INTRODUCTION TO MICROCOMPUTERS

Section I

Objectives

In this section you will learn:

- ☞ The Rise and Development of Computers
- ☞ Computer Generations
- ☞ Characteristics of Computers
- ☞ Various Areas of Computer Applications

1.0 The Rise and Development of the Computer

Since the earliest days of civilization man has been preoccupied with mathematics and logic, and the attempts to create a machine to carry out calculations on numbers – additions, subtractions, multiplications, divisions – began in the days of the great thinkers of Asia, Greece and Egypt.

The abacus and later mechanical implements were developed, but until the twentieth century no machine has been invented which could "store" a sequence of calculations and repeat them as required. Every calculation needed to be carried out afresh.

It was a Victoria gentleman called Babbage who invented, in the late nineteenth century, the first "programmable" computer. That was a machine built of thousands of intricate geared cylinders interlocked in incredibly complex ways which could carry out *instructions* under the control of a "program" contained in the holes in punched cards – an idea inspired by the jacquard loom, a card-controlled loom (weaving machine) which wove extremely complex patterns.

Early in the twentieth century, the idea was developed of storing the instructions electronically, instead of mechanically, using ***valves***. That was so successful that the first "real" computers were built; but the number, complexity and size of their components were so great that the machine were enormous in size and cost.

Until the mid-1950's, computer development and use were largely confined to a few universities in Britain and the United States of America, here their main use was the rapid solution of mathematical and scientific problems.

Gradually computers came to be used more for government administration and business purposes, but their huge size, cost and complexity limited their use to only the largest enterprises and institutions.

As ***transistors*** replaced valves as the essential components of computers, medium-size businesses and industries found the sizes and costs of computers more suited to their needs and resources. As the new computers were still designed primarily for complex mathematical and engineering problems, however, operators of the computers still had to be specially trained to use them, and highly skilled programmers were needed to produce the results required by the "users".

Soon "thin-film" technology was able to etch many transistorized components on a single chip of silicon - the ***"silicon chip"*** - giving use the ***integrated circuit.***

Rapid developments in the 1970's provided vast increases in the density of such circuits which could be packed on to a single silicon chip, with dramatic improvements in speed, reliability and versatility - and immense reduction in costs. The power and capabilities of a computer, which would once have filled a whole room and would have hundreds of thousands of pounds, could now be held in a microcomputer capable of being housed on a desk and costing well within the financial resources of the average small business.

In addition to the developments in the size and cost of computes, clear changes have taken place over the years in the manner of usage of such computers, and each stage can be clearly defined.

1.1 Computer Generations

The **first generation** of modern electronic computers was, as has been described, remote, large, difficult, expensive and - usually - single-purposed, capable of carrying out just one "user task" at a time.

The **Second Generation** of computers was, however, characterized by being less large, difficult and expensive, and general-purpose rather than being dedicated to a particular objective. But such computers were still somewhat remote, with very scientifically-minded and trained programmers being needed to write the instructions for them and highly skilled operators being needed to control the running of them. Most importantly, they were still capable of carrying out a succession of single user tasks (often described as operating in a 'batch processing mode'). Such equipment became known generally as **mainframe** computers.

The **third generation** of computers became known as **mini-computers.**
(Smaller and cheaper than the huge mainframe,)They continued the trend, too, of making the actual programming part of getting the machine to perform something useful - which is, after all, the whole purpose of computers and computing - much more "approachable". Gradually *programming languages* were developed which became more easily available for many people who were not trained computer scientists to learn; and *computer programming* became a skill, which many people with the necessary level of ability could learn and use.

The **fourth generation** (**Microcomputers)** in this family of decreasing size and increasing power. They were, in fact, a development in concept from the hand-held calculator, which in its early days had the disadvantage of not being able to store and repeat complex instructions (or programs). At first the microcomputer appealed only to the "hobbyist", who purchased it in "kit" form to build, smaller to hi-fi, radio and television equipment.
Then the fascinating of programming – of actually being able to instruct this electronic machine to do something useful and variable – began to take hold. It was very soon realized that here was a means of carrying out "personal" or even "small business' computing applications at a price affordable for the first time by a whole range of people who never before had been given that opportunity.

