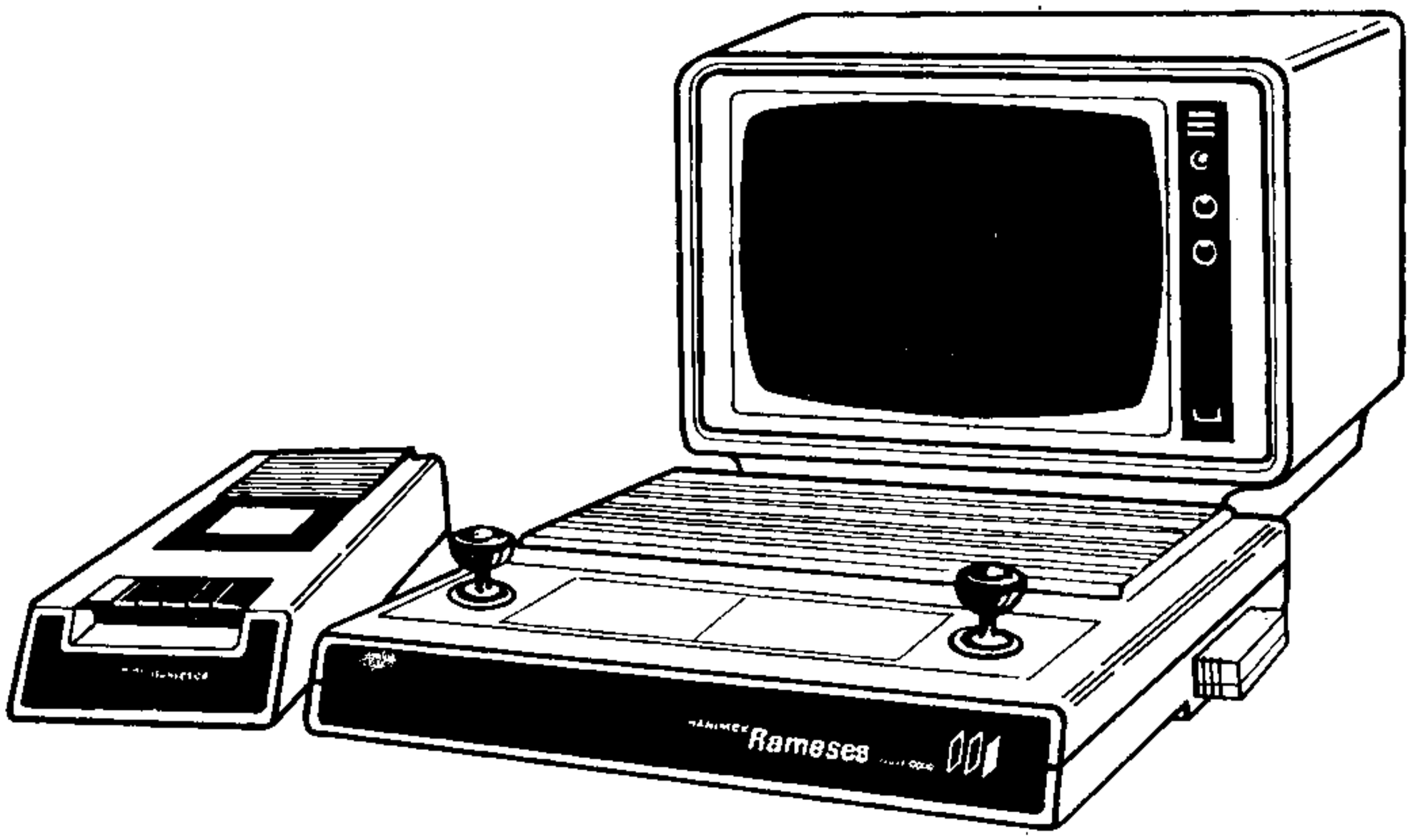
RAMESES HANIMEX HVC 6502

PERSONAL COMPUTER &
VIDEO ENTERTAINMENT SYSTEM



your introduction to home computing
coupled with video entertainment
brought to you by

HANIMEX

CONTENTS

1 INTRODUCING RAMESES®

Congratulations on purchasing a RAMESES Home Computer and Video Entertainment console. Let us tell you a little more about RAMESES before you read the rest of this book and set the console up, and start to get some video entertainment from it.

RAMESES console is part of a computing system. It combines the functions of a Central Processing Unit with memories and a keyboard, and has input and output ports to enable connection of peripherals that add to its overall flexibility and entertainment facility. (Incidentally, if we use a few words that are new to you, don't worry, they are explained later!)

RAMESES peripherals (which enable expansion to a complete computing system) are listed out in later parts of this book.

