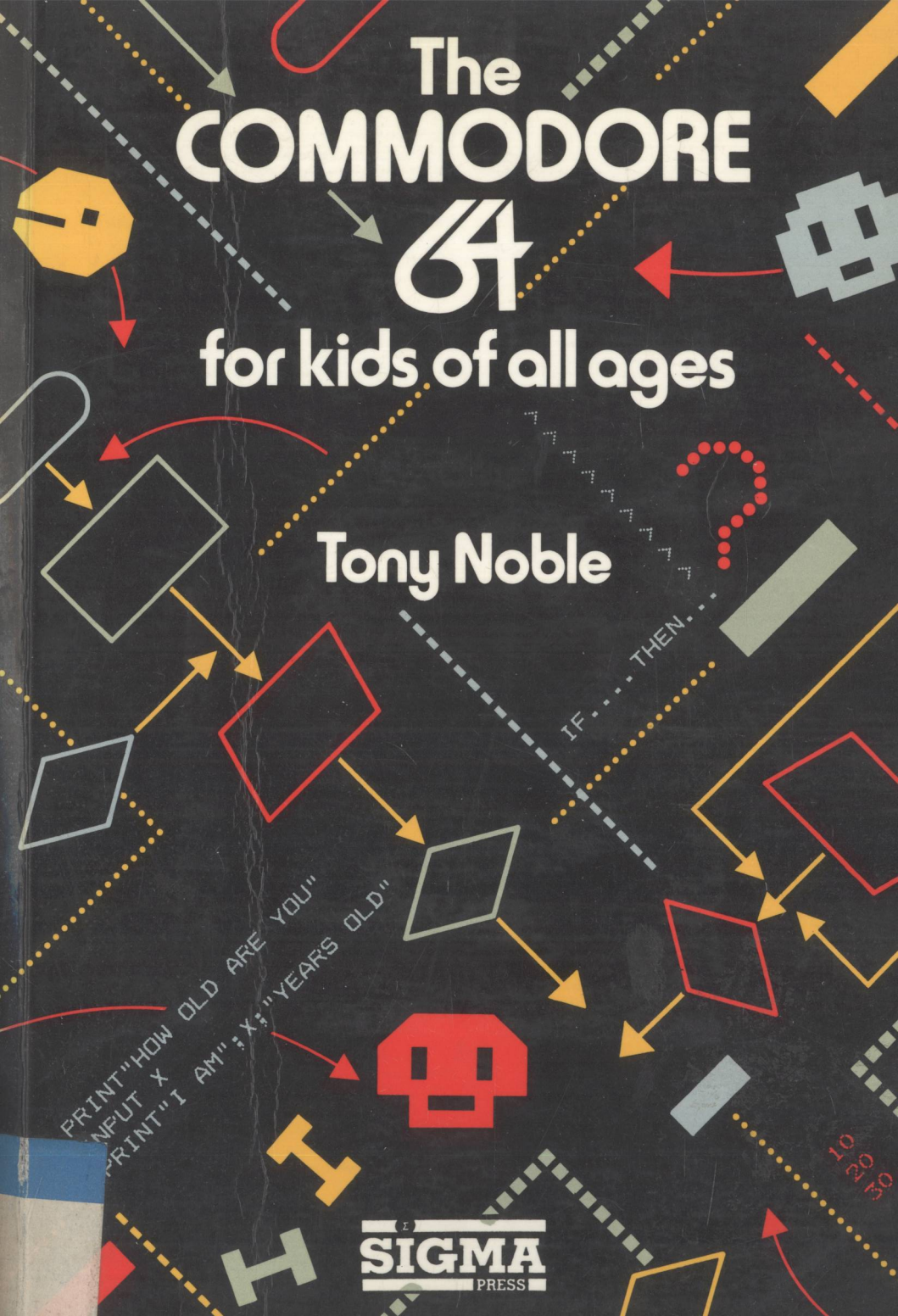
The COMMODORE 64

for kids of all ages

Tony Noble



SIGMA PRESS

G434
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8562518

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Tony Noble

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ISBN 0 905104 77 3

Published by: Sigma Press
5 Alton Road
Wilmslow
Cheshire SK9 5DY

Distributed by: John Wiley and Sons Ltd.
Baffins Lane
Chichester
Sussex
PO19 1HD

ACKNOWLEDGEMENTS:

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Printed and bound in Great Britain by
J. W. Arrowsmith Ltd., Bristol

8562518

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CHAPTER 1
WHAT'S IN THE FUTURE?