As micro-computers became more generally available, the demand for less complex, more easily usable programs grew, and there has been a steady increase in the number of generalized programs which can, within limits, be adapted to meet the requirements of individual businesses. Use of these program packages, avoids the very high costs of writing programs for each user.

The **microcomputer**, originally produced by International Business Machines (IBM), but imitated – and is some cases improved upon – by many other computer manufacturers, has established a '**standard**' throughout the business world. Within a relatively short period of time, PC-compatible micros have appeared on managers' desks, offering a wide range of facilities never before available in such variety and breadth. Equipment and programs compatible the "PC standard" have proliferated, taking full advantage of the ease of transfer now available between one PC-compatible computer and another.

The speed of developments in the computer industry is so breath-taking that it is almost impossible to keep up to date with it. Every month new and exciting inventions and enhancements are being announced, and explored and developed.

The portable computer, which fits into a briefcase or on a lap, with its own screen, keyboard and mini-printer, is available in a variety of forms. Many micro-computers use a "mouse" – a hand-held remote control box, to move an arrow around the screen to instruct the computers are a reality, with only the cost of these newer features limiting their wider popularity. Modern microcomputers can produce pictures,

graphs, charts, play tunes, as well as undertake many necessary administrative and clerical functions.

The **fifth generation** of computers is often mentioned in the news. Major research in the field of *artificial intelligence* is continuously under way, and it will not be too long before computers will be developed which can "think" more like a human brain. These will be used to make very complex decisions, based on a huge number of factors, and will eventually come to the aid of those such as doctors and lawyers, researchers and all those others who have need to rely on intuition and experience.

Whole areas of uses for computers have yet to be opened up, and the manager who thinks ahead and who wishes to harness the latest contributions of technology for the better service of his enterprise, will do well to keep in touch with the rapid developments of the computer world.

1.2 Characteristics of Computers

This following summary will give you an insight into many ways in which the use of computers can improve the efficiency of management in the Armed Forces, and of many businesses, whatever their sizes.

Speed – Computers work at incredible speeds, performing hundreds, thousands, even millions of calculations in a second. The speed at which electrical signals pass within the computer's "brain" is approximately the speed of light. It is this speed, measured in terms of *microseconds* (millionths of a second), or even in *nanoseconds* (thousand-millionths of a second), which enables the provision of instant information, for example, on tomorrow's weather, today's flight bookings, this year's sales by department – answers within seconds whereas previously considerable research and manual documentation might have been necessary.

Storage and Retrieval of Information – Computers can store vast quantities of information, which they can "sift" through when so instructed. They can then present relevant details of that information, exactly in the format required, within seconds.

Diligence – Computers, unlike frail human beings, do not become bored or tired or lose concentration when performing highly repetitive work. If a computer has to perform a certain calculation on a million numbers, it will calculate the first and the last with equal diligence. This enables trust to be placed in the results generated by computers, and confidence to be replaced in their ability – neither of which can always be replaced in humans!

Accuracy – The computer is capable of doing only what it is told to do. If the human beings who design a given application make a mistake, in invoicing customers for example, then it is hardly fair to "blame" the computer, when correctly programmed computers are far more accurate than human beings. It must be remembered always that computers are only machines to be used by humans, as are typewriters,

calculators, etc., and the results produced by computers are only as good as the skills of those who designed and operate them.

There is a phrase well known to computer users: "GIGO", which means "*garbage in, garbage out*". In other words, if rubbish is fed into the computer, the results will be rubbish too. It is therefore, for the user to ensure:

- That information being fed into the computer is always accurate, well organized and clear.
- That the programs chosen to run the computer are the ones necessary to give the desired result(s).
- That the people who are to operate the computer have the right levels of skill and ability.

It cannot be emphasized enough that computer is NOT a replacement for human competence. It is an office machine, an aid to administration and management, and as such it is only as good as the people who use it.

1.3 Various Areas of Computer Applications

- Accounts receivable, payable, sales, purchases, nominal ledger, aged debts, balance sheets, profit and loss statements
- Payroll and cheque printing
- Stock control, finished goods, re-order highlighting, on-self reports, stock levels.
- Mailing lists, customer lists, letter writing, invoice reminders, credit control.
- Sales analysis, sales commission statements and lists, prospect highlighting.
- Cash flow control and analysis.
- Manufacturing and production control, work scheduling, time costing, shop floor loading.
- Order entry, sales order processing, back-order reports, credit reports, customer billing.
- Monitoring overdue accounts, identifying profitable and unprofitable accounts.

