting

v. Calculating

vi. Reporting.

(i) Recording: Is the transcribing of data into permanent form,

(ii) Summarizing: Involves the consolidating of data emphasizing main points and tendencies.

(iii) Classifying: This involves classifying or grouping of like terms transaction.

(iv) Sorting: This has to do with arrangement of data into sequence according to some common characteristics.

(v) Calculating or Computing: Is the adding, subtracting, multiplying or division of raw data to produce useable results.

(vi) Reporting: Once the data have been summarized they must be

2.3 VEHICLE MAINTENANCE

Maintenance is the ability of keeping vehicles in proper operating condition. In order for the vehicles to remain functional. It must be maintained and repaired for its operational efficiency.

The main objective of maintenance is to prevent failures and malfunctions, forestall rapid wear of components, eliminate in good time the defects which interfere with normal operation of the vehicle. Thus maintenance is a preventive course of action.

Maintenance is nothing more than cleaning and washing, trouble shootings, mounting hardware tightening, lubricating, filling, adjusting and other operations which are carried out as a rule in order to keep the vehicle working efficiently.

Maintenance can be classified into number of types depending on their occurrence scope of work and labour requirements involved. These are:

i. Daily Routine Maintenance
ii. Weekly Maintenance
iii. Monthly Maintenance
v. Seasonal Maintenance

Operations

- Check the oil filter for dirts, and flush out the dirts, to clean the oil filter. If clogged with too much dirts replace with a new one.
- Remove the plug and check for carbon deposits on the plug and ensure that the deposits are properly cleaned after every 3600 km. When setting the gap, adjust the side electrode and check with a wire gauge for preference. If plug is clogged with too much carbon deposits replace with a new one.
- Inspect the friction linings (brake pads], wheel brake springs, master cylinders of the hydraulic brake and the air compression of the pneumatic brake using a testing manometer to check it.
- Check the hydraulic pipes for leakage. The point of leakage are detected by brake fluid leak. In pneumatic brake, they are detected by listening to the hissing of the escaping air, for better detection soapy water is applied to the brake line connection. Where there is leak, air bubbles will show.
- Check leaf springs and their cushion for ruptures and cracks in leaves, and ensure that the left and right leaf springs have even deflection.
- Ensure that the shock absorber with lever arm that has a filter plug is topped up with damper fluid at regular intervals.
- Check the shock absorber for signs of leakage and make sure that the leaking unit is replaced.

Table for Maintenance

Driving Condition	Maintenance Item	Maintenance operation	Maintenance Interval
a	Air cleaner filter Dry paper type other types	Clean Replace	More frequently
	Pvc filter and air induction valve filter	Replace	
a,f	Fuel filter	Replace	Every 20,000km
e	Brake fluid	Replace	12,000 miles or 12months
b	Automatic transmission Fluid	Replace	Every 40,000km (24, 000 miles)or 24 months
b--d	Steering, gear and linkage axle and suspension parts, propeller shaft and front axle shaft.	Check	Every 5000km (3,000 miles) or 3 months
a,b--d	Brake pads, discs and other components brake lining, drum and other components	Check	
a,b--d	Brake lining, drum and other components	Check	Every 10,000km (6,000miles)or 6 months
d	Lock hinges and hood latch	Lubricate	Every 5,000km
c	Front wheel bearing grease and free-running hub-grease	Check	(3,000 miles) or 3 months

iv. **Seasonal Maintenance**

Seasonal maintenance is timed to be carried once twice a year and involved in this case are operations associated with seasonal changeover. Seasonal maintenance often coincides with monthly maintenance.

operations:

- Washing the cooling system, most especially the radiator, by flushing out the dirts in the radiator so as to allow efficient cooling of the engine.

- Changing the lubricant in the engine - crankcase and in the oil bath of other units (fresh oil of a grade appropriate for the forthcoming season should be used].
- Check the fuel system and wash the fuel tank and ensure that anti-rust is used in washing the tank.

The recurrence of maintenance is decided by the kilometers logged by every motor vehicle of a fleet given service conditions. The servicing of a vehicle depends on certain conditions such conditions are type of road condition / pavement, traffic intensity etc

General Maintenance

General maintenance includes those items which should be checked during the normal day-to-day operation of the vehicle.

They are essential if the vehicle is to continue operating properly. The owners can perform the checks and inspections themselves or they can have their mechanics do the checking for them for a nominal charge.

i. **Engine**

- Check the engine oil level and gauge it.
- Check the radiator for coolant/water level and top it, if necessary.

ii. **Brake\clutch**

- Make sure that the brake and clutch fluid level is between the MAX and MIN lines on the reservoir.

iii. **Battery**

- Check the fluid level in each cell. It should be between MAX and MIN lines.
- Remove dirts from vent plugs so as to allow free flow of air.

iv. **Windshield Washer**

- Ensure that there is adequate fluid in the windshield washer tank.
- Ensure that the wiper is always in good operating condition.

v. Lights

- Make sure that the headlights, spotlights, tail and lights, turn signal and other lights are all operating properly and installed securely.

vi. **Steering**

- Check for change in steering conditions such as excessive free play, hard steering or any strange noise.

vii. **Gearing/Transmission**

- Check the gear/transmission oil and ensure that there is adequate gear oil in the gear box.
- Check for change in gearing conditions, such as gears jumping out of mesh, noisy gear box worn bearings etc

viii. **Tyre**

- Check that there is adequate air pressure in the Tyre and make sure that it is gauged.
- If the Tyre is misaligned and unbalanced, make sure that it is carried out for alignment.

Periodic Maintenance

periodic maintenance is normally carried out depending upon the weather and atmospheric condition, varying road surfaces, individuals driving habits and vehicle usage. Additional or more frequent maintenance may be required when:-

a. Driving under dusty conditions.
b. Driving on rough or muddy roads or in the desert.
c. Frequent driving in water.
d. Driving in areas using salt or corrosive materials.
e. Driving in high humidity areas or in mountainous areas.
f. Driving in extremely adverse weather conditions or in areas

where ambient temperatures are either extremely low or extremely high.

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2.4 SAFETY PRECAUTION

These are measures or rules that are observed in order to prevent accident in a workshop environment.

Precautions

- Vehicles must not be started or moved in the workshop by inexperience person.
- Before commencing work on a vehicle, the battery should be disconnected. This prevent short circuit or accidental rotation of engine.
- Beware of open pits. If part or the whole of the pit is exposed, a movable guard rail placed around the pit may prevent some one from falling.
- A mechanic working on the upper part of the vehicle must take care that no tools or components fall on to anyone working below.
- Before working beneath a vehicle on a hydraulic hoist, check that the hoist is functioning properly and make sure that all is clear before lowering the hoist. Do not use a hoist or a crane to lift a load beyond that for which it was designed.
- Before jacking up a vehicle ensure that the hand brake is on or the wheels are prevented from rolling by placing wooden blocks or bricks in front of the front wheels as suits the case. Always place axle hands beneath the axles to ensure against failure of jack.

chosen as the programming language because of its powerful and useful features. Requirement was explained and the hardware and software requirements needed for the new system including the computer operators. The procedures tells us about the steps that will be taken in order to produce the desired output. The operational manual explains to the user how to operate the system. Programs were also written which enables us to carry out operations such as entering data, viewing records computation and also deleting records, etc Modular programming structure of the proposed system shows us how the programs were written in modules from the main program to other sub-programs. The software has to be maintained in order to correct lateral defects.

Chapter five deals with the summary conclusion and recommendations . References were listed and also the appendices.

1.4 SCOPE AND LIMITATION OF STUDY

The scope of the study is on the record keeping system of the maintenance workshop of the organisation. The study is limited to the records of the maintenance of vehicles in the organisation. Due to time constraints the research student will not be able to deal with the record keeping of maintenance of tractors and heavy duty machineries (plants) in the workshop of the organisation.

PNEUMATIC:- Worked or driven by compressed air filled with compressed give e.g tyre

RELAYS:- To pass on or to transmit a program recorded from another transmitting station

VACUUM TUBE:- An electron tube containing an almost perfect vacuum.

VOLATILE:- Liquid that easily and quickly evaporate at ordinary temperature, that can change easily.

CHAPTER TWO

RELATED LITERATURE REVIEW

1.0 HISTORY OF NIGER STATE AGRICULTURAL DEVELOPMENT PROJECT

The Niger State Agricultural Development Project (NSADP came into being soon after the official closure of Bida enclave Agricultural Development Project. The NSADP is one of the multi-state Agricultural Development Project II (MSADP II) sponsored by World Bank organisation. Loan (No. 2988 UN) with initial sum of United State $28.54m, equivalent to #146.326m in 1988. The loan was negotiated and approved in 1988 and implementation commenced early in 1990 following the loan effectiveness in November, 1989. The initial loan period was terminated in June, 1993.

The Mid-Term Review of project implementation was undertaken in 1992/93. The MTR team also undertook a re-redesign exercise which resulted into the extension of the project life by one year to June 1994 and another year to June 1995. This (1995) work programme/plan is therefore built on the rounding up activities after the project implementation. In fact, during the year an Implementation Completion Review would be undertaken. Also to be undertaken is operational planning covering the period June 1995 to December, 1997. This is to specify activities towards sustenance of the project. Also incorporated into the document are activities expected to be undertaken by new projects which the project intends to go

into notable among these are the National Agricultural Technology Support Project (NATSP) and National Fadama Development Project (NFDP).