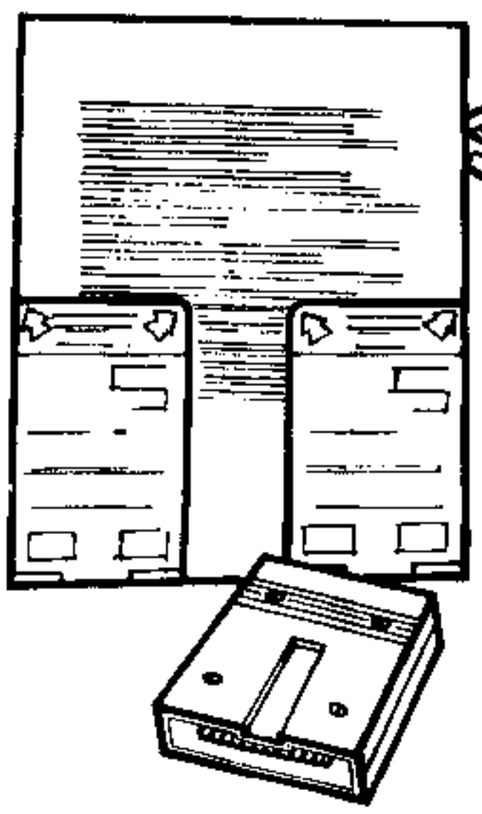
We have tried to make this book as simple to follow as possible in the setting up of the unit and connecting it to your TV set. Follow the instruction book carefully and read the ancillary instruction manuals that are issued with each games cartridge.

The game supplied with RAMESES has its own instruction book just as do the other games cartridges.

Similarly, when the peripherals are added to your overall computing and entertainment facility, detailed books, including those about use of the RAMESES console as a computer and utilizing the BASIC programming language, are available as you need them.

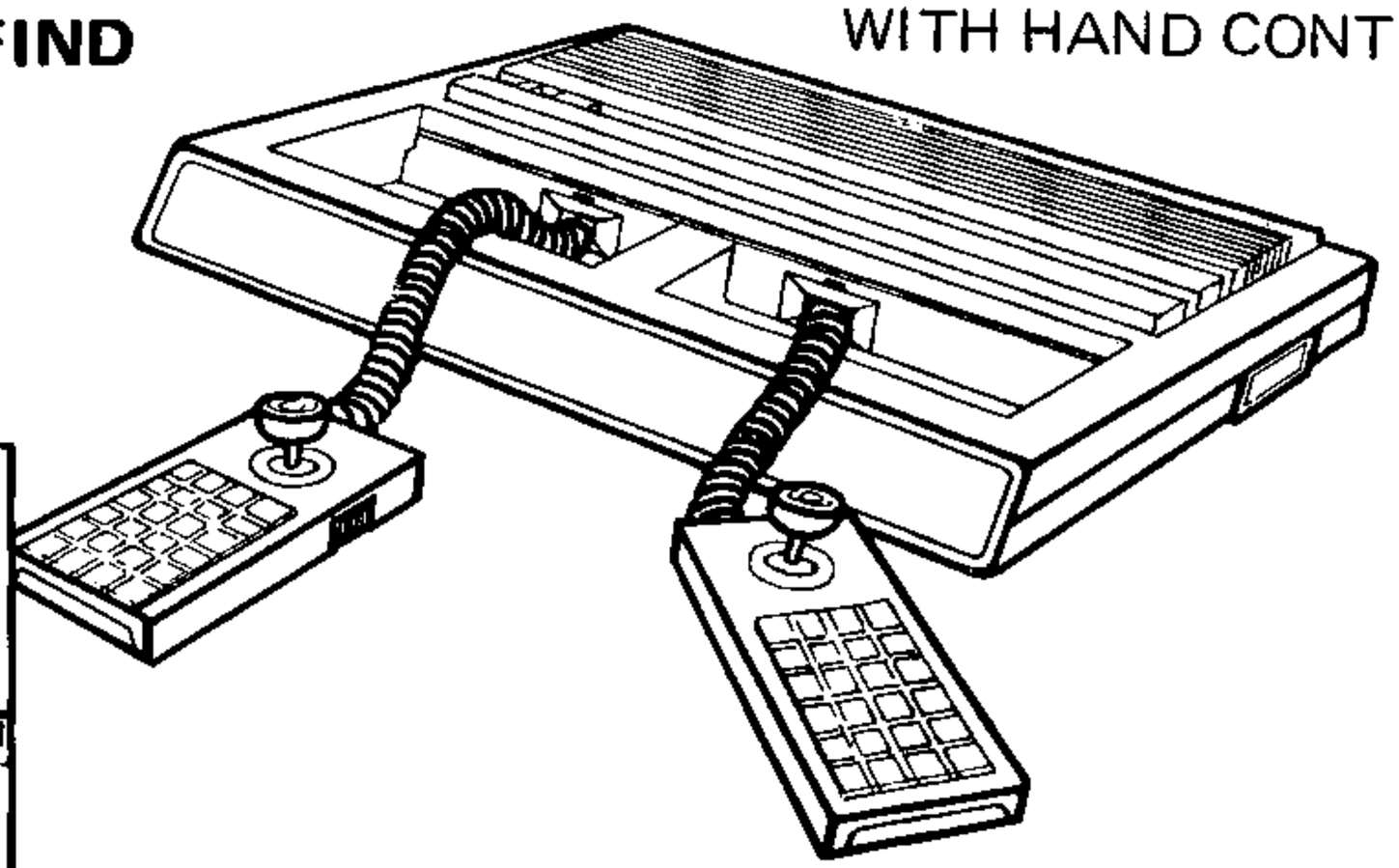
This booklet tells you more about these things later on. Now let's get the console going:—