Section II

Objectives

In this section you will learn:

- ☞ Definition of a Computer
- ☞ Classification of Computers
- ☞ Types of Computers
- ☞ Parts of a Computer System
- ☞ How a Computer System Works
- ☞ Computer Programming Languages

2.0 Definition Of A Computer

A computer is an electronic machine or device that accepts data (raw facts) from an input device, performs arithmetical and logical operations (processing) in accordance with a stored pre-defined program and finally transfers the processed data (information) to an output device.

The above definition will be understood excellently when we come to illustrate how a computer system works later in this section.

2.1 Classification of Computers

All electronic computers are basically the same in their functional design. The main essential differences are in four categories:

- *Cost*
  This refers to the initial and maintenance cost which is determined by the technology involved and the accompanying facilities, e.g. the power of processing.

- *Functional performance*
  This refers to the capability of the CPU to handle input data and instructions to generate information to the recipients.

- *physical size*

This is influenced by the computer generation.

- *Storage facility*
  The storage facility is influenced by the type of media that the computer supports and/or information to be stored.

2.2 Types of Computers

Basically, there are three main types of computers. These are:

- ***Mainframe computers***
  Mainframes are large computers with almost unlimited power allowing many users access to them simultaneously. They have large storage capacity and can perform calculations at very high speeds.

- ***Mini-computers***
  As technology improved, it was possible to design smaller computers especially after the invention of integrated circuits. Minicomputers were designed for use in a normal office environment, providing extensive processing power, adequate for medium sized organizations.

- ***Micro-computers***
  Microcomputers (commonly called personal computers, PCs) are the smallest computers and were intended for use in an office, fitting on a desktop. Their design is based on large-scale circuit integration that confines several physical components to a small element. Their internal memory is smaller than the mini and mainframe computers and they support limited backing storage media. They are relatively cheaper and are the most commonly used computers in offices today.

2.3 Parts of a Computer System

There are two basic parts of a computer system namely:

- Computer Hardware.
- Computer Software.

Computer Hardware Components.

The computer hardware comprises of the physical and tangible components. They are the parts of the computer that you can see when it is displayed. If it is visible, then that is hardware.
The hardware is again divided into two basic parts namely: -

- Central Processing Unit (CPU)

- Peripheral Devices
  - **Central processing unit (CPU)** has a data store, an arithmetic and logic unit, and a control unit. The storage unit holds data, together with instructions until it is ready to work on it. The functions of each unit is as described below:

    - ***Arithmetic Logic Unit (ALU)*** - Does all arithmetic and logic operations.
    - ***Control Unit (CU)*** - Coordinates all activities of the computer and causes an instruction to be fetched and to be executed.

    - ***Main Memory (MM)*** *also called main storage* – Stores data which is to be processed, stores (programs) instructions and information. The main memory is volatile (it loses its memory once power is switched off).

- Peripheral Devices are divided into: -

  - Input Devices
  - Output devices
  - Backing Storage

- **Input Devices**:

  - which allow data as well as instructions to be input into the computer. E.g. Keyboard, Mouse, Optical scanner etc.

- *Keyboard* is that part of a computer that allows you to enter information into the computer. The keys allow you to type information into the computer like one would type on a typewriter.

- *The Mouse* may have got its name from the fact that it looks like a mouse especially with the long tail coming from one end. This tail will be attached to your computer, or if the mouse is a cordless one, it runs on a battery. A mouse's primary purpose is to allow you to choose what you would like to happen on your screen without typing. All you have to do with a mouse is point and click on your choice of instructions.

Keyboard

Mouse

- **<u>Output Devices</u>** which:
  - Collect data and send it out to the user e.g. Monitor, Printer.
- *Monitor* is the device that looks like a television set. It where text and images are displayed on a screen. The monitor has controls to adjust the quality and contrast of pictures displayed on the screen.

- **A *Printer*** produces paper copies of what the computer has created. There are several types of printers. They include the following;
  - Dot Matrix Printer
  - Ink Jet Printer
  - Laser Jet Printer
  - *Solid Ink Printer
  - *Thermal Ink Printer
  - *Dye Sublimation Printer

The last three (*) provide high quality colour images and are favourites in the graphic industry. While all printers will produce images, not all printers are compatible with all computers and software. Remember to choose a printer according to your printing needs.