(Primarily for Parents and Teachers.)

The Computer, You and Your Family.

Digital watches, televisions, telephones, video recorders, sewing machines, dishwashers, washing machines, cookers, cameras, and now personal computers, all have one thing in common – chips! The micro kind! Does it all sound frightening, bewildering and, perhaps, beyond you? Maybe, but almost certainly not to your children. We are living in an exciting technological age, the "computer explosion" has happened and your COMMODORE 64 will help you to enter this new era.

Whilst reading this and using your COMMODORE 64, I hope that you will be able to appreciate and understand the micro-revolution which is affecting our lives – it's exciting!

As parents, we are looking to education to fit our children for life in the future. Teachers continually warn us that a lack of education will cripple a child's chance in the world of tomorrow. Schools need to look forward to the emerging new society and to search for aims, objectives and methods for the future.

Certainly, our children are growing up into a world where the micro-chip is appearing in many areas of our lives. The silicon chip is in our homes in televisions and cookers, in children's toys and games; surely the home computer will become an integral part of your home audio system and not only as a round of space invaders, although your COMMODORE 64 is ready to challenge your games skills with plenty of ready prepared software.

This rapid advance in technology is emphasised by the fact that when Neil Armstrong and Edwin Aldren first walked on the moon in 1969, digital watches had not been invented. Now many children have these watches, some of which even have space invaders programmed into them. Technology is progressing very rapidly, even to the extent that computerised pacemakers can now be fitted into the human heart.

Tomorrow's citizens will have to cope with even more hectic change, and according to Alvin Toffler, who wrote "Future Shock" over a decade ago, our prime objective, as educationalists and parents, must be to increase the individual's "cope-ability" – the speed and economy with which he can adapt to continual change. There is an urgent need to look at present day jobs and professions and their images, and consider the future needs of the next twenty to fifty years.

Toffler suggests three main objectives within the education system:

(i) to transform the organisational structure;
(ii) to revolutionise the curriculum;
(iii) to encourage a more future-focused orientation.

Figure 1.1 Some benefits of your COMMODORE 64.

These are indeed high objectives and ideals, but they pose a few questions. Is the traditional curriculum of English, Mathematics, History, Geography, Religious Education and Nature Study totally relevant to today's world of increasing leisure time? Would it not be more useful for our children to study leisure time pursuits, or art and design, music and literature and enjoy a variety of physical and recreational activities? Naturally, this needs to be achieved within a scientifically based curriculum. These subjects, together with keyboard literacy, are surely more applicable to the world of the 1990's. Of the current school curriculum, Toffler says, "It is a mindless holdover from the past."

Children entering school now and leaving in eleven years time will face an entirely different situation than that of today's children. What, then, are the educational questions that we should be asking ourselves as children are prepared for the world of the 1990's and 2000?

The principal aim is to help people to adjust to a rapidly changing society where the major area of employment will be in new technologically advanced operations. There is also the necessity to help the unemployed to keep their self-respect and enable them to utilise their free time purposefully. Some of these objectives are displayed in Figure 1.2.