OPEN THE GIFT BOX AND YOU WILL FIND THESE ITEMS

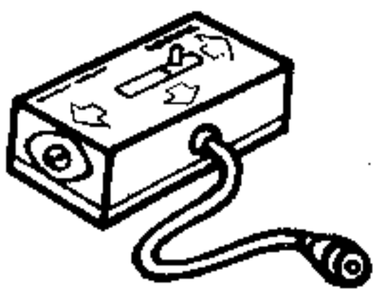


GAMES CARTRIDGE
WITH HAND CONTROL
OVERLAYS AND
INSTRUCTION BOOKLET

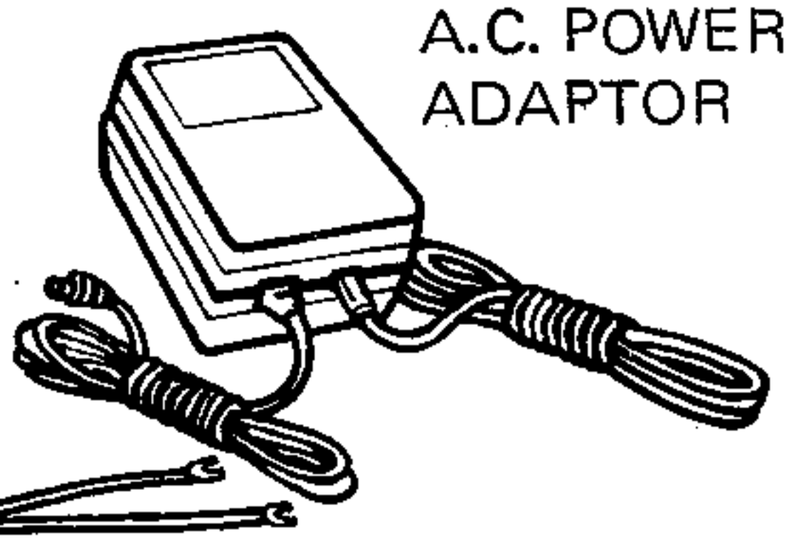
CONSOLE UNIT
WITH HAND CONTROLS



AERIAL
SWITCH BOX



A.C. POWER
ADAPTOR



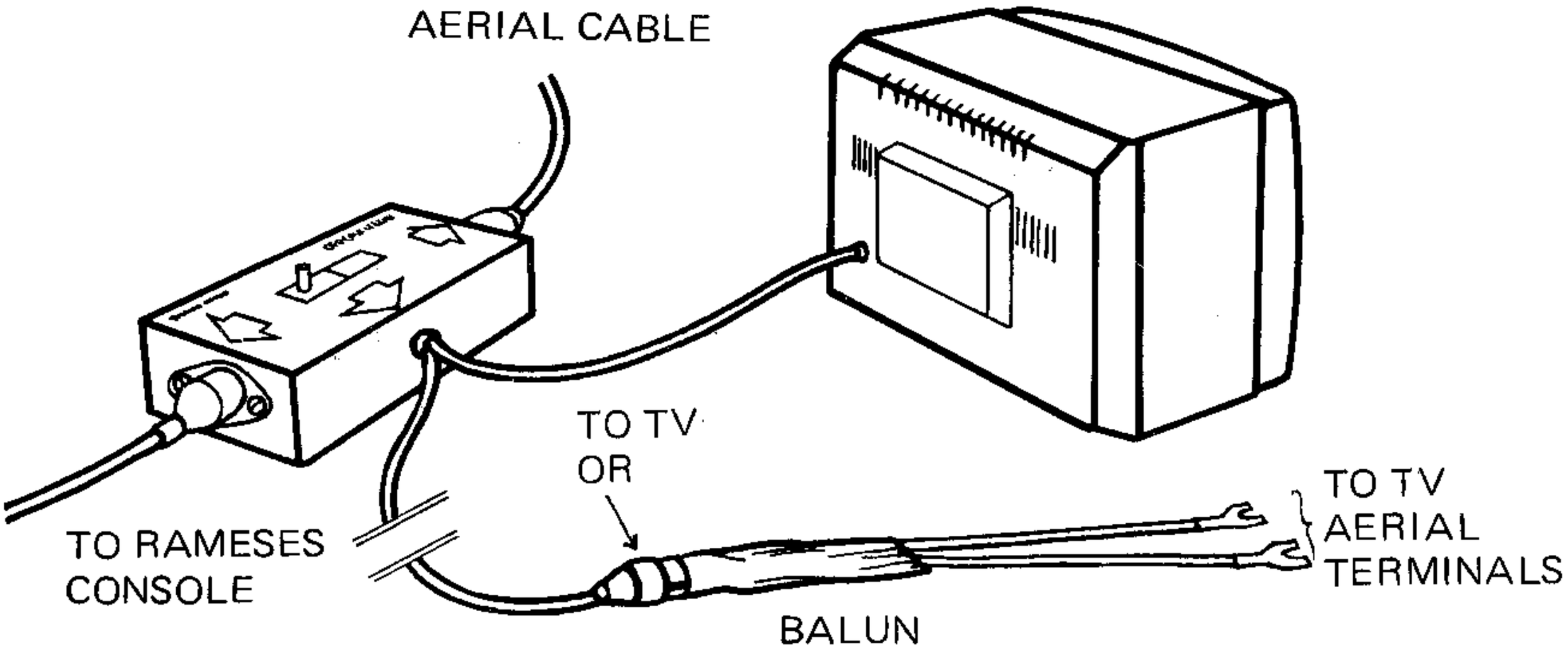
BALUN

2 MAIN CONSOLE — OPERATING INSTRUCTIONS

A Connecting the aerial switch box and balun

The aerial switch box provides you with a convenient means of using your television set for normal TV programmes, or for using your RAMESES.