The project uses programming budgeting and monitoring system (PBMS) to produce annual work programmes/plans, but once again because of the deficiencies in some submissions only Form A, B and C of the system are used to give annual project summary work plan and time-line charts. However, Form G (Monthly Monitoring Forms) would be used for monthly monitoring of physical and financial progress.

NSADP covers an area of about 84,000 sq. km. with about nineteen (19) Local Government Areas (LGAs). The project is operated under three (3) zones based on cropping pattern each headed by a Zonal Manager. The project is managed by a management team (NADMU) headed by a Managing Director under guiding policies formulated by an Executive Committee (NADPEC) chaired by the State Chief Executive. The project has three (3) operational divisions namely Agriculture and Technical Services, Commercial Services and Engineering Services (Rural Infrastructural) and four (4) other supportive ones namely Management and Administration, Finance Accounts, Human Resources Development and Planning, Monitoring and Evaluation.

There are sub-programmes under each of the division and the supportive ones.

(i) AGRICULTURE AND TECHNICAL SERVICES

(a) Extension: Unified Extension Services including Women-In-Agriculture and Fisheries.

(b) Technical Services: Crop and Non-crop on-farm trails/on-station trails.

(c) Seed Multiplication: Direct effort by project and contract outgrowers.

(d) Animal Traction.

(ii) COMMERCIAL SERVICES

(a) Cash sales

(b) Co-operative Financing Agency (CFA)

(iii) ENGINEERING SERVICES

(a) Road

(b) Building

(c) Fadama Development and Rural Water Supply

(d) Workshop

(e) Agro-processing.

(iv) MANAGEMENT AND ADMINISTRATION

(a) Management

(b) Administration

(c) Internal Audit

(d) Stores/Procurement

In a similar observation by Mullins E. - Each business organisation has its own reason for computerizing its office function. The most common reasons are:

(i) Existing system are unable to accommodate the rate of organisational growth.
(ii) Delays in output of information (turn around time).
(iii) Delays in retrieving and collating information.
(iv) Inefficient and time wasting procedures often involving duplication.
(v) High error rate.

(Mullins .E Information Processing A Student Book).

In view of this, any of the above could result in reduce organisational growth, lowering of staff morale leading to inefficiency in production rate and in adequacy in record keeping in the organisation. It could also lead to poor management and administration within the organisation.

In a related development by Senn J. A.

A benefit of computer aided tools information further improve the benefit of using a computer in record keeping in other to generate information. The time needed to perform tasks decreases, labour intensity is reduced, procedures are followed constantly and data describing the system are captured for storage in computer readable for. This will help in:

- Never use a jack to lift a load heavier than that for which it was designed.

Tools

- Tools used in the maintenance and repairs of vehicles should always be in proper working condition.
- Never use the wrenches with worn faces or of inadequate size. Never use any bar to elongate the tool handle.
- In tightening or loosening nuts it is preferable to use rings and box spanners. These make a better grip of the nuts and are convenient in work. If the component of interest is difficult to reach and where tool handling is limited, use a rachet wrench.
- Always clean tools and keep in a tools box or tools rack after usage.

Electrical system

- Always keep electrical tools separate and before using them check to see they are in proper working condition.
- Always connect the electrical tools to the supply line only via a plug and socket connection which has an earth terminal.
- Do not hold electrical tool by its cable and do not touch the rotating parts until they come to a complete standstill.
- When the work is over disconnect electrical tool immediately.
- With storage battery. All the persons handling batteries must be briefed on the procedures and safe rules involved in the

maintenance of batteries.

- If some electrolytes or acid is spilled on the skin, wash it out immediately with a strong water jet or 10 percent solution of soda or ammonium hydroxide.
- After handling battery wash hands thoroughly with soap and hot water.
- Do not smoke or keep any food in the room where storage batteries are serviced.
- The racks walls and floors should be provided with an acid-resistant coating. The coating of the wall should at least be 1.75m high.
- When preparing electrolyte, always pour sulfuric acid into the distilled water by small portions. Never pour the distilled water into the sulfuric acid since a vigorous reaction of water with a large volume of acid leads to splashing and probably burns of skin and eyes. Do not prepare electrolyte in a glass vessel since the latter may burst due to the heat emitted as the acid dissolves in water.

FIRE

- Do not smoke or start a wood fire near re-fuelling points or in the workshop and never use naked flame when checking for the presence of fuel in drums and tanks.
- Use cotton waste to remove spilled oil/fuel in the workshop and keep oil soaked waste in lidded metal box. Since a great risk surrounds the motor vehicle owing to the presence of

petrol which is very volatile and highly inflatable.

- All traces of petrol or fuel must be removed before applying heat to a petrol tank. Every possible access to the tank should be opened. Filter cap, drain plug, and outlet connections.
- Periodically check the condition of electrical equipment and wiring for a spark may be the cause of fire. If wiring should catch fire as a result of short circuit immediately switch off loads or disconnect the wiring and then fight the fire as usual.
- If fire breaks out immediately cover the flames up with clothing free from oil stains or a piece of canvas or felt, extinguish them with water or blanket them with earth or sand.
- If petroleum products catch fire, put it out with a fire extinguisher, blanket it with earth or sand or cover the flames with a piece of canvas or felt, but never use water.

2.5 COMPUTERIZED RECORD KEEPING SYSTEM OF THE MAINTENANCE WORKSHOP

Since the organisation has many vehicles, tractors, heavy duty machineries such as bulldozers, graders, paleloaders etc there is the need for the computerization of the record keeping system of the maintenance workshop. In order to store the large volume of information needed in the record keeping system of the maintenance workshop, the organization can buy a computer with large memory capacity, also information about the record keeping can be stored in diskettes which are very

small compare to the manual system which involves the use of files and paper which are bulky.

However, it will be more economical using a computer system than the manual system of record keeping in the sense that there is the need to be buying files, papers and printing forms that will be filled periodically. Also many people are involved in the manual system of record keeping as such the organisation has to be paying these people at the end of the month, by the time you compare the payment of these staff for three to four years, it will be quite enough to buy a computer system which is more accurate and reliable and of which only one or two people can use to do the work of many people using the manual system. Therefore, the computerized system will save the organisation some cost.

The computerization of the maintenance workshop will also help the organisation to check fraudulent practices, observed by some mechanics and drivers because any maintenance, repair work or parts changed on the vehicle will be reflected on the computer system; by the time the organisation is checking the record of each vehicle and it is found out that a particular vehicle is maintained and repaired frequently, more than the others, it will know that something is wrong, and thereby take measures to prevent such practices.

Another very important reason why the records of maintenance workshop is to be computerized is that it will help the organisation to know how much it will budget for the maintenance of its vehicles for a year or throughout their life span because, the maintenance cost of each particular vehicle will be taken at the end of the month. It will also help the organisation to know the life span of their vehicles; that is when the vehicles in the organisation are due for change, so that the organisation will purchase new ones.

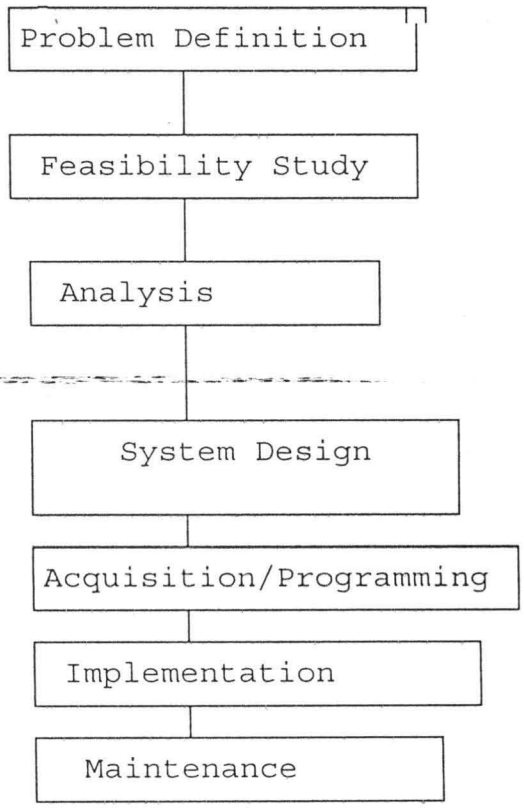
CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.0 AN OVERVIEW OF THE SYSTEM

The emphasis of system design is to develop a new system that helps to achieve the goals and objectives of the organisation and overcome some of the shortcomings and limitations of the existing system.