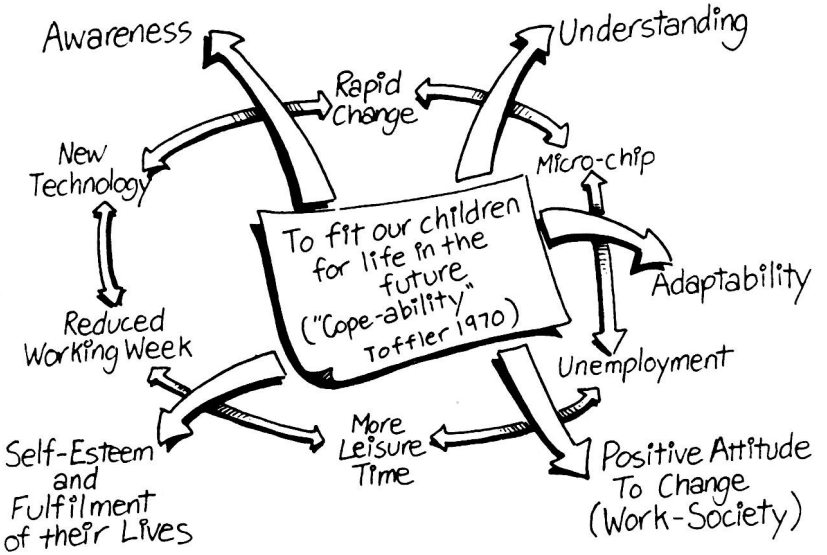

Figure 1.2: The impact of Current Social and Technological changes of Children

At the centre of any educational training which prepares children for the future, is the need for a positive attitude to change, one that relates to work and society and helps towards views that will offer a sustained fulfilment of their lives. It must instil curiosity and pleasure in learning, and not an active distaste against it. It is important to develop study skills leading to autonomy of independent learning and to provide the foundations for later training.

The Council for Educational Technology's pamphlet "Micro-Electronics : Their Implications For Education and Training" offers an interesting summary: "But there is not unlimited time. If change is coming, it will come with unprecedented speed. We need to think and to act with courage and resolution." We do need to act now, the computer explosion is well under way.

Parents, teachers and educationalists must help and guide these changes, so that the quality of life continues to improve.

To introduce young children to the world of micro-technology is a step in the right direction. Headteachers and teachers now have this opportunity, through the recent Central Government's scheme. All primary schools throughout Great Britain should have a micro-computer by the end of 1984, thus giving all children the opportunity to gain practical experience of computers. This opportunity must be accepted otherwise our children will suffer.

The COMMODORE 64 will allow children to be given a real insight into the

micro-revolution and the opportunity to acquire keyboard skills and write programs of their own – albeit simple ones to begin with. The children must understand that they are "masters of the machines" – not vice versa – and that the computer is only as good as the programmer.

Micro-Computers for Learning.

With the advanced technology available, the micro-computer has become a low cost audio-visual aid, but it should never replace or dominate the class teacher. Teachers can use the computer as an aid – the name of this technique is Computer Assisted Learning (CAL). Different teachers will have different ideas of CAL and exploit the different characteristics of each make of computer.

As a teaching aid, the micro-computer has several important advantages for its use in schools:

1. As a motivator, it is second to none. Children become keen and interested and will practice their basic skills for hours with enjoyment and satisfaction. Often these will take the form of simple drills in mathematics or language. The micro-computer can generate simple arithmetic problems within a games situation. With added graphics, children (and adults!) become totally absorbed, involved and motivated. Even after havng a computer for over two years, my own two children still argue about whose turn it is to use it. Throughout all this fun, children will learn quickly and grow confident in handling the machines that are rapidly becoming part of everyday life and will be part of their working world.

2. The micro can give instant repetition and reinforcement – a common ingredient throughout all forms and stages of teaching. This repetition and reinforcement requires patience – something the micro has plenty of. It will never get cross and makes practising the boring repetitive skills fun.

3. So often, within the classroom situation, children have to wait until the teacher is available to answer questions. Whilst the micro will never replace the teacher and the vital human contact and human relationships between the teacher and pupil, the computer does have the advantage of giving an immediate direct response. The computer must be carefully programmed so that the questions and responses put by children can always be accepted and acted upon.