- Remove the co-axial cable from your television set and connect to the switch box.
- Connect the co-axial cable from the switch box to the aerial socket of your television set.
- Connect the co-axial cable from RAMESES console to the switch box. **NOTE:** If your TV set doesn't have a co-axial cable to the antenna, but has two terminals, then connect the Balun to these terminals, and the co-axial cable from the switch box to the Balun.



B Steps to set up for a game

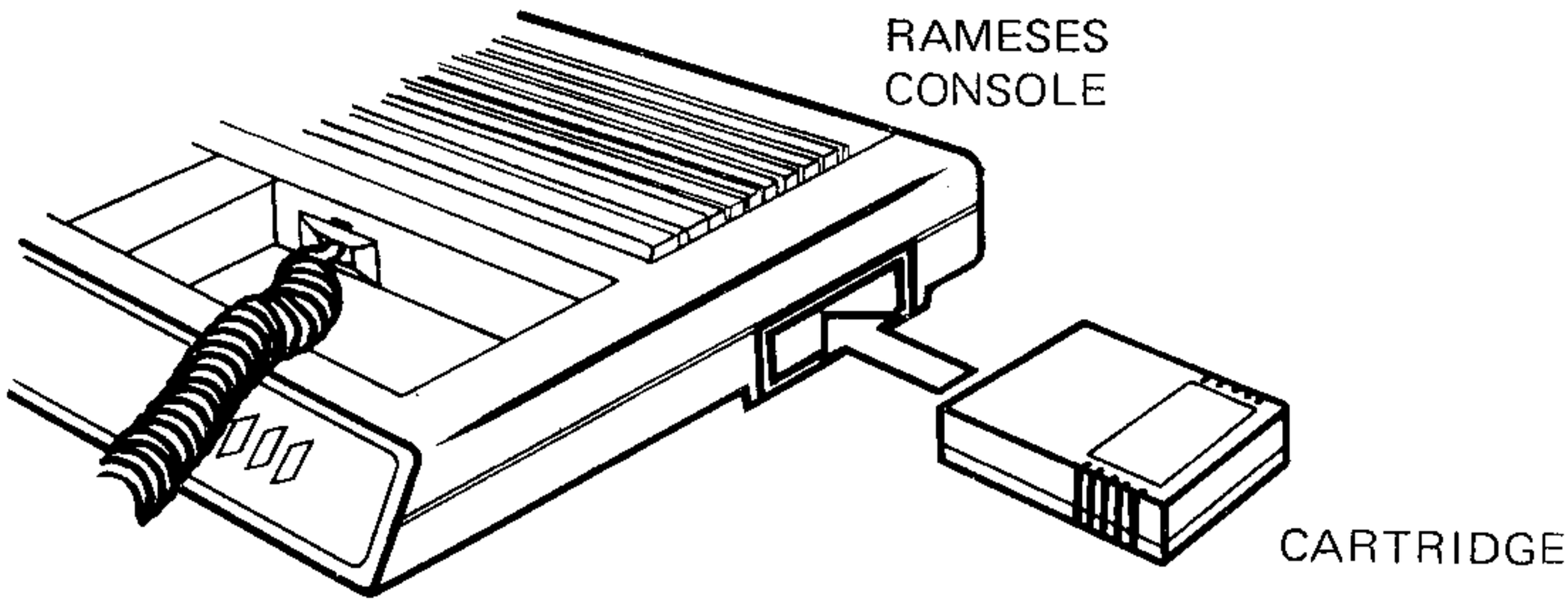
1 Make sure that RAMESES power switch if "OFF".

2 Connect the AC adaptor power plug to RAMESES power socket.

3 Plug the wall plug of the AC adaptor into a normal wall AC outlet.

4 Push the switch on the aerial switch box to 'GAME'.

5 Insert the game cartridge into RAMESES cartridge port.



6 Insert the particular game overlays into the hand controls.

7. Turn on the TV set and select channel one (1). (The channel that has been chosen for games is the spare one that you do not usually use for regular TV programmes.)