However, every system consists of a number of interrelated components. In order for the system to function properly, these components must work in harmony. Developing a detailed plan for a computer based system include going through the following stages:



1. **PROBLEM DEFINITION**

The problem definition stage points out the lapses in the existing system. Therefore, the nature and scope of the existing manual system of record keeping in the maintenance workshop of the organisation is determined by the research student and are hereby listed below:

i) Inadequate storage facilities like cabinets, drawers or lockers. Most a times you see files that are used in the recording of the maintenance of vehicles lying on the ground in the workshop supervisors office; thereby, occupying too much space in the office.

ii) Since it involves the use of manual record keeping a lot of paper work is involved. Therefore, it is easy for important documents or information to be destroyed due to frequent handling of the files and papers.

iii) Lack of adequate security: Documents could be removed without any ones knowledge.

iv) Since a lot of paper, files forms etc are involved, replacement always cause delay due to bureaucratic bottlenecks involved in raising funds in the organisation to purchase such materials.

v) Retrieval of information: A lot of time is wasted since the speed of retrieving information is very slow as one has to search for a particular file (among many) from which the information is to be obtained.

vi) Duplication of records, there are some forms that are filled

in order to keep the record of maintenance of vehicles like the job cards and the vehicle logsheet of which the nature of repair/service carried on the vehicle are specified.

2. FEASIBILITY STUDY OF THE EXISTING SYSTEM OF OPERATION

The main aim of carrying out the feasibility study is to carefully study the current manual way of keeping records of maintenance of vehicles in the workshop, with a view to determine whether it should be enhanced or an entirely new system be developed. The workshop supervisor enables the research student to carry out his research by giving his full cooperation and necessary information the research student required.

However, a careful study of the existing method of record keeping in the workshop reveals that there are about five (5) forms that are filled in order to keep the record of maintenance of each vehicles. These forms are:

i. Stores Requisition Form;
ii. Workshop Job Card;
iii. Vehicle Logsheet;
iv. Monthly Routine Service Card;
v. History Card.

i. Stores Requisition Form:

This form is for the stores whereby request is made from the

user department for spare parts of the vehicle after the fault of the vehicle has been identified by the mechanic. The storekeeper that will issue out the spare parts fills the form specifying the type and quantity of spare parts to be issued out. The vehicle registration number is also taken, the person requesting for spare parts and the storekeeper issuing out the spare parts will all sign the form and finally the Chief Store Officer will also sign so as for him to know the number of items going out of stock from his store. Then the mechanic will be issued the spare parts so as for him to effect repairs on the vehicle.

ii. **Workshop Job Card**

The workshop job card is normally issued to the mechanic to fill after he has already effected the repairs on the vehicle. The mechanics will now fill in the vehicle registration number, date, the description of the nature of work/repairs carried out on the vehicle, the quantity of spare parts used, the rate and total cost of the spare parts. At the back of the form the mechanic will also fill in the date, his name or tally number, the number of hours worked, the supervisor (IOC) will also endorse his signature and then finally remark.

iii. **Vehicle Log Sheet:**

This form is in three (3) parts:

Part A:

This part deals with the trip of vehicles, that is the journey from one station to another, the speedo out and speedo in reading of vehicles so as to determine the distance covered by the vehicle, the drivers signature and remark.

Part B:

This part has to do with reading of the quantity of oil/fuel used in litres. The description of the type of service and repair work carried out on the vehicle and the cost where applicable.

Part C:

This section deals with the monthly summary. The total kilometre covered in the month. The fuel/oil used in the month in litres and the total running cost.

iv. Monthly Routine Service Chart

The form is used to determine when a vehicle is due for servicing. The type of vehicle is specified and the date for the servicing of the vehicle. The registration number of the vehicle is used to initialize the vehicle, for example NG02A32 becomes vehicle A, NG03A32 becomes vehicle B etc The monthly routine service chart is used in conjunction with the vehicle logsheet to determine the distance covered throughout the month. By the time it covers a distance of 3600km., it will be due for servicing therefore, the date for the servicing of such vehicle will be reflected on the monthly routine service chart.

v. History Card

The history card of vehicles is used to determine the life span of the vehicles. The type of vehicle and its registration number is specified, the month and year. The history card is used in conjunction with the job cards; to determine the cost of maintenance and repair work carried out on the vehicle. Each vehicle has many job cards depending on how many times maintenance and repair work is carried out on it. The job cards of a particular vehicle for that year makes a history card for the vehicle, by the time the maintenance cost of a vehicle is added throughout the year or throughout its life span, it will help the organisation to know how much it will budget for the maintenance of each vehicle for a year or throughout its life span. If the economy is stable that is when prices of items such as spare parts, fuel and oil are not increased.

How Records Are Kept

The stores requisition forms are normally kept in files in a cabinet and are labelled based on the month and year of entry. This is normally in the storekeepers office.

The job card and monthly routine service chart and vehicle logsheet are also kept in files and cabinet in the workshop supervisor's office. Each vehicle has its own job card, the registration number of the vehicle is labelled on the file for

DATABASE STRUCTURE FOR INPUT SPECIFICATION

FIELD NO	FIELD NAME	FIELD TYPE	FIELD WIDTH	DEC
1	T VECH	CHARACTER	18	
2	PDATE	DATE	8	
3	CHASIS NUMBER	CHARACTER	10	
4	REG:NO	CHARACTER	10	
5	MDATE	DATE	8	
6	NREPAIR	CHARACTER	30	
7	PARTS	CHARACTER	50	
8	PCOST	NUMERIC	8	2
9	LCOST	NUMERIC	8	2
10	FCOST	NUMERIC	8	2
11	DIST-COV	NUMERIC	8	0
12	TCOST	NUMERIC	8	2
13	CCOST	NUMERIC	8	2
14	DRIVER	CHARACTER	15	
15	ENGINEER	CHARACTER	15	
16	MONTH	CHARACTER	10	

3.2 OUTPUT SPECIFICATION

Normally, the starting point of any system design is the output. It is therefore necessary to consider what is required from the new system before deciding how to set about producing it. The analyst will need to consider form, types, volume, frequency of reports and documents. Below is the data structure for output specification.

DATABASE STRUCTURE FOR OUTPUT SPECIFICATION

FIELD NO	FIELD NAME	FIELD TYPE	FIELD WIDTH	DEC
1	TVEH	CHARACTER	18	
2	PDATE	DATE	8	
3	REG:NO	CHARACTER	10	
4	D_COVERED	NUMERIC	8	2
5	FUEL	NUMERIC	8	
6	MCOST	CHARACTER	10	2
7	DRIVER	CHARACTER	15	
8	ENGINEER	CHARACTER	15	
9	MONTH	CHARACTER	10	

3.3 FILES

A file us a collection of meaningful information to which the user can attach a name or a collection of related data records usually grouped together for the purpose of access,

control, retrieval and modification. The file is very much linked to input and output. Input is processed against the files to produce the necessary output. Consideration involved in designing files are:-

i. Storage media.

ii. Method of file organisation and access.

iii. File security.

iv. Record layout.

5. **ACQUISITION/PROGRAMMING**

This involves the selection and acquisition of the hardware/software or developing the needed software to be used by the new system. This will be discuss in detail in chapter four (4).

6. **IMPLEMENTATION**

In this stage the program were actually coded and debugged. The research student then spent time preparing operating procedures, security procedures, back up and recovery procedures and also a solid test plan for the system.

7. **MAINTENANCE**

This includes whatever changes and enhancements need to be made after the system is up and running.

3.4 FACT FINDING TECHNIQUES

It is essential to gather facts about the current system to ensure that all strengths and weaknesses are discovered. Thus, when a new system is designed as many of the weaknesses as possible are eliminated whilst retaining its strength. However, there are several methods of gathering information, those used depending upon the particular circumstances. These are:-

i. Interviewing
ii. Record inspection
iii. Questionnaires
iv. Observation

i) **Interviewing**

This is probably the most widely used technique and satisfactory way of obtaining information. During interviews fact about what is happening come to light together with the opinions of the existing system. Personal contacts are important in getting the operation of the people involved and in giving them the feeling of having made a substantial contribution towards the design of the new system. In this regard, the workshop supervisor together with the people concerned were interviewed by the research student in order to gain their confidence so as to gather all the necessary facts.

ii) **Record Inspection**

The study of the organisation charts, procedures, manual and

statistics can reveal much useful information about a procedure. However, a close study of the forms currently being used should give the best guide to the current practice, it may also indicate whether the organisations objectives are being achieved and whether information needed for decision making is available when required.

iii) **Questionnaires**

Questionnaires are used when detailed information about the nature and volume of work in the organisation is needed from a great number of people; when the study involves many different geographical locations, they may be the only practical method of gather facts. They save the time of the interviews but are difficult to design and are generally considered irksome to complete.

iv) **Observation**

This is best employed in conjunction with other techniques and carried out after the observer has an understanding of the procedures involved. It involves watching an operation for a period to see exactly what happens. The technique is particularly good for tracing bottlenecks, checking facts that have already been noted and generally apply a "seeing eye to the job".

3.5 Testing Project Feasibility

There are three (3) tests for testing project feasibility. These are:

i. Operational Feasibility
ii. Technical Feasibility
iii. Economical Feasibility.

i. Operational Feasibility:

This relates or is concerned with the work ability of the proposed information system when developed and installed. From my interaction with the Deputy Director Engineering, it was found out that the study is desirable.

ii. Technical Feasibility:

At the moment the workshop has no personal computer (pc) for the take off of this proposal. However, it is hoped that the facilities in the computer room, the proposed system could take off until such a time the organisation can acquire a personal computer (pc) for the workshop. Also the computer will not need much training in using the proposed system since it will be designed as much as possible to be user friendly.

iii. Economical Feasibility:

The test for financial feasibility is undertaken to assess cost of implementing the proposed project. The hardware, software and stationeries that will be needed by the maintenance workshop are affordable.