4. As an educational aid, the micro has the ability to help the less able child and to provide the constant repetition, reinforcement and patience required for this task. At the same time, the micro can be programmed to stimulate the more able and bright pupil with more difficult and extended applications.

5. Many pupils, at all stages and levels of education, have difficulty in recording their work in written form, perhaps due to physical or manual dexterity problems, handwriting difficulties or general backwardness.

The computer, requiring just a typewriter movement, avoids many of these and, therefore, has the ability to help the pupil who is struggling with this handicap.

6. Using the delete key on a micro, children are able to 'wipe-out' mistakes instantly. No other child need see these errors and there are no visible messy changes – a great bonus to the child lacking in confidence.

7. Some children in our society cannot communicate easily by speech, perhaps due, in part, to social deprivation, yet they may be mentally quite bright. The traditional way of recording work adds to their difficulties. Whilst not advocating that all their work should be done through the computer, it will certainly help relieve their frustrations, add to their previously limited success and thus instil confidence.

8. A complete new area, as yet unmentioned, is the computer's ability to help the physically handicapped to communicate. It may require additional aids, but the computer's visual and sound abilities make this an exciting area of development.

9. As you begin to program your COMMODORE 64 you will appreciate the need in all your planning to think logically, otherwise your programs will not work. The computer thinks logically and helps to develop this way of thinking in the user which is a basic requirement in developing man's learning skills.

10. An advantage often overlooked with the micro is the ability to create group interaction in a decision making situation. Simulation programs that require logical thinking, group discussions and thought-provoking situations lead to controlled group interaction and role playing.

11. As mentioned, the computer has the ability to store information already in the program or to receive and store information supplied by the user. A well-written program will enable the user to present this information or DATA in a more interesting, colourful and graphical way than the traditional textbook method.

12. An interesting development, which is more advanced in the U.S. due to its research and development by Seymour Papert, is the use of LOGO for children. LOGO, although a very simple concept, is a very powerful computer language for children to work in. One very widely used aspect of LOGO is "turtle graphics" in which the cursor (acting as the "turtle") is moved around the screen by various commands such as: "FORWARD", so many steps; "RIGHT",so many degrees and so on. The child can now construct a variety of graphical drawings. The "turtle" can also lift its "pen" up or down, thus producing marks or not. With simple commands the child has a powerful tool for thinking and planning logically, and can produce a wonderful variety of graphically drawn geometric shapes, giving a wide range of mathematical experiences. Some children may have had experience of using the "floor turtle" (a device attached to the computer, having a physical pen) to construct similar designs on large pieces of paper. They may even have used BIGTRAK, a programmable toy "tank", which although it has fewer capabilities, nevertheless uses instructions similar to LOGO.

Very quickly children of all ages and indeed all the family will learn to manipulate and use the micro. The input commands required are easily learnt by the children, who will soon be challenging the COMMODORE 64 and writing their own programs for this versatile and powerful machine.

Computer-keyboard Literacy.

Has it ever occurred to you that reading a book, requires certain skills which children develop both at home and in the formal school situation? It is essential that this reading-readiness environment is fostered and developed and not left to chance. It is essential that the teacher prepares and plans these pre-reading skills so that activities and situations develop in a lively and attractive environment which encourages:

- discussion
- conversation
- listening
- re-telling stories
- sequential ordering

to name just a few.

Only by creating this kind of environment will children have the pre-reading skills, which lead to reading readiness. The world of books and reading must appear quite daunting for a child just beginning to learn. For example, children must be familiar with the printed word and be able to recognise word shapes, to discriminate visually, to recognise the odd-one out, and recognise their own names – all these are part of this reading readiness environment. Early on, children must acquire the skill to read from left to right – an orientation that sometimes takes a while to grasp – and at the same time, cope with the manipulative and co-ordinating skills required for the writing process.