- **Backing Storage** is a permanent storage device used to store data, program instructions and information for future use.

  We either use Magnetic tapes or magnetic disks to store information Magnetic disks are commonly used.

Magnetic disks are of two types:

- **Hard disk** which is fixed into the computer and consists of one or more large disks permanently mounted on a horizontal spindle rotating at high speed, which can provide very high volume capacity. They are frequently used when a large amount of data needs to be stored and accessed rapidly.

- **Floppy disk** are smaller units of storage, each one consisting of a flexible plastic material (hence the adjective "floppy") in a protective envelope. It is inserted into a special drive attached to the computer. Original floppy diskettes developed in the early 1970s were 8" in diameter. These have progressively reduced in size, first to 5i/4 and now 5¼" and now 3½". These disks are cheap and easily interchanged and stored, so their use has become increasingly popular, particularly in connection with micro-computers.

Computer Software.

Software cannot be seen even though it comes packaged in boxes that you can see. Software is a set of electronic instructions that tell a computer how to do the job. It is actually the programs that run the computer. Some people have described it as the language that the computer uses to understand what you want it to do.

There are three main types of software, and they are used for different purposes:

- Tailor-made programs
- Application packages
- Standalone Operating systems

Tailor-made programs, sometimes called Bespoke, are written for "one specific user", and to meet "specifically defined needs." The programs work for that user ONLY. They will not be of any use to any other organization unless its requirements are exactly the same , and its input date is organized in exactly the same way.

In order to understand this concept, we will use the analogy of buying a garment. There are many shops that have ready-made clothes. But there are occasions when no shop has a garment that fits a customer's specification. In such a case, the customer goes to a tailor who makes a custom-made garment. The garment suits his exact needs. His needs may not suite anyone else unless similar specifications prevail.

The advantage of tailor-made software – provided that it is well written – is that it does "fit the bill", and provides exactly the solution which is required for that user-organization's problems.

The disadvantage is that because such software is so specialized, it is expensive to design and to develop. In other words, a great deal of time has to be "invested" in discovering exactly what is needed and in writing every program to match those needs.

Examples of Tailor- made programs are:

- Payroll system
- Tea stock system
- Accounts processing system

Application packages are groups of programs written for particular types of usage. For example, most enterprises will have a need for a payroll system and an accounts system; many will need a stock control system and/or a sales invoicing system. In practice, many of the features within each individual organization's requirements will coincide with – be very similar to – those of another organization. A variety of "standard" applications have therefore been designed and "packaged" to suit a number of users with similar needs.

Examples of application software are:

- *Word processors* e.g. Ms-word, Word Perfect
  (deal with manipulation of textual information)

- *Spreadsheets* e.g. Ms-excel, Quatropro
  (deal with production of business financial statements and calculation of figures)

- *Database* e.g. Dbase, Ms-access, Paradox
  (deal with record keeping, data manipulation and sharing).

Standalone Operating Systems are designed to manage the resource of a computer and control its interface to other systems. Such operating systems are held in the processor memory during the whole of the time that the computer is being used. It supervises the execution of programs, assigns and controls the use of available hardware, monitors the flow of data and, in some cases, decides which programs are to be operated at certain times.

The operating system can perhaps be compared to the system of roads and traffic regulations without which it would be impossible to travel. If we regard the car or automobile as the hardware of the system and the planned journey as the function of the software, then we can see that the possibility of the journey depends primarily on the existence of a road system and on the observance of basic traffic conventions. For example, vehicles must travel on the same side of the road in each direction, must observe certain speed limits etc.

There are several well-known and commonly used operating systems which operate on a range of micro-computers, and which enable a wide choice of packaged software

to be run on those computers. Among them, are MS-DOS, PC/DOS, OS/2, UNIX, XENIX, MS Windows and many more.

Included in the standalone operating systems are *utility programs,* which serve to simplify the operation of the complete system. Example of these programs would be Antivirus programs (Dr. Solomon's toolkit, Fprot), Compressing and decompressing programs, back-up programs, etc. Such utility programs do the following:

- Perform maintenance routines in the computer e.g. formatting routines, file copying routines, back-ups, file protection routines, housekeeping routines etc.
- They translate other programs into machine sensible form e.g. translators & compilers.
- They issue error messages to the VDU screen or printer when faults occur.