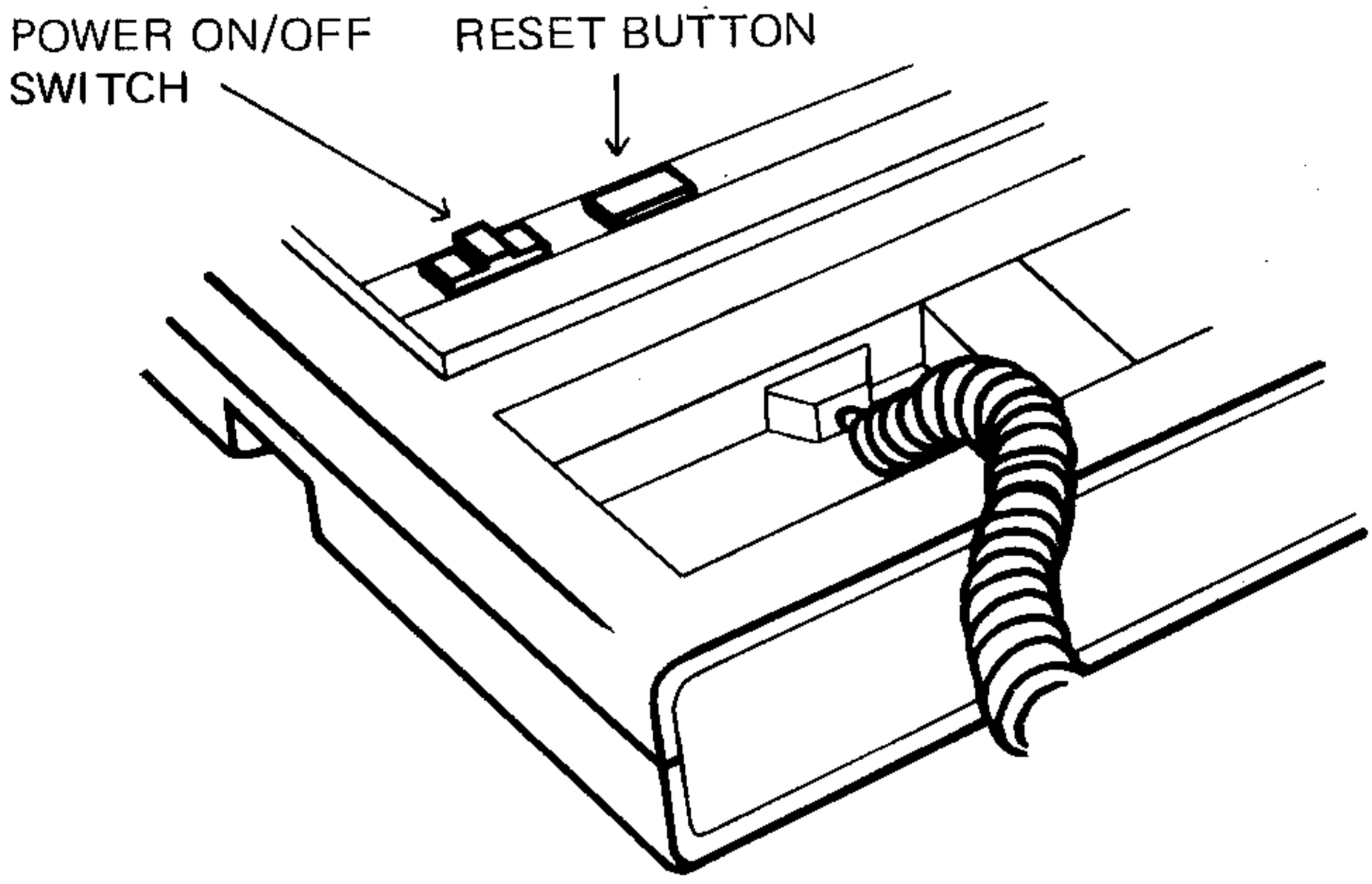
8 Push RAMESES power switch to "ON".

Note:

(i) If your TV set has an AFT (Automatic Fine Tuning) button, make sure the switch is "OFF" when tuning.

(ii) Adjust the fine tuning knob. Adjusting this knob should ensure picture clarity from RAMESES.

(iii) Switch AFT switch on (if set has AFT).



9 All of the game cartridges include a demonstration program which will run when the RAMESES console power switch is first turned on, and will continue to play until the RAMESES reset button is pressed.

10 Now follow the instruction book for the particular cartridge you are using.

C The reset button

If the RAMESES reset button is pressed, the system will terminate an unfinished game and will go back to the very beginning of the game.

D The hand controls

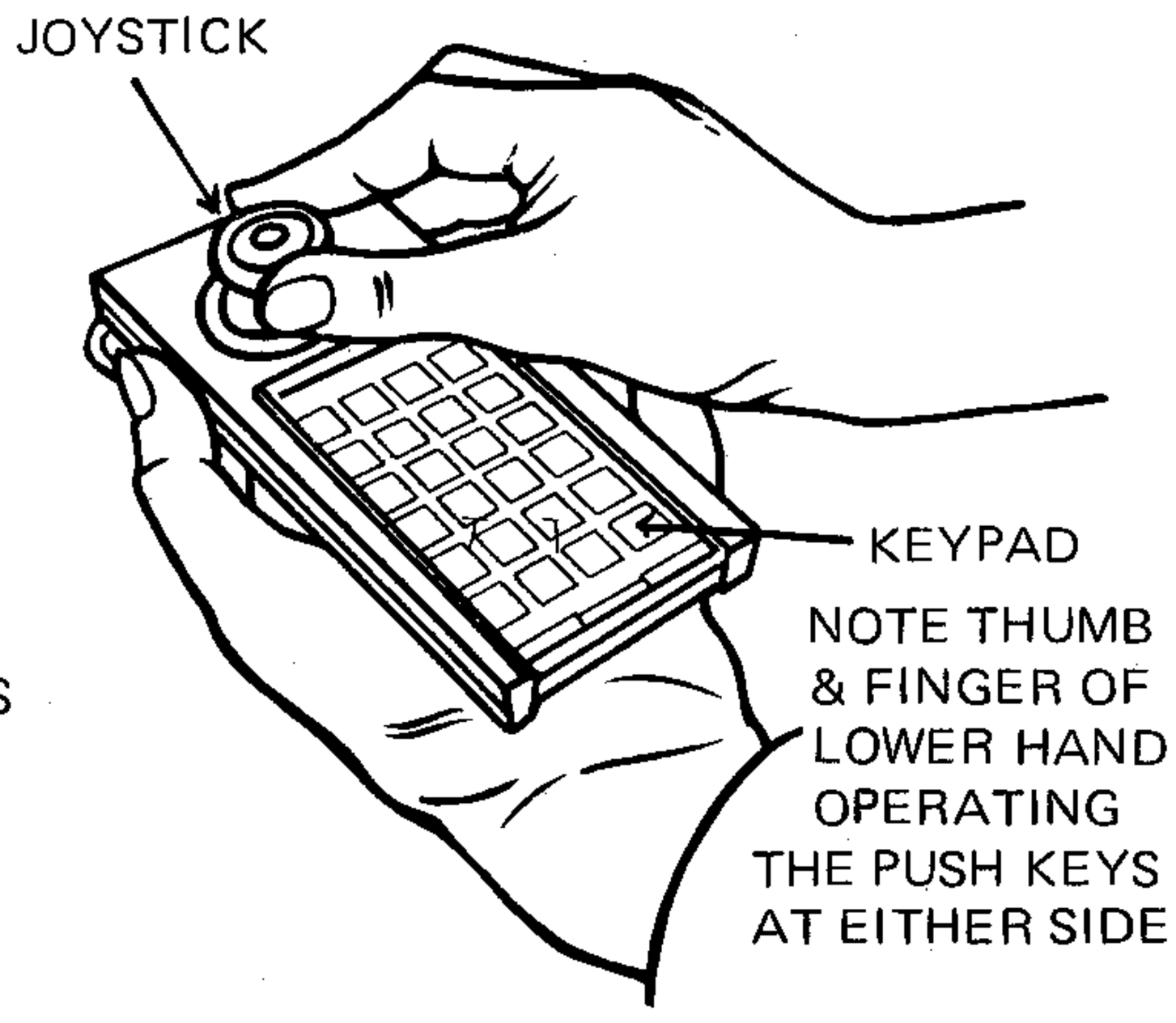
(i) The RAMESES console includes 2-hand controls which are attached to it by coiled cables, which plug into the console unit, and may be disengaged from the console by depressing the moulded detent in the centre of each plug and gently but firmly withdrawing. (This "plugability" is to enable later expansion for computing purposes.)