We live in a visual world; we see advertising all around us, television provides us with constant, lively and colourful entertainment, and now we have the computer! All these technological innovations are continually becoming more sophisticated.

The reading readiness processes of purposeful activities created in a colourful and visual environment, lay the foundations for the understanding of many concepts. Later, children will begin to develop phonic word building, leading to the use of indexes, encyclopaedias and dictionaries and on to skimming and higher order reading skills.

Compare all this with the skills required to use a personal computer. Within the development of reading skills, I have stressed the need for a lively and attractively planned environment – the COMMODORE 64 complements this. It looks, and is, friendly. With its ability to create "sprites" – high resolution programmable characters – it enables the programmer to write colourful and exciting programs with a variety of graphical facilities and sound qualities. Upper and lower case letters are available and it is possible to program larger letter characters, thus helping children as they begin to master the keyboard and visual screen skills.

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The COMMODORE 64 has a keyboard which is light and easy to use. Fingers can move easily across the keyboard whilst the visual aspects and characters on the screen are being noted. Contrast these computer skills with using a pen while reading from a page of a book – quite different manipulative and visual skills from those used at the computer.

Very quickly, children will begin to read and digest information from the screen and, simultaneously, refer back to the keyboard to type answers. Children learn so quickly that having introduced a computer to a group of five year old children one morning, they then proceeded to act as teachers to a second group of children that same afternoon – and remember, they were five year olds!!

Living in a technological age, the modern child has no fear of machines – a very healthy state of affairs and one to be encouraged. Man is master of the machine and even the young five or six year old will turn to an adult and explain why we press RETURN or what happens when the SHIFT key is hit.

Children will be coming to school at five years of age, having basic writing skills and computer literacy before they can use a pen. And why not? Hitting any key on a computer keyboard will give instant success and communication, without all the frustrating manipulative skills involved in writing with a pen.

CHAPTER 2
YOUR QUESTIONS ANSWERED.

(Primarily for Parents, Teachers and Older Children.)

Now that you have your COMMODORE 64, exactly what will it do? What is a program? Do you know what the terms chips, bytes, ROM and RAM mean? Or is this flood of new technology completely bewildering? Now your problems and queries are about to be answered.

Exactly, What is a Computer?

A computer consists, basically, of two main units: the processor and the memory.

The processor, itself, has two units, so that it can perform two basic functions.These are the arithmetic and logic unit, and the control unit: Figure 2.1. The main part of the processor, the arithmetic and logic unit, carries out any arithmetic operations necessary, based on the data currently in the control unit and memory.

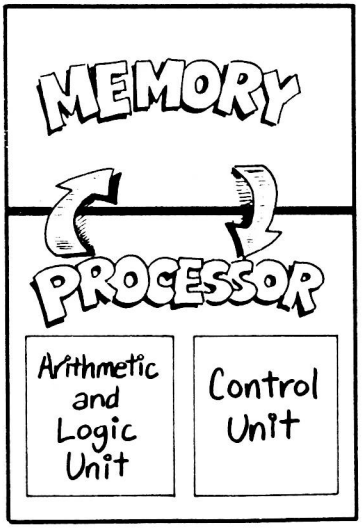


Figure 2.1: Plan for a Simple Computer.