Features of good Software

Whatever the language in which a set of programs may be written, their most important features are

- That they should work without errors.
- That they should be totally reliable.
- That they should do the job required of them.

2.4 Computer Programming Languages

There are three main categories of programming languages:

- Machine language
- Low-level language
- High-level language

Machine language

All instructions to the computer are given in strings of 1's and 0's, using the binary number system known as "machine code". The reason for using the binary number system is that, as an electronic machine, the computer can respond only to two conditions whether transmitted by valve, transistor or integrated circuit.

Low-level languages (Assembly languages)

Low-level languages are written in symbolic form, with one machine instruction corresponding to one written instruction. Instead of using machine code operation numbers, the programmer is able to use easily learnt and understood operation mnemonics (i.e. ADD, SUB, MULT, etc.) and symbolic operands (names allocated by the programmer and used to refer to particular data areas in the program) to replace numeric operands.

Although programming is now made easier, the symbolic language must be translated into the machine code which 'works' on a particular computer. This can be done manually, but computer manufacturers will supply an *assembler program*, which translates the operation mnemonic and replaces the symbolic operands by the precise storage location address reserved for them. The low-level language source program is thus assembled into the machine code object program; the process involves translation, allocation of storage space and the picking of grammatical and logic errors.

High-level languages

High-level languages have extensive vocabulary of words and symbols used to instruct a computer to carry out the necessary procedures, regardless of the type of machine being used. High-level languages are designed for interactive use via a terminal and they provide facilities for the programmer to make corrections and/or changes to his program during its compilation and execution.

High-level language program has to be translated into machine code before it can be used. This is done by a *compiler program* which compiles the source program into the object program. It translate words much closer to 'real' language into machine code and back again, so that the English-speaking programmer could write programs in words which are meaningful in English, such as 'READ', 'ADD', etc.; the French programmer could use similar words in French, and so on.

Today, mainly 'high-level' languages are used, in particular for micro-computers, the best known among them are:

- COBOL (Common Business Oriented Language) - used mainly for business applications.
- FORTRAN (Formula Translation) - for scientific and mathematical uses.
- BASIC (Beginners All-purpose Symbolic Instruction Code) – is an easy language to learn and is widely used in educational establishments and in time-sharing applications.

2.5 How A Computer System Works

Having mentioned the basic parts of a computer system and their brief individual functions, it is significant at this juncture to put them together and assimilate how a computer system actually works.

In order to be able to appreciate how a computer system actually does it is essential to examine the various "activities" which are involved in the **manual** performance of a fairly simple and straightforward routine office task.

Scenario

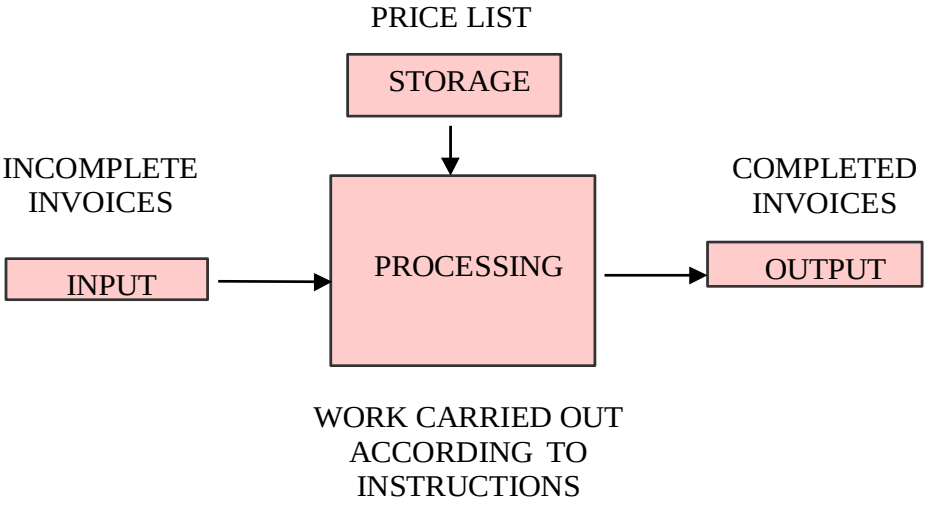
A retail stationery business employs a clerical assistant to complete sales invoices before sending them to customers. Each completed invoice is to contain the name and address of the relevant customer, plus the quantity, description and catalogue number of each item of goods purchased on credit by that particular customer. The assistant's function is to look up the unit price of each item in the relevant price-list, and then to calculate the total cost by multiplying the quantity purchased by the unit price. He has then to write the total cost for each entry on the invoice, and must finally add up the total invoice charge and write that in the appropriate place on the invoice.