3.6 NEW SYSTEMS CAPABILITIES

The capabilities of the new system include the followings:

i. **Speed**

The most obvious benefit of using a computer is speed. The computer can perform calculations and data processing more quickly than alternative methods, work that might take several months or years to be completed manually maybe accomplished in hours or at most days by the computer. For example some computers can do hundreds of thousands or even millions of arithmetic operations per second.

ii. **Accuracy**

If a computer is properly programmed and provided with accurate data, it will do the intended work with a very high degree of speed and accuracy. The computer does exactly what the program tells it to do. In addition the system does not get bored or fatigued thus, avoiding the errors human might make under the same circumstances.

iii. **Reliability**

The system can work almost twenty four hours (with little time for equipment check out and maintenance). Every day of the year computer can still operate reliably. Modern Electronic Computers perform at high levels of reliability and equipment failures are very few.

iv. **Retention**

The system can store and search massive files of data and programs. The contents of the files does not fade or get lost

and it can be used time and again.

v. Economy

The advantage of speed accuracy and reliability can after be translated into Naira (₦) savings realized. Usually, the per unit cost of processing data or doing computation by computer is considerably lower than by alternative means (i.e. manual or mechanical methods).

v. Wide Applicability

A computer system can be used to solve a wide variety of problems that arise in science and business. The boundaries of what the computer can accomplish are limited only by the ability and imagination of its users.

3.7 CHANGE OVER PROCEDURES

The change over from the old to the new system may take place when:-

- The system has been proved to the satisfaction of the systems analyst and the other implementation activities have been completed.
- The user managers are satisfied with the results of the system tests, staff training and reference manuals.
- The target date for change over is due.

The change of procedure may be achieved in a number of ways. The most common methods are:

i. Direct change over

ii. Parallel running

iii. Pilot running and

iv. Staged change over.

i. **Direct Changeover**

This method is the complete replacement of the old system by the new, in one move. Sometimes it takes over a week or even overnight. This method forces users to make sure the new system works. This means that the users have no other method to fall back on in the event of any problem. They must have complete confidence in the new system's reliability and accuracy before the method is used. Therefore, the method requires careful and detailed planning. This method is potentially the least expensive but the most risky.

ii. **Parallel Running**

In this method, the old system is operated along side with the new one. Its major advantage is that it offers the greatest security, since the organisation can still fall back to the old system without loss of time, money or services in the event of problems such as errors in processing. Its disadvantages are the double operation cost since the two systems are maintained, employment of extra staff or overtime working for existing staff which can create difficulties over the period of changeover, also the new system may not get a

fair trial.

iii. **Pilot Running**

In this method working conversion of the system is implemented in one department of the organisation. Therefore, based on the result of the outcome, the new results are compared with the old. This method is more like an extended system test, but it may be considered a more practical form of changeover for organisational reasons. It also gives experience as live test before implementation.

v. **Staged Changeover**

This method involves the gradual implementation of the new system in segments; while the remaining parts or sections are processed by the old system. Only when the selected part is operating satisfactorily is the remainder transferred. This method reduces the risks inherent in a direct change over of the whole system and enables the analyst and users to learn from the mistakes made as the changeover progresses. Its disadvantages are, it tends to prolong the implementation period of the new system. It also creates problems of controlling the selected parts of the old and new systems.

However, having looked at the advantages and disadvantages of all the four (4) methods of changeover procedures, in relation to this study. I therefore, recommend the parallel system of

change over procedure to be used in converting the old system to the new one.

3.8 COST BENEFIT ANALYSIS OF THE PROPOSED SYSTEM

The overall cost of computerization of record keeping of maintenance of workshop of Niger State Agricultural Development Project can be divided into four areas, which are:-

i. Installation or capital cost
ii. Maintenance cost
iii. Running cost
iv. Personnel training cost.

i. Installation or Capital Cost

These includes the cost of purchasing a personal computer including all the necessary hardware like printers keyboards etc, the system analysis and design, software development and cost of installation of the system.

ii. Maintenance Cost

The maintenance cost will mostly be on repair and servicing of the system which is necessary, and also the maintenance of the necessary software to meet the ever increasing challenges and needs of the user department.

iii. Running Cost

The running cost is basically on the purchase of back up copies like diskettes, stationeries, ribbon for printer etc which are necessary for efficient performance. This also include the electricity bills, etc

iv. **Personnel Cost**

This is the cost of training personnel to handle the computer and their monthly renumeration or salaries.

The total estimated cost of computerization of the workshop is calculated as follows:

i. **Capital Cost:**

- A personal computer complete with a printer, uninterrupted power supply)UPS) or stabilizer;
- Cost of installation = ₦15,000.00
- System Analysis/Software Development = ₦25,000.00

ii. Maintenance cost per annum (approximately) = ₦20,000.00

iii. Running cost per annum (approximately) = ₦10,000.00

iv. Cost of training two personnel and their salaries for a year = ₦30,000.00

Total: = ₦350,000.00

Additional contingencies 5% of the total estimate cost for the first year = ₦17,500.00

Over all total = ₦367,500.00

However, after the first year, the cost will drastically reduce because the maintenance cost, running cost and the salaries of the personnel will be the costs that will be incurred. As such the system will be able to pay back the initial investment in the next three or four years if the benefit derived from the new system is considered.

3.9 SYSTEM MAINTENANCE

Maintenance may be required to deal with faults which may occur as a result of the usage of the system. The system need to be reviewed and maintained periodically for the following reasons:

i. To deal with unforeseen problems arising in operation e.g. programs may need to be modified to deal with unforeseen circumstances.

ii. To confirm that the plan objectives are being met and to take action if they are not.

iii. To ensure that the system is able to cope with the requirement of the organisation.

CHAPTER FOUR

SOFTWARE/PROGRAMMING DEVELOPMENT

4.0 COMPUTER SOFTWARE

These are collection or suits of programs which are installed in the computer system to enable it perform its tasks or operations. It is the software that enables the computer hardware to be put into effective use.

However, three types of software are used in a computer these are:

i. Systems software
ii. Application software
iii. Utility software.

i. Systems Software

These are programs written usually by computer manufacturers. They contribute to the effective control and performance of the computer system. They provide several advantages and conveniences for programmers and computer users in general. Examples of systems software (program) include operating system and language translators.

ii. Application Software

Application programs may be provided by the computer manufacturer or supplier but in many cases the user produces his own application programs called USER PROGRAMS (e.g.

fair trial.

iii. Pilot Running

In this method working conversion of the system is implemented in one department of the organisation. Therefore, based on the result of the outcome, the new results are compared with the old. This method is more like an extended system test, but it may be considered a more practical form of changeover for organisational reasons. It also gives experience as live test before implementation.

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However, having looked at the advantages and disadvantages of all the four (4) methods of changeover procedures, in relation to this study. I therefore, recommend the parallel system of

easy identification of its job cards. The history card is also kept in files in the Deputy Director Engineering Office.

Retrieving Records

This is done by checking the labels of the files on the cabinet to look for a particular record that is needed by the user. This normally takes a very long time for the file to be seen. If it is seen there are times that some papers are missing from the files.

Editing Records

This is also done by searching for the label on the files for a particular document. When such files are found the necessary amendments are made on the records.

3. ANALYSIS

The system analysis involves detailed study of the current system including its procedures, information flows and methods of work organisation and control. The research student examined all the facts gathered in order to make proper assessment of the existing system; so as to spell out its strength and weakness in order to draw up the system specification, from which the programs will be eventually written.

4. SYSTEM DESIGN

The system design stage is based upon the findings obtained from the feasibility study and the analysis conducted. In designing the new system several criteria were considered. Major consideration was given to the requirement of the users.

Apart from considering the users requirement detailed specifications were given to the input, out, files, flexibility of the new system, ease of maintenance and efficiency of the new system.

3.1 INPUT SPECIFICATION

Here a database file will be used. The database, file is VEH.1DBF. This records the particulars of maintenance of each vehicle. The type of vehicle, the date of purchase, chassis number, registration number, maintenance date, nature of repairs, parts changed, cost of parts, cost of labour, cost of fuel distance covered, total cost, cumulative cost, driver's name, engineer's name and the month. The data base file will have 16 fields which will be shown in the database structure below:

payroll program, stock control program etc).

iii. **Utility Software**

They are pre-developed programs that can accomplish a particular task. They are standard packages that are developed by software organisations (e.g. word star, word perfect etc).

4.1 PROGRAMMING

The process of writing a program is referred to as programming. A program can be defined as a set or sequence of instructions which informs a computer of the steps required for achieving a defined task. Each instruction defines a basic operation to be performed identifies the address of the data to be processed and input/output devices to be used.