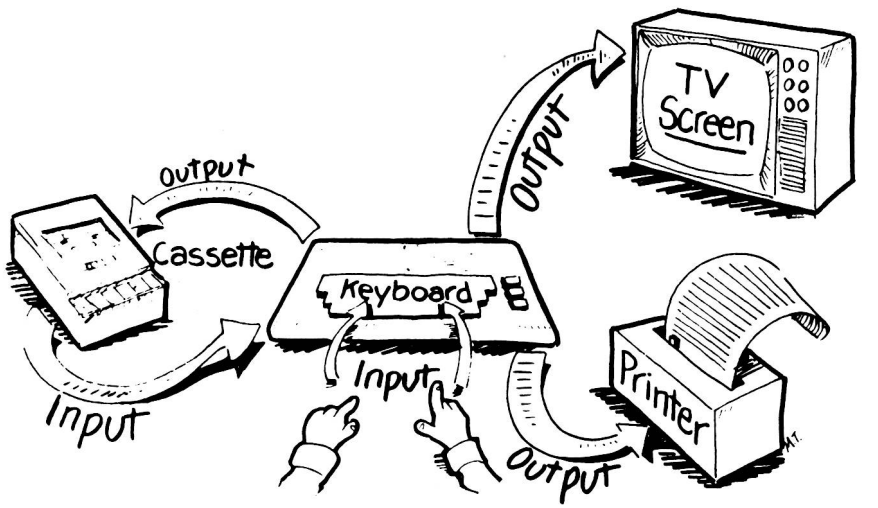
The control unit has the ability to select instructions, one at a time, and then to decode these instructions. In decoding them, the control unit will decide which operation needs to be performed and in which order.

The computer, being a logical machine, is only capable of obeying certain instructions:

(i) arithmetic operations of addition, subtraction, multiplication and division, e.g. 4+3, 10-6, 5*2, 12/4.

(ii) collecting, storing and retrieving data via input and output functions, e.g. read a number from the keyboard or print it on the screen.

(iii) carrying out simple Yes/No type logic comparisons, e.g. if today is Saturday, or Sunday, then it is the weekend, if not, if any other day it is a weekday.



There are several ways of making inputs to (and outputs from) your COMMODORE 64. Some devices, such as the cassette recorder, are used for both input and output.

The input and output functions are sometimes difficult to understand. The INPUT of any data usually involves using the keyboard to type information INTO the computer's memory. This information can then be retrieved from the memory and could be displayed on a T.V. screen. The screen is an example of an OUTPUT device. DATA is the information which is received by the computer's memory and stored for later use. It is records such as names, telephone numbers, stock lists, and so on.

Hardware and Software.

When reading computer magazines, you will frequently meet the words HARDWARE and SOFTWARE. HARDWARE is the term used to describe the

physical side of the computer and its components or peripherals. It is the equipment such as the computer, printer and cassette. Generally, any parts which you can touch, are HARDWARE. The SOFTWARE is best described as the paperwork supporting the hardware but, in particular, the computer's programs which store the data and which end up in the computer's memory.

What is a Program?

A program is a sequence of logical instructions (often called 'statements') written by a programmer. When input through the keyboard, the program is stored in the memory of your COMMODORE 64. Then, when you type RUN, the statements will be obeyed in the numerical order of the line numbers. The computer is a logical machine and the programmer must think each step out logically. It is important to remember that a computer assumes nothing, so all instructions must be programmed. If there is any data to be included with the instructions, you must also supply it. The computer then processes the data through the program statements. Programs, when printed out, come in the form of LISTINGS.

Naturally, the computer's program must be written in a language that the computer understands. BASIC, the Beginner's All-Purpose Symbolic Instructional Code is such a language. Amongst other things, BASIC enables you to write algebraic statements and expressions. Each BASIC statement consists of a command to the computer to carry out a certain course of action. Every BASIC statement must be preceded by a line number.

For example:

```
10 PRINT "Hello, what is your name?"
20 INPUT A$
30 PRINT "Pleased to meet you";A$
```

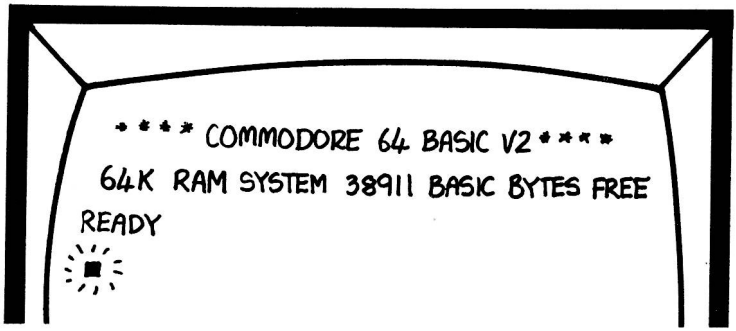
This is a small, but complete BASIC program. Do not worry about what it does, or how it works, for the moment.