Explanation

- Reading the item catalogue number and quantity stated on the invoice, i.e. receiving new information. **(input)**
- Looking up the item unit price in the price-list, i.e. referring to information already recorded or stored. **(main storage)**
- Calculating the total entry cost. **(arithmetic)**
- Writing the total cost on the invoice. **(output)**
- If there are no more entries, calculating and writing the total invoice charge; if there are more, repeating the sequence again. **(logic)**

A simple outline procedure is as shown in the diagram below.

A SIMPLE PROCEDURE



How Data Flows in the Computer System

The above explanation can be amplified further by examining the way data flows from the moment it is keyed into the computer system and the time it is available as a as soft copy (at the VDU) or hard copy print out from any printer.

- From input devices data goes into main memory (main storage) ready to be processed and the results of processing flow from main storage to output devices.
- Data flows from main storage to the ALU. The ALU performs operations on the data thus generating results, which flow back to main storage.
- Data in main storage, which is not required immediately, may be passed to backing storage from where it may subsequently be brought back to main storage when needed for processing.
- Instructions (essentially a special form of data) flows from main storage to control unit, which interprets them and causes the required hardware operations to take place.
- Commands flow from the control unit to other elements of the computer system and are distinct from data flow.

NB: The ALU and the Control Unit form the processor.

Section III

Objectives

In this section you will learn:

- ☞ Why Computer Security
- ☞ Common Risks and Threats
- ☞ Fraud and its Elements
- ☞ Computer-related Crimes
- ☞ Managing Computer Fraud and security

Computer Security and Fraud

- ☞ Physical Security (Hardware)
- ☞ Data Security

3.1 Why Computer Security

There are many good reasons to justify critical appraisal of security issues particularly in a highly computerized organization. The use of computers presents immense benefits to all organizations, and more specifically to information-based organizations.

The objective of security is to ensure that both hardware and software continue to operate successfully and provide expected service levels. To understand why computer security is important, let us examine the results of poor security. Firstly, the loss of essential irreplaceable data means that appropriate decisions cannot be made. Secondly, where such data can be recovered, the cost of reconstruction can be high and time consuming. Thirdly, if people discover that they can "get away with it", there will be all the temptation to perpetuate fraud. All these will result in unnecessary losses to the organization and create operating difficulties.

Vulnerabilities

The main areas of vulnerabilities are:

- *Processors* – is vulnerable to failure and misuse of privileged instructions. The software of the central processor is vulnerable to bypassing of file protection and access control programs or falsification of user identification.
- *Storage devices* – are vulnerable to unauthorized copying of stored information and theft of removable electronic data processing media and to hardware or software failure that could result in compromise.
- *Communication facilities* – can be compromised by undesired signal data emanations, cross-talk between secure and insecure circuits and the insinuation of technical surveillance devices.

- *Users* – may misrepresent or gorge their identification or authorization, may seek unauthorized access to sensitive material by rousing; and can use debugging procedures to circumvent security mechanisms.
- *Remote terminals* – can produce undesired signal data emanations, they are vulnerable to technical surveillance devices, and they can produce a potentially compromising text in the form of hard copy or as permanent images on platens or ink ribbons.
- *System personnel* – have normal access to supervisor programs, accounting files, system files, protective features, core dumps, and files stored on removable electronic data processing media and, if they are not loyal and reliable they can become serious security risks.

3.2 Common Risks and Threats

- Deliberate sabotage
- Fire and other hazards
- Through equipment failure
- Operator negligence
- Unauthorized access to computer systems.
- Password exposure
- Insufficient security
- Virus and malicious codes
- Unauthorized access to computer network

In analyzing the security problems of a modern computer environment and seeking solutions to those threats, an overall view is useful. It can tell us in general where we are, what we are up against, and what resources are available to us for defence. But it is unfortunate that most organizations 'gain confidence' and think that security measures are too costly and are bad for the morale of their employees. This 'negative attitude' breeds a culture for FRAUD to take up roots.