The main functions of the hand controls are:

- to allow you to control games, and
- as they consist of 48 ASCII keys, enable you to write programmes and make computations with the system when upgraded to a personal computer.

Caution:
If you interchange the Left and Right hand control plugs, it will result in confusion of commands to RAMESES logic system and may result in damage to the inbuilt electronics.

We recommend that you do not disengage the control plugs until you are adding the RAMESES extended keyboard.



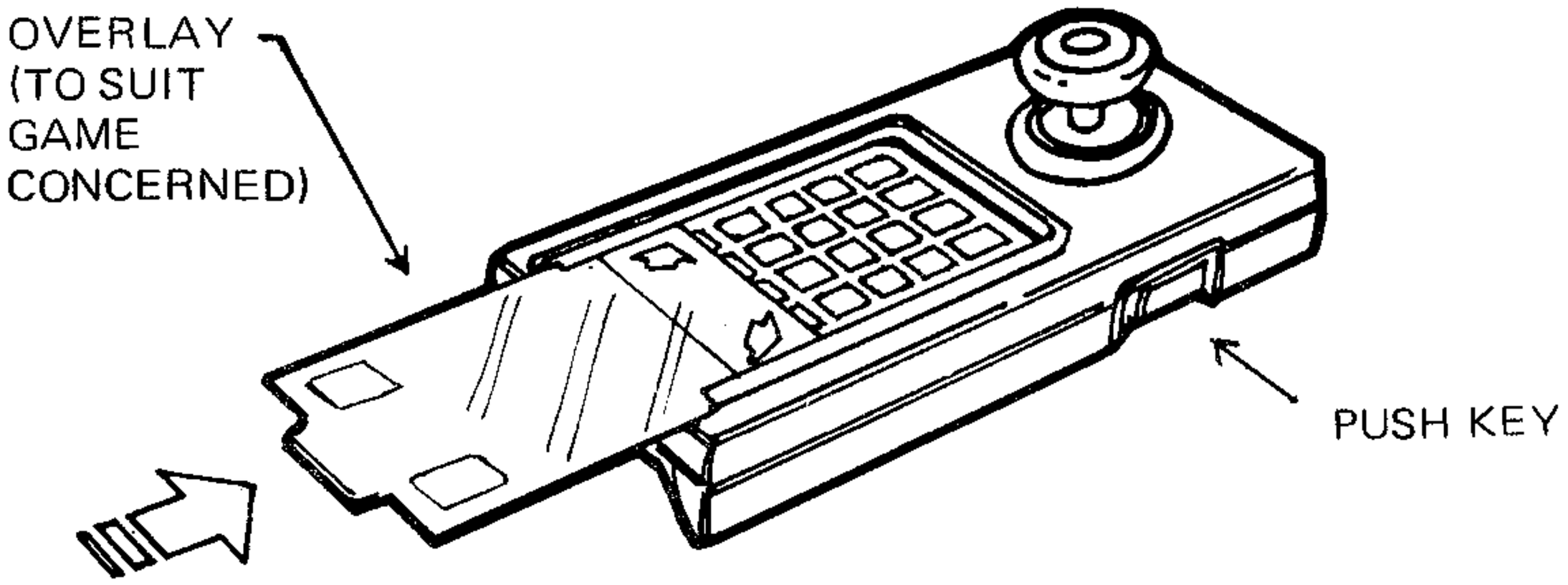
(ii) The structure of the hand-control is such that:

- each side of each control has a 'push' key which has a particular function shown by an OVERLAY for each game.
- each control joystick is unmarked, but it controls 16 discrete directions. Up on the joystick (away from the keypad) is up on the television screen; down on the joystick (towards the keypad) is down on the television screen; the remaining 14 other direction points are equally spaced between these two.