How is the Program Remembered by Your Computer?

Your COMMODORE 64 micro-computer has two memories, known as ROM (Read Only Memory) and RAM (Random Access Memory), but do not be put off by these phrases. Read Only Memory is the memory which is already built into the machine. ROM stores the instructions which allow programs written in BASIC to be interpreted for the computer. In fact, it is the brain which translates your program.

RAM (Random Access Memory) is the "user" memory of the computer. This is memory space which can be used to store program instructions and the

data relating to these programs. the amount of vacant memory is shown on your TV screen by the phrase "BASIC BYTES FREE".Your Commodore 64 has 38911 BASIC BYTES FREE of Random Access Memory and each time that you switch the computer on, this will appear on the screen of your television or monitor:



The size of the computer's memory is measured in "bytes" and one byte of storage can store one character. Your COMMODORE 64 has approximately 38K of "user" memory. This figure of 38K indicates the RAM size measured in Ks, where one K is approximately 1000 bytes, (actually, it is 1024 bytes). If you read computer magazines, you will see advertisd, computers which have 1K, 4K, 8K, 16K, 32K, 64K etc of memory, or software which requires a similar quantity of memory. For instance, a 64K machine has just over 64000 bytes of storage power or storage for over 64000 characters.

The programmer types the program into the computer's memory and, with the aid of the VDU (visual display unit), follows the program as it is typed. The VDU is usually a television monitor, although some VDUs are suitable only for computers. Your home television is perfectly suitable for use as your VDU. As the program is typed onto the VDU, the RETURN key is hit at the end of each line. It is the action of this key which actually transfers the program into the computer's memory.

Why Save Programs?

It becomes tedious and boring to constantly type the same program into your computer each time you wish to use it. There is no fun using the computer like this, hence, the need to "store" the programs.

The cheapest way of storing data and programs for loading into the computer's RAM memory is to use an ordinary audio cassette recorder with either a special computer tape or traditional audio tape.

The other storage system uses a floppy disc. As the name suggests, this is a flexible disc rather like a plastic 45rpm record. The disc has far greater storage

facilities and will give the user quicker access to the programs and data, but at a much higher cost than the audio cassette system. Setting up a floppy disc system, although it is quite expensive, possibly over £200, is far more convenient and is well worth considering if you can afford it.

Having acquired your storage facilities, how do you SAVE your programs? Firstly, remember to give your program a title at the beginning as this is vital in referring to programs later. Look at the listings at the end of the book. You will see that the first line of each listing always contains a title, for example:
1 REM VICTOR

Now let's see how SAVE works with an example. Suppose you had typed the program VICTOR (see Chapter 7) into your COMMODORE 64, you would then complete the following steps:

1. Insert your cassette into the recorder.

2. Rewind the tape to the beginning using the ◄◄REW on the COMMODORE cassette.

3. Set the tape counter at 000.

4. Wind the tape on slightly to avoid recording on the plastic "leader" tape, using the F.FWD►► key, say until the counter is at 010.

5. Type : SAVE"VICTOR" and press the RETURN key.

6. Immediately appearing on the screen are the instructions:

   PRESS RECORD AND PLAY ON TAPE

7. Press together REC and PLAY► on the cassette unit.

8. The screen will go blank and turn the colour of the border. During this period the program is being SAVEd.

9. Eventually, the cassette will stop, the screen colour will return to normal and the following message will appear on the screen:
   OK

   SAVING VICTOR

   READY

10. Your program should be stored on tape but it is important to check that your tape has made a good recording. This can be done by a VERIFYING process. Rewind the tape back to the beginning (press ◄◄REW)

11. Type VERIFY"VICTOR" and press RETURN

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