3.3 Fraud and its Elements

Why fraud occur

Fraud can be defined as a dishonest business transaction aimed at a financial gain to the fraudster and a subsequent loss to the victim. It is an act of stealing. It generally takes place because there is *opportunity* (access, skill, and time) and *motivation* (need, justification and challenge) to commit it.

Why fraud can easily take place

- Trust and greed
- No victim awareness till very late

- Official reaction differ
- Low penalties due to the fact that proving the case beyond reasonable doubt is not easy
- High profit compared to the low risks involved
- There is unwillingness to report because of:

    - Embarrassment to self
    - Embarrassment to organization
    - Some thing that police cannot help

Fraud warnings

- Autocratic line management - a forceful (domineering) person can exert authority to his/her status. This may allow controls to be over-ridden or favourable information to be suppressed: conditions essential to the concealment of many frauds. This problem sometimes arises where an individual sees himself as the driving force behind a business and start to behave more as owner than manager.
- Low morale – low staff morale is conducive to fraud. Unhappy staff are less likely to operate controls effectively and may cut corners. If for example, a major redundancy plan is in progress or a site is to be closed there is a risk that staff may avenge themselves at the expense of the company.
- High staff turnover – high staff turnover may indicate disquiet at fraudulent activity or the way the business is managed and a reluctance to continue working under such conditions. Departing employees should always be debriefed by someone independent of their line management.

Rule: watch for the signs of increased risk and investigate.

Fraud alerts

Fraudsters often test a fraud by making several small deniable or inconsequential attempts before a single large transaction. Detection of small frauds may indicate more substantial attempted fraud. It is therefore vital to react quickly and effectively to fraud alerts. Common fraud alerts are:

- Anonymous letters
- Lifestyle
- Untaken holidays
- Unusual, irrational or inconsistent behaviors.

Rule: recognize and investigate all fraud alerts.

3.4 Computer-related crimes

The concept of computer crime is necessarily founded on new and different concepts from those of traditional crimes. This is because the patterns of conduct treated as misuse or abuse differ, to a great extent, from those of traditional crimes. Computer

crime is understood by legal scholars to be antisocial activity related to computer systems.

This broad concept can be concretized by surveying the circumstances related to the commission of computer crimes and by classifying the crimes themselves. Many classifications have been attempted, but most commonly they fall into five categories:

- ***Manipulation of data*** – e.g. false account numbers, changing values through written input documents, altering cheques, values, names or account numbers.
- **Unauthorized computer use** – gaining access to confidential information and changing it. Most common types of computer fraud are in payroll systems, the internal transfer of funds in customer accounts, inventory ledgers etc. this is usually done by creating ghost employees, stock, items, customers, etc.
- ***Computer sabotage*** – malicious damage to computer hardware or software programs. This may occur if there is a motivation, eg. Justification, revenge etc.
- ***Computer theft*** – this may include theft of information and computer-related assets.

3.5 Managing Computer Fraud and Security

The protective features that computer security shares with other kinds of security consist of administrative and organizational measures, provisions to ensure the loyalty and reliability of personnel and traditional physical and environmental safeguards.

The protective features involve measures relating to hardware, software and communications if a remote environment is under consideration. The underlisted are some of the measures, which can be enforced to ensure fraud does not occur and also maximum security prevail.

- Establish authority
- Establish fraud policy
- Ensure loyalty and reliability of employees by doing the following:
    - Segregation of duties
    - Delegation of duties
    - Rotation of duties
    - Pre-employment screening (vetting)
    - Education (exposure)
- Establish means whereby authorizing actions may clearly be recognized as valid.
- Identify assets deserving protection
- Count your protected assets
- Concentrate your valuable assets so that they can be protected
- Reduce exposure of protected assets
- Document actions affecting protected assets
- Investigate all discrepancies
- Punish deviations
- Fix responsibility for protected assets
- Accounts must be analyzed and reconciled

- Variance between actual and budgeted
- Access control software
- Decentralized security administration
- Antivirus products
- Off-site storage of backup files
- Password management
- Network access control
- Computer room security
- Dial-up port protection