4.2 TYPES OF PROGRAMMING LANGUAGE

These are quite a number of programming languages available, these include:-

i. Basic
ii. Pascal
iii. Fortran
iv. Cobol
v. Snobol
vi. Data Base Management System, etc

i) **Basic**

Basic was designed in the mid-1960s to be easily used by beginners. Its name stands for Beginners All-purpose Symbolic Instruction Code and the aim was for a high level language which was friendly and easy to learn particularly for non specialist users. Basic is mostly used for simple applications. Complex applications will require the use of more sophisticated language.

ii) **Pascal**

The language pascal (named after Blaise pascal) was the result of research carried out by Niklaus Wirth in the late 1960s and early 1970s. The objective was to formulate a language which could be used as a vehicle to teach people the methodology of structured programming. Pascal meets this objective and has been adopted as a primary teaching language course in many educational institutions. The language really came into prominence due to its adoption as a standard language on many micro computer systems.

iii) **Fortran**

The name fortran stands for formula translator and as the name implies it was developed and is still used as a scientific application language. Fortran is the oldest of the high level languages and work started on forming the language in 1954. It was not until 1962 that steps were taken to try to

standardize its various versions. Fortran language is criticism because many of its statement forms are not easy to read. Despite its criticisms, FORTRAN is still in very widespread use.

iv) **Cobol**

Cobol stands for common business oriented language. this was developed in 1968. COBOL is by far the most widely used programming language in the world today and is likely to remain so for many years, not because it is a particular good language but because so much time and money has been invested in developing COBOL programs that it is not feasible to change them for different language. COBOL programming language has a lot of critics most of whom accuse it of being cumbersome and verbose. The designers of the language tried to make it as English - like as possible. The manipulation of the data is expressed in words rather than formula.

v. **Snobol**

Snobol is a pure string handling language whose most basic operation is the comparison of strings of data with an associated action. If a match between the two strings is found. Not only can matches of entire strings be tested but also tests on whether a particular string contains a certain character or characters can be performed. SNOBOL also provides this facility for not only matching characters but

controls the access to the database because it is a software which can perform the function of creating, revising printing, totalling, formatting data; and also for report generation. Apart from providing these program facilities. It also reduces data duplication, integrity and security of data can easily be secured, data redundancy is reduced or eliminated, data independence can also be achieved, data are also centrally controlled.

4.3 CHOICE OF PROGRAMMING LANGUAGE

The choice of programming language is an important factor to be considered when developing a new system. Therefore for the purpose of computerizing the record keeping system of the maintenance workshop of Niger State Agricultural Development Project, Minna for which this project work is being undertaken, the Data Base Management System (dBase IV) was recommended because of its useful and powerful features. The following are some of the features:

i) <u>Information Storage and Retrieval</u>

It has a large number of memory variables up to 99 files can be opened at one time and up to 255 fields can be specified per record. Therefore, it handles storage retrieval and organisation of information better than other micro computer based DBMS,

ii) <u>Program Commands</u>

Its commands are short easy to co-ordinate and remember.

ii) **Personnel**

Two computer operators are required in order to operate the computer as the computer is nothing but an electronic robot.

4.5 PROCEDURES

Procedures are the steps that unify the whole process that link everything together to produce the desire output. They also provide the primary means of breaking code in a program into modules are procedures, most of them are because procedures can easily be individually designed, tested and documented. They can also be stored in files and used by a variety of programs. In short They offer all of the conveniences accrued to modular programming and do so in a flexible manner.

4.6 PROGRAMS

Dbase computer program for the record keeping system of the maintenance workshop of Niger state Agricultural Development Project Minna were developed and are shown on the Appendix of this write up. Therefore twelve programs were written in a menu driven form thus:-

i Maint.prg

ii Mmenu.prg

iii Veh1.prg

iv App1.prg

v View1.prg

vi Mon.prg

vii Del1.prg

viii Rep1.prg

ix Myear.prg

x Annu.prg

xi Ymon.prg

xii Rep2.prg

i **Maint.prg**

This program is used to display the project title, the name of the research student, his registration number and also the name of the project supervisor on the computer screen .

ii **Mmenu.prg**

This is the central program that links up with other programs. It also enable one to select options displayed on the computer screen from the main menu.

iii **Veh1.prg**

Veh1 program allows one to chose a particular vehicle from the options, so as to enable him enter data, view records, carry out computation, delete records and also to exit.

iv **App1.prg**

This program is used to enter data about the type of vehicle, maintenance date, registration number, nature of repair, cost of spare parts e.t.c. This normally displayed on the computer screen .

v **View1.prg**

This program enables one to view the record of particular vehicle.

vi **Mon.prg**

Mon program is used for the computation of monthly report

vii **Del1.prg**

This program is used for deleting records that are not wanted by the maintenance workshop.

viii **Rep1.prg**

This program is used to generate monthly report on the maintenance cost, distance covered, fuel consumption on the vehicles used by the organisation.

ix **Myear.prg**

This program is used for the preparation, transfer to annual report files and also for annual computation.

x **Annu.prg**

This progarm is used for computation for annual report.

xi **Ymon.prg**

This progarm is used for the transfer of monthly report to annual report files

xii **Rep2.prg**

This program is used to generate yearly report .

OPERATIONAL MANUAL

The Database Management System(DBMS) dBASEIV is used and the program is accessed as follows:-

- Boot the system to take you to c:\> prompt

iii) **Debugging**

It include some features for tracking unwanted program bugs. Also data can be verified automatically as they are entered into the fields.

iv) It provides full relational database capabilities using SQL (Structured Query Language) that is compatible with IBM (International Business Machine).

v) Through the use of control centre without the use of command language you can design databases manipulate and edit records and files generate reports, perform database query, design labels and browse data bases.

vi) There is also improved printer handling capabilities, improved command line editor, user, definable functions, and faster execution of programs.

4.4 REQUIREMENTS

These are features that must be included in the new system based on the analysis of data produced during the fact-finding investigation.

i. Hardware Requirements

The hardware of a computer refers to various mechanical magnetic, electrical and electronic part of the computer. The more powerful the features of the hardware components the

better the utilization of the design system. For the hardware requirements a computer with the following specifications will be ideal.

IBM AT or COMPATIBLE (COMPRISING OF 80386 INTEL PROCESSOR, 20mhz OF SPEED, 640 kb ram, 40 mb hard-disk, 1.2MB (5") FLOPPY DISK-DRIVE, 1.44MB (3") FLOPPY DISK DRIVE, VGA ADAPTOR, 1.41VGA MONITOR, ENGLISH KEYBOARD 101 KEYS).

ii) **Software Requirement**

The software requirement that are essential for the operations of the proposed system are as follows:

- DISK OPERATING SYSTEM MS-DOS 3.5
- DATABASE MANAGEMENT SYSTEM PACKAGE (DBMS) DBASE IV

iii **Peripheral Requirement**

Printer: The printer is essential in obtaining hard copies of reports generated. In view of this, the printing mechanism mentioned should satisfy the following requirements.

- A FAST D>T MATRIX PRINTER. Espon LQ 1050 OR EQUIVALENT
- UNINTERRUPTED POWER SUPPLY: VA STABILIZER.

In order to avoid unnecessary interruption of power supply which may eventually lead to loss of information an uninterrupted power supply of about va will suit the purpose of this system.

- At C:\> prompt type cd DBASEIV, press return key. This changes the directory and lead you to DbaseIV environment and type dBASE and press return key.
- Press the ESC to lead you to the Dot prompt from the control centre.
- Insert the working diskette which contain the programs and database files
- At the dot prompt type SET DEFAULT to A (To change to A: drive) and press return key
- TYPE DO MAINT

  TO Lead you to the main title of the project and press any key to continue.
- Press Y (Yes) to lead you to the main menu for you to select the task to be performed using the task code

TASKCODE	TASK
1	VEHICLE MAINTENACE DATA
2	MONTHLY REPORT GENERATION
3	PREPARATION OF ANNUAL REPORT
4	ANNUAL REPORT GENERATION
5	EXIT

- At the dot prompt type DO REP1 This will generate the monthly report for the maintainance of all the vehicles.