To move an object on the screen, push the joystick in the direction in which you want motion to take place. To stop motion, stop moving the joystick.

Note: In some games, some of the 16 directions are not needed, of course, and therefore do not operate in those circumstances.

(iii) Each hand control has 24 keys on its keypad. Each key is marked with a different character, and the overlays for each game tell you what each key does. These overlays are different for each game, so that we provide you two (2) overlays with each cartridge; one for each hand control. The overlays can be pushed into the hand control slots as shown in the diagram, so as to fit exactly over the keys. You must make sure that the overlay is all the way into the slot so that you can press the right key under the overlay to get the action you want.



PUSH OVERLAY RIGHT HOME
IN THE TWO SIDE SLOTS.

E Precautions

1 Keep the RAMESES hand controls and all cartridges away from liquids.

2 Avoid exposing the cartridges, the RAMESES console or hand controls to excessive heat. Please keep them in a well ventilated place.

3 Switch off power when not in use.

4 Do not drop RAMESES console, hand controls or cartridges. Handle them with care.

5 Insert cartridges into the RAMESES cartridge port slowly and make sure power is turned off when inserting or removing cartridges from RAMESES.

6 Do not stick fingers in the open end of the cartridges. The static electricity from your fingers may in some cases damage sensitive electronic components in the cartridges.

7 Always remove cartridges from RAMESES when not in use and store in the cartridge carton.

F To switch your television set back to normal use

1 Ensure RAMESES is turned off. (Do not forget to remove and safely store the cartridge.)

2 Push switch on the aerial switch box to TV antenna.

3 Your television set is now ready for normal use, and can be tuned to the required station.

G Summary of set-up procedures

1 Push the cartridge into the RAMESES port properly, and slowly.

2 Make sure that the AC adaptor is properly plugged into wall socket and the other end to RAMESES, and the power then turned on.

3 Set aerial switch box to 'Game'.

4 Make sure that all co-axial cables are properly plugged in, and that the Balun is connected to aerial terminals if your TV set doesn't use a direct co-axial cable.

5 Turn ON your TV set.

6 Turn OFF the Automatic Fine Tuning of your TV set (if it has AFT).

7 Turn ON RAMESES.

8 Tune to Channel 1, (then turn ON AFT).

3 GAMES & COMPUTING CARTRIDGES

There are many brands of cartridges available for use with units that enable TV games to be played on a TV set. Only Hanimex RAM® cartridges are suited to fit RAMESES® personal computer and video entertainment system. The RAM® cartridge provided with your RAMESES® will enable you to get the feel for use of the entertainment centre, and then obtain further RAMS. New Game RAMS are constantly being introduced. See your local retailer for the latest releases.

As your friends get RAMESES, you can swap cartridges between you, learn more about the use of RAMESES and then buy a RAMESES Basic Interpreter cartridge. The Basic Interpreter is the first stage of beginning to use RAMESES as a personal computer. It has two functions:

- to give RAMESES a memory of vocabulary in the BASIC computer programming language, and
- to enable RAMESES memory banks to store data on command, and use it in computer programmes.

The Basic Interpreter comes complete with an instruction book dealing with introduction to BASIC programming.

If you wish to extend your computer further, the other RAMESES peripherals can be progressively purchased as you feel that you are ready for them.

RAMESES Basic Interpreter is up to date with current technology, but as technology advances, further computer cartridges and cassettes will be released to enhance the simplicity and versatility of your RAMESES. We will let you know as this happens.

RAMESES is designed to allow it to expand with personal computer requirements.

4 INTRODUCTION TO RAMESES HOME COMPUTING

Computers are precise! They only do what they're told to do. They understand a vocabulary that is precise but simple. A lot of everyday words are used in telling a computer what to do, and some abbreviated words or symbols. Becoming used to these words and what they tell the computer to do takes a little time.

Once you have learnt them, then you can start to write your own programmes! Initially, we expect that you will buy one of RAMESES programme tapes to start your home computing. These tapes "use all the right words" to tell RAMESES what to do, using the BASIC computer language, and then your TV screen spells out questions and you feed in answers — sometimes words, sometimes just one or two letters, and often numerals. RAMESES then uses this input to compute, and progressively comes up with answers suited to the nature of the subject of the programme concerned.

As you learn to write your own programmes you will find that with the 16 colors and large range of sounds that RAMESES has available for you to command, you can create many and varied colorful and musical programmes that are both entertaining and educational. Really the sky's the limit!

Also, if you feel that you want to "settle in" to home entertainment without at first beginning to write your own programmes — or even if you do; which we feel sure that you soon will — then we will have taped games programmes available that you can go on playing for days and days if you want to. These "advanced computer games" are so interesting that you will be amazed at the skill you have acquired in understanding how to control RAMESES.

Of course, we also have software tapes that TEACH YOU how to TEACH RAMESES! They teach you how to programme in BASIC computer language.

Now to explain a few things about the RAMESES system and what some of those "nasty computer words" mean, and how computers work!