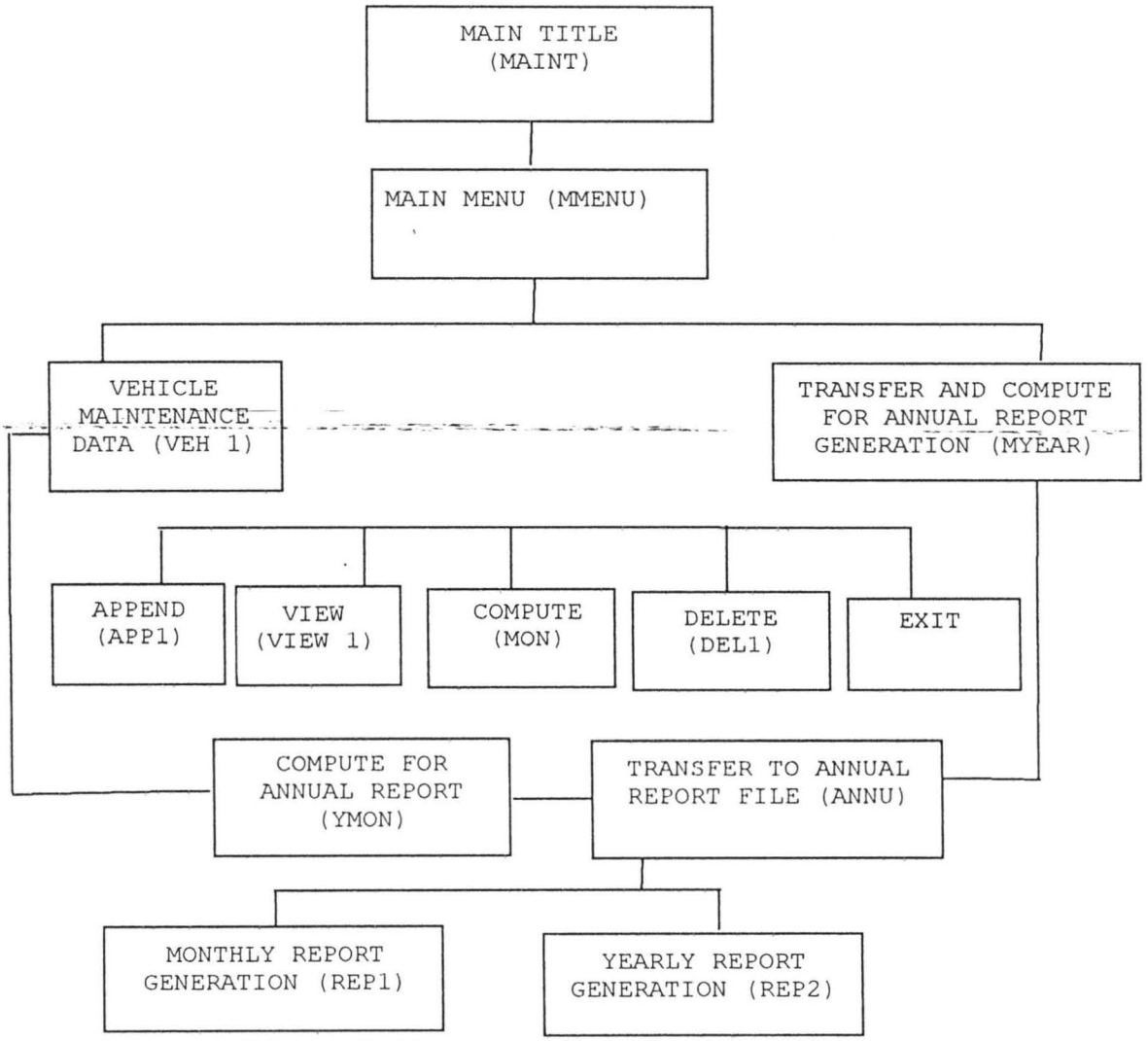
In order to generate yearly report:-
Type Do Rep2

this will generate the yearly report for the maintenance of all the vehicles in the organisation.

4.8 PROGRAM STRUCTURE

For a logical flow of the system a modular program structure is adopted. This enables a logical relationship between the processes. This type of structure also enables each file to be maintained by set of sub routines.

MODULAR PROGRAMMING STRUCTURE OF THE PROPOSED SYSTEM



4.9 SOFTWARE MAINTENANCE

This is totally unlike hardware maintenance, it neither fade nor does it wear out. Software maintenance consist of two

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 SUMMARY

The record keeping system of the maintenance workshop is an important factor to be considered in the organisation. The review of literature gave an insight on the topic of dissertation.

Based on the feasibility study conducted it has shown that record keeping system of the maintenance workshop is done manually. However, the research was conducted in order to findout problems with existing system of recrod keeping in the maintenance workshop of the organisation. Based on the analysis of the study a new system was designed which can store a large volume of information, more reliable, faster and accurate than the manual system.

Database management system (DBASE)DBASEIV was used as the choice of programming Language. The programs were written in modules to carry out different operations in record keeping of the maintenance workshop.

However, the software in used has the facility to enter data view records, carry out computation delete record and also to exit. The report generation enables one to print the monthly and yearly maintenance records of all the vehicles used by

the organisation.

5.1 CONCLUSIONS

This research work has been primarily directed at determining the feasibility of employing Computers for record keeping of the maintenance workshop of Niger State Agricultural Development Project Minna. However the following conclusions were drawn based on the facts gathered.

i Computerized data processing is far more efficint than the manual system, since it enables larger and broad based information to be generated.

ii Computerized maintenance workshop will help the organisation to know how much it will budget for the maintenance of their vehicles each year which will also help them to know the life span of their vehicles ie when the vehicles are due for change.

iii Many organisation usually feel reluctant to incur the basic capital cost to purchase computers for their use. However, at long run it proves them wrong as a computerised system minimises frauitulent, practise and also reduce cost.

iv Finally the project work has help the research student to understand what system design and development entails and how to go about it not only in school as a project but also for future need.

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```
#    1


   Set Talk off
   Set scoreboard off
   Set Status off
DO WHILE .T.
   Set color to G+/B+
   @ 2,10 to 9,57 double
   @ 3,12 say "THESE PROGRAMS ARE DEVELOPED AS A SOFTWARE"
   @ 4,15 say "TO BE USED BY NIGER STATE AGRICULTURAL"
   @ 5,22 say "DEVELOPMENT PROJECT"
   @ 6,12 say "WITH RESPECT TO THE RECORD KEEPING SYSTEM"
   @ 7,18 say "OF THEIR VEHICLES MAINTENANCE"
   Set color to G+/R
   @ 13,16 say "THE PROGRAM SOFTWARE IS WRITTEN"
   @ 14,21 say "AND DEVELOPED BY"
   @ 15,23 say "RUFAI AUDU"
   @ 16,22 say "PGD/MSC/196/96"
   @ 17,25 say "1996/97"
   @ 18,17 say "THE PROJECT IS SUPERVISED BY"
   @ 19,22 say "MR L. N. EZEAKO"
   @ 11,10 to 22,56 double
   wait
   clea
   choice = space(1)
   SET COLOR TO W/N
  @ 10,5 say "TO CONTINUE WITH THE MAIN PROGRAM (Y/N)"
   @ 10,60 get choice pict "@!"
   read
   if choice = "Y"
   do mmenu
   else
   exit
   endif
 ENDDO
```

```
#    1

   Set echo off
   Set status off
   Set talk off
   Set color to w/R
   DO WHILE .T.
   Clea
   @ 2,5 to 22,75 double
   @ 4,35 say "MAIN MENU"
   @ 5,35 TO 5,43 DOUBLE
   @ 7,25 say "TASK CODE"
   @ 7,45 say "TASK"
   @ 8,25 to 8,33
   @ 8,45 to 8,49
   @ 9,29 say "1" + space(7) + "VEHICLE MAINTENANCE DATA"
   @ 11,29 SAY "2" +space(7) + "MONTHLY REPORT GENERATION"
   @ 13,29 say "3" +space(7) +"PREPARATION OF ANNUAL REPORT"
   @ 15,29 say "4" +space(7) + "ANNUAL REPORT GENERATION"
   @ 17,29 say "PRESS 5 TO EXIT"
   CH = 0
   @ 19,15 say "ENTER TASK CODE"
   @ 19,33 get ch pict "9" range 1,5
   read
   DO CASE
        case ch = 1
        do veh1
        case ch = 2
        do rep1
        case ch = 3
        do myear
        case ch = 4
        do rep2
        case ch = 5
        exit
    ENDCASE
    ENDDO
    CLEA
    RETURN
```

```
#    1


   Set talk off
   Set status off
   Set scoreboard off
   clea
   DO WHILE .T.
   Set color to w/n
   @ 2,7 to 22,65 double
   @ 3,24 say "MENU FOR VEHICLE MAINTENANCE FILES"
   @ 4,24 TO 4,57
   @ 5,20 say "VEH. CODE"
   @ 5,35 say "VEH. NAME & REG. NO."
   @ 6,20 TO 6,28
   @ 6,35 TO 6,53
   @ 7,24 say "1" + space(11) + "PEUGOET PICK-UP AA034MNA"
   @ 9,24 say "2" + space(11) + "PEUGOET SALOON AA103MNA"
   @ 11,24 say "3" + space(11) + "STATION WAGON AA104MNA"
   @ 13,24 say "4" + space(11) + "PEUGEOT SALOON AA095MNA"
   @ 15,24 say "5" + space(11) + "PICK-UP AA106MNA"
   @ 17,24 say "PRESS 6 TO EXIT"
   CH = 0
   @ 19,24 say "ENTER VEHICLE CODE"
   @ 19,50 get ch pict "9" range 1,6
   read
       if ch = 1
           use PAA034M
       endif
       if ch = 2
           use SAA103M
       endif
       if ch = 3
           use WAA104M
       endif
       if ch = 4
           use SAA095M
       endif
       if ch = 5
           use PAA106M
       endif
       if ch = 6
           exit
       endif
       ch = space(1)
@ 20,9 say "PRESS A TO ENTER DATA, V TO VIEW, M TO COMP FOR"
@ 21,9 say "MONTHLY REPORT, D TO DELETE & E TO EXIT"
    @ 21,55 get ch pict "!"
   read
   DO CASE
       case ch = "A"
           do APP1
       case ch = "V"
           do VIEW1
       case ch = "M"
           do mon
       case ch = "D"
           do del1
       case ch = "E"
```

```
        EXIT
ENDCASE
ENDDO
clea
RETURN
```

```
#    1

     Set talk off
     Set status off
     Set scoreboard off
     DO WHILE .T.
     @ 1,15 say "SCREEN FOR ENTERING OF VEHICLE DATA"
     @ 2,15 TO 2,52 DOUBLE
     @ 4,3 TO 21,74 DOUBLE
     APPEND BLANK
     @ 6,5 say "TYPE OF VEHICLE" get tveh
     @ 6,40 say "DATE OF PURCHASE" get pdate
     @ 8,5 say "CHASIS NUMBER" get chasis_no
     @ 8,40 say "REGISTRATION NUMBER" get reg_no
     @ 10,5 say "DATE OF MAINTENANCE"
     @ 10,26 get month
     @ 10,36 get mdate
     @ 12,5 say "NATURE OF REPAIR" get nrepair
     @ 14,5 say "NAME(S) OF PARTS" get parts
     @ 16,5 say "COST OF SPARE PARTS" get pcost
     @ 16,40 say "LABOUR COST" get lcost
     @ 18,5 say "FUEL COST" get fcost
     @ 18,40 say "DISTANCE COVERED" get dist_cov
     @ 20,5 say "DRIVER'S NAME" get driver
     @ 20,40 say "ENGINEER'S NAME" get engineer
     read
     MCCOST = 0
     MTCOST = 0
     MPCOST = PCOST
     MCCOST = CCOST
     MLCOST = LCOST
     MFCOST = FCOST
     MTCOST = MPCOST + MLCOST + MFCOST
     REPL TCOST WITH MTCOST
     GO TOP
     DO WHILE .NOT. EOF()
     MTCOST = TCOST
     MCCOST = MCCOST + MTCOST
     REPL CCOST WITH MCCOST
     SKIP
     ENDDO
     REPL TCOST WITH MTCOST
     REPL CCOST WITH MCCOST
     ch = space(1)
     @ 22,5 say "ANY NEW RECORD TO ENTER(Y/N)"
     @ 22,40 get ch pict "!"
     read
     DO CASE
         case ch = "Y"
             loop
         case ch = "N"
             exit
    ENDCASE
    ENDDO
     CLEA
     CLOSE DATABASE
   RETURN
```

```
#    1

     Set talk off
     Set status off
     Set scoreboard off
     store space(12) to mtveh
     store space(10) to mchasis_no
     store space(10) to mreg_no
     mpdate = ctod(" /  /" )
     store space(40) to mparts
     store space(20) to mnrepair
     store 0 to mcost,mlcost,mtcost,mfcost,mdist_cov
     store space(15) to mdriver
     store space(15) to mengineer
     MMDATE = CTOD(" /  /" )
     DO WHILE .T.
     CLEA
     set color to w/n+
     GO TOP
     @ 2,5 to 21,72 double
     @ 3,19 say "SCREEN FOR VIEWING OF VEH. MAINT. DATA"
     @ 4,19 to 4,55 double
     @ 6,7 say "ENTER DATE OF MAINTENANCE" get mmdate
     read
     locate for mdate = mmdate
     if found()
     mtveh = tveh
     mpdate =pdate
     mchasis_no =chasis_no
     mreg_no = reg_no
     mnrepair = nrepair
     mparts = parts
     mpcost = pcost
     mlcost =lcost
     mtcost = tcost
     mccost = ccost
     mfcost = fcost
     mdist_cov = dist_cov
     mdriver = driver
     mengineer = engineer
     @ 8,7 say "TYPE OF VEHICLE" get mtveh
     @ 8,43 say "DATE OF PURCHASE" get mpdate
     @ 10,7 say "CHASIS NUMBER" get mchasis_no
     @ 10,40 say "REGISTRATION NUMBER" get mreg_no
     @ 12,7 say "NATURE OF REPAIR" get mnrepair
     @ 14,7 say "COST OF PART" get mpcost
     @ 14,40 say "LABOUR COST" get mlcost
     @ 16,7 say "FUEL COST" get mfcost
     @ 16,40 say "DISTANCE COVERED" get mdist_cov
     @ 18,7 say "TOTAL COST" get mtcost
     @ 18,40 say "CUMMULATIVE COST" get mccost
     @ 20,7 say "DRIVER'S NAME" get mdriver
     @ 20,40 say "ENGINEER'S NAME" get mengineer
     read
     else
     clea
     @ 10,15 say "RECORD NOT FOUND"
     endif
     clea
```

```
ch = space(1)
@ 12,15 say "DO YOU WANT TO VIEW ANOTHER RECORD(Y/N)" get ch
read
if ch = "Y"
loop
else
```

```
#     2

        exit
        endif
        ENDDO
        clea
        close database
        RETURN
```

```
#    1

     Set talk off
     Set status off
     Set scoreboard off
     *Set device to printer
     @ 3,24 say "NIGER STATE AGRICULTURAL"
     @ 4,26 say "DEVELOPMENT PROJECT"
     @ 5,32 say "MINNA"
     @ 7,22 say "MONTHLY VEHICLE MAINTENANCE"
     @ 8,32 say "REPORT"
     store space(9) to mmonth
     @ 10,5 say "MONTH" get mmonth
     read
     Store space(18) to mtveh
     Store ctod("/ /") to mpdate
     Store space(8) to mreg_no
     Store 0 to mdcovered, mmcost
     Store space(12) to mdriver
     Store space(12) to mengineer
     @ 11,2 say "VEHICLE NAME"
     @ 11,19 say "REG. NO."
     @ 11,29 say "PUR. DATE"
     @ 11,41 say "DISTANCE"
     @ 11,52 say "MAINT. COST"
     @ 11,64 say "DRIVER"
     @ 11,72 say "ENGINEER"
     @ 12,2 say repl ( '-',12)
     @ 12,19 say repl ('-',7)
     @ 12,29 say repl ('-',9)
     @ 12,41 say repl ('-',8)
     @ 12,52 say repl ('-',11)
     @ 12,64 say repl ('-',6)
     @ 12,72 say repl ('-',8)
     USE MONTH
     r = 13
      *Locate for month = mmonth
     DO WHILE .NOT. EOF()
        *if month <> mmonth
        *wait
        *clea
        *exit
        *endif
         mtveh = tveh
         mreg_no = reg_no
         mpdate = pdate
         mdcovered = dcovered
         mmcost = mcost
         mdriver = driver
         mengineer = engineer
     r = r + 1
     @ r,2 say mtveh
     @ r,18 say mreg_no
     @ r,29 say mpdate
     @ r,37 say mdcovered
     @ r,50 say mmcost
     @ r,64 say mdriver
     @ r,72 say mengineer
       SKIP
```

```
  enddo
  wait
  clea
  set device to screen
RETURN
```

```
Set talk off
Set status off
Set scoreboard off
clea
DO WHILE .T.
Set color to w/n
@ 2,7 to 22,65 double
@ 3,21 say "MENU FOR ANNUAL REPORT PREPARATION"
@ 4,21 TO 4,54
@ 5,22 say "CODE"
@ 5,42 say "TASK"
@ 6,22 TO 6,26
@ 6,42 TO 6,46
@ 7,24 say "C"+space(7)+"COMP. & TRANSFER TO ANNU. FILE"
@ 11,24 say "A"+space(7) + "TO COMP FOR ANNU REPORT"
@ 14,24 say "PRESS E TO EXIT"
CH = Space(1)
@ 19,24 say " CODE"
@ 19,50 get ch pict "!"
read
 DO CASE
    case ch = "C"
        do YMON
    case ch = "A"
        do ANNU
    case ch = "E"
         EXIT
  ENDCASE
ENDDO
 clea
RETURN
```

```
e #    1


   Set status off
   Set scoreboard off
   Set talk off
   @ 2,3 say "tveh" +space(21)+"pdate" +space(8)+"distance"
@ 2,50 say "mcost" +space(3)+ "driver" +space(4)+"engineer"
  Store space(12) to amonth, bmonth, cmonth, dmonth, emonth
tore 0 to adcovered, bdcovered, cdcovered, ddcovered, edcovered
   Store 0 to accost, bccost, cccost, dccost, eccost
   Store 0 to adist, bdist, cdist, ddist, edist
   Store 0 to amcost,bmcost,cmcost,dmcost,emcost
   Store space(18) to atveh, btveh, ctveh, dtveh, etveh
   Store space(10) to areg_no, breg_no, creg_no, dreg_no, ereg_no
   Store ctod("/ /") to apdate, bpdate, cpdate, dpdate, epdate
   Store space(15) to adriver, bdriver, cdriver, ddriver, edriver
tore space(15) to aengineer, bengineer, cengineer, dengineer, eengineer
    Sele A
    use YPAA034M
    SELE B
    Use YSAA103M
   SELE C
    USE YWAA104M
    SELE D
    USE YSAA095M
    SELE E
    USE YPAA106M
    SELE F
    USE YEAR
     r = 3
       Sele A
       go top
       DO WHILE .NOT. EOF()
         atveh = tveh
         apdate = pdate
         areg_no = reg_no
         adcovered = dcovered
         amcost = mcost
         amonth = month
         adriver = driver
         aengineer = engineer
      accost = accost + amcost
      adist = adist + adcovered
      Sele A
      SKIP
      ENDDO
       r = r + 1
      @ r,3 say atveh
      @ r,20 say apdate
      @ r,30 say areg_no
      @ r,50 say accost
      @ r,65 say amonth
      Sele F
      locate for month = amonth
      repl tveh with atveh
      repl pdate with apdate
      repl mcost with accost
```

```
   repl dcovered with adist
   repl driver with adriver
   repl engineer with aengineer
   Sele B
    go top
DO WHILE .NOT. EOF()
```

```
      btveh = tveh
      bpdate = pdate
      breg_no = reg_no
      bdcovered = dcovered
      bmcost = mcost
      bdriver = driver
      bengineer = engineer
      bmonth = month
      bccost = bccost + bmcost
      bdist = bdist + bdcovered
      Sele B
       skip
    ENDDO
       Sele F
       locate for month = bmonth
       repl tveh with btveh
       repl pdate with bpdate
       repl mcost with bccost
       repl dcovered with bdist
       repl driver with bdriver
       repl engineer with bengineer
         Sele C
        go top
    DO WHILE .NOT. EOF()
       ctveh = tveh
       cpdate = pdate
       creg_no = reg_no
       cmcost = mcost
       cdcovered = dcovered
       cdriver = driver
       cengineer = engineer
       cmonth = month
       cccost = cccost + cmcost
       cdist = cdist + cdcovered
       Sele C
       skip
     ENDDO
      Sele F
      locate for month = cmonth
      repl tveh with ctveh
      repl pdate with cpdate
      repl dcovered with cdist
      repl mcost with cccost
      repl driver with cdriver
      repl engineer with cengineer
      Sele D
    go top
   DO WHILE .NOT. EOF()
      dtveh = tveh
      dpdate = pdate
      dreg_no = reg_no
      ddcovered = dcovered
      dmcost = mcost
      ddriver = driver
      dengineer = engineer
      dmonth = month
      dccost = dccost + dmcost
```

```
      repl tveh with dtveh
      repl pdate with dpdate
      repl dcovered with ddist
      repl driver with ddriver
      repl mcost with dccost
      repl engineer with dengineer
      Sele E
      go top
   DO WHILE .NOT. EOF()
      etveh = tveh
      epdate = pdate
      ereg_no = reg_no
      edcovered = dcovered
      emcost = mcost
      edriver = driver
      eengineer = engineer
      emonth = month
      eccost = eccost + emcost
      edist = edist + edcovered
      Sele E
      skip
   Enddo
    Sele F
    locate for month = emonth
      repl tveh with etveh
      repl pdate with epdate
      repl dcovered with edist
      repl mcost with eccost
      repl driver with edriver
      repl engineer with eengineer
     clear
   RETURN
```

```
¤                 1           PEUGOET PICK-UP AA034MNA      ¤
¤                                                           ¤
¤                 2           PEUGOET SALOON AA103MNA       ¤
¤                                                           ¤
¤                 3           STATION WAGON AA104MNA        ¤
¤                                                           ¤
¤                 4           PEUGEOT SALOON AA095MNA       ¤
¤                                                           ¤
¤                 5           PICK-UP AA106MNA              ¤
¤                                                           ¤
¤                 PRESS 6 TO EXIT                           ¤
¤                                                           ¤
¤                 ENTER VEHICLE CODE        0               ¤
¤                                                           ¤
¤                                                           ¤
```

```
                MENU FOR VEHICLE MAINTENANCE FILES
                ááááááááááááááááááááááááááááá
            VEH. CODE       VEH. NAME & REG. NO.
            áááááááá        áááááááááááááááááá
                1            PEUGOET PICK-UP AA034MNA
                2            PEUGOET SALOON AA103MNA
                3            STATION WAGON AA104MNA
                4            PEUGEOT SALOON AA095MNA
                5            PICK-UP AA106MNA
                PRESS 6 TO EXIT
                ENTER VEHICLE CODE        0
```

```
                MENU FOR VEHICLE MAINTENANCE FILES
                ááááááááááááááááááááááááááááá
            VEH. CODE       VEH. NAME & REG. NO.
            áááááááá        áááááááááááááááááá
                1            PEUGOET PICK-UP AA034MNA
                2            PEUGOET SALOON AA103MNA
                3            STATION WAGON AA104MNA
                4            PEUGEOT SALOON AA095MNA
```

COST OF SPARE PARTS	0.00	LABOUR COST	0.00
FUEL COST	0.00	DISTANCE COVERED	0
DRIVER'S NAME		ENGINEER'S NAME	

SCREEN FOR ENTERING OF VEHICLE DATA

TYPE OF VEHICLE		DATE OF PURCHASE	/ /
CHASIS NUMBER		REGISTRATION NUMBER	
DATE OF MAINTENANCE	/ /		
NATURE OF REPAIR			
NAME(S) OF PARTS			
COST OF SPARE PARTS	0.00	LABOUR COST	0.00
FUEL COST	0.00	DISTANCE COVERED	0
DRIVER'S NAME		ENGINEER'S NAME	

SCREEN FOR ENTERING OF VEHICLE DATA

TYPE OF VEHICLE		DATE OF PURCHASE	/ /
CHASIS NUMBER		REGISTRATION NUMBER	
DATE OF MAINTENANCE	/ /		
NATURE OF REPAIR			
NAME(S) OF PARTS			
COST OF SPARE PARTS	0.00	LABOUR COST	0.00
FUEL COST	0.00	DISTANCE COVERED	0
DRIVER'S NAME		ENGINEER'S NAME	

MINNA

MONTHLY VEHICLE MAINTENANCE
REPORT

MONTH AUGUST

EHICLE NAME	REG. NO.	PUR. DATE	DISTANCE	MAINT. COST	DRIVER	ENGINEER
EUGEOT PICK-UP	AA034MNA	12/09/92	1535	32186	MALLAM IMR JOHN	
EUGEOT SALOON	AA103MNA	12/24/93	1187	19970	MAL YAKUMR. G. K	
TATION WAGON	AA104MNA	02/13/94	255	25600	BAWA BALMR GANA	
EOGUET SALOON	AA095MNA	05/23/95	600	2171	MALLAM BMR GANA	
EUGEOT PICK-UP	AA106MNA	06/12/94	1246	8500	MALLAM IMR GANA	

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NIGER STATE AGRICULTURAL
DEVELOPMENT PROJECT
MINNA

MONTHLY VEHICLE MAINTENANCE
REPORT

MONTH AUGUST

HICLE NAME	REG. NO.	PUR. DATE	DISTANCE	MAINT. COST	DRIVER	ENGINEER
UGEOT PICK-UP	AA034MNA	12/09/92	1535	32186	MALLAM IMR JOHN	
UGEOT SALOON	AA103MNA	12/24/93	1187	19970	MAL YAKUMR. G. K	
ATION WAGON	AA104MNA	02/13/94	255	25600	BAWA BALMR GANA	
OGUET SALOON	AA095MNA	05/23/95	600	2171	MALLAM BMR GANA	
UGEOT PICK-UP	AA106MNA	06/12/94	1246	8500	MALLAM IMR GANA	

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NIGER STATE AGRICULTURAL
DEVELOPMENT PROJECT
MINNA

MONTHLY VEHICLE MAINTENANCE
REPORT

MONTH AUGUST

IICLE NAME	REG. NO.	PUR. DATE	DISTANCE	MAINT. COST	DRIVER	ENGINEER

PEUGEOT SALOON	AA103MNA	12/24/9	19380	MALLAM UMAR	MR GANIYU
STATION WAGON	AA104MNA	02/13/9	25600	BAWA BALA	MR GANA
PEUGEOT SALOON	AA095MNA	05/23/9	2171	MALLAM BALA	MR GANA KOLO
PEUGEOT PICK-UP	AA106MNA	05/23/9	6430	DAVID SLOMOM	MR GANA JONH
		/ /	0		

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NIGER STATE AGRICULTURAL
DEVELOPMENT PROJECT
MINNA

YEARLY VEHICLE MAINTENANCE
REPORT

YEAR 1997

VEHICLE NAME	REG. NO.	PUR. DATE	MAINT. COST	DRIVER	ENGINEER
PEUGEOT PICK-UP	AA034MNA	02/24/9	27154	DAVID BELLO	MR GANA KOLO
PEUGEOT SALOON	AA103MNA	12/24/9	19380	MALLAM UMAR	MR GANIYU
STATION WAGON	AA104MNA	02/13/9	25600	BAWA BALA	MR GANA
PEUGEOT SALOON	AA095MNA	05/23/9	2171	MALLAM BALA	MR GANA KOLO
PEUGEOT PICK-UP	AA106MNA	05/23/9	6430	DAVID SLOMOM	MR GANA JONH
		/ /	0		

ess any key to continue...

NIGER STATE AGRICULTURAL
DEVELOPMENT PROJECT
MINNA

YEARLY VEHICLE MAINTENANCE
REPORT

YEAR 1997

EHICLE NAME	REG. NO.	PUR. DATE	MAINT. COST	DRIVER	ENGINEER
EUGEOT PICK-UP	AA034MNA	02/24/9	27154	DAVID BELLO	MR GANA KOLO
EUGEOT SALOON	AA103MNA	12/24/9	19380	MALLAM UMAR	MR GANIYU
TATION WAGON	AA104MNA	02/13/9	25600	BAWA BALA	MR GANA
EUGEOT SALOON	AA095MNA	05/23/9	2171	MALLAM BALA	MR GANA KOLO
EUGEOT PICK-UP	AA106MNA	05/23/9	6430	DAVID SLOMOM	MR GANA JONH
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