"Software" for home computing is the means of enabling a computer to react in a certain way when given information. (There is a bit more about this later.)

The Basic Interpreter cartridge is Systems Software; it enables RAMESES to operate in a defined system of computation, and to respond in a defined and logical way to commands given by the programme software.

Programme software is a means of inputting instructions into RAMESES memory banks that issue commands to operate and compute from data in the programme, plus that data and commands fed into the system via the keyboard. The tapes and cartridges are programme software.

Modern programmes are available to suit RAMESES. The RAMESES console, coupled with RAMESES cassette drive and Basic Interpreter, enables software programmes on standard cassette tapes to be used. Once in use, the cassettes (which store the necessary data instructing the computer as to how to behave), feed the programme into RAMESES memory banks, so that additional input data (via the keyboards) can be utilized, and a final result obtained.

Probably you will buy a RAMESES Basic Interpreter cartridge together with a RAMESES cassette drive. However, if you are interested in using the RAMESES console to gain experience in general computing and writing your own programmes, then firstly, the Basic Interpreter cartridge is necessary and this can enable the RAMESES console to act as a home computer. However, without a cassette drive, any information that you may programme into the RAMESES console memory banks (via the keypads) cannot be stored on tape for later use or reference. Therefore, we recommend that you buy the Basic Interpreter cartridge and the cassette drive at the same time as buying a RAM cassette computing programme (tape) and set the unit up as per the detailed instructions that come with those units.

When you feel that you have mastered the Basic Interpreter instructions and have used a cassette computing programme together with the RAMESES cassette drive, then later, you could try writing a simple programme of your own, and store it onto a blank cassette tape. It is a lot of fun, and you will be surprised how quickly you become quite expert.

As you start to use the RAMESES computer system, probably you will find that to get maximum information easily available to you, you would like to print out many of the things that you have asked RAMESES to answer, rather than read them from your TV screen. To do this, all you will need is a RAMESES printer interface (that jacks into RAMESES input/output port and also into the printer), and, of course, you will need a printer. Now let us look at the complete RAMESES computing system, and explain what the various peripherals are and what they do:—

The RAMESES console

You already have this unit, and you soon will know how it operates, and probably have already experienced many of the entertainment facilities available from the RAM cartridge games. The left-hand port of the console enables connection of the cassette drive, and the right-hand port enables connection of cartridges or other interface items which couple with other peripherals as listed below. When suitably connected to the peripherals, the RAMESES system will give you up to "64" K of Ram (Random Access Memory), and has 12 K of Basic Interpreter systems software programme. This degree of Ram memory and Basic Interpreter Rom will enable you to carry out a very wide range of computation.

RAMESES Basic Interpreter cartridge

When plugged into the right-hand console port, this cartridge gives the RAMESES console the systems software to enable it to function under commands that are standardised in the general format of the BASIC computing language, and respond to data fed in from the software programmes via the cassette drive or disc drives etc. It also enables the computer to carry out a great number of mathematical calculations, or graphic color picturisation on the TV screen. It can also enable you to write your own programmes whether for games or other purposes of a computational nature. Additionally, it enables you to programme various sounds over a wide range of frequencies and to combine various sounds at command so as to achieve very comprehensive musical effects. The combination of the Basic Interpreter with the inbuilt Roms (Read Only Memories) that are already in the RAMESES console, gives you a very powerful computational facility.

RAMESES Cassette Drive

A unit that may look like an ordinary cassette recorder, but has additional electronics built into it that interfaces with the circuitry available from the left-hand input/output port of the RAMESES console, and enables the control of the drive of the cassette so that it will start or stop at command from the keyboard or commands inbuilt to the programme concerned, and feed data from a recorded computer programme tape into RAMESES console memory banks, and then under instruction, proceed with the computation together with data input from the keyboard. Additionally, when a programme has been written and is stored in the memory of the RAMESES console, then under suitable command, the complete programme can be recorded onto a blank cassette tape by the cassette drive unit, and then stored for later use.

RAMESES Parallel and Serial Input/Output Extender

A module which plugs into the right-hand port of the RAMESES console and has further ports in it to accept other peripheral devices into these ports. Simply explained, it is similar in principle to an adapter or power extension board used from a normal power outlet, but in our case, it is designed to match with the electronics of the various parts of the RAMESES system.

When you want to add a printer, you will need a RAMESES I/O Extender, (and it is very reasonably priced).

RAMESES Extended Keyboard

This keyboard is designed to replace the two control modules (key pads) of the RAMESES console, and to give it a greater flexibility when used in conjunction with the BASIC Interpreter cartridge and other peripherals. The two control modules are disconnected from the RAMESES console, and two plugs from the extended keyboard fit into the sockets then available. The keyboard has key buttons rather than a membrane type of pad as on the existing modules, and enables fast operation of the keyboard for inputting information, very similar in operation to a typewriter keyboard. As you become accustomed to computing, you will need this.

RAMESES Memory Expander

This unit plugs into the right hand console port and is available in 16 K of Ram memory. By addition of memory expanders, the total random access memory of the RAMESES system can be built up to a total of 64 K!

RAMESES Disc Drive Extender

Plugs into the additional ports provided by the parallel and serial Input/Output extender. The electronic interface necessary for connection of the Disc Drive is also provided. "Floppy Disc" drives accept special magnetic discs which can "record" and "play" data much more quickly than cassette tapes, and enable a greater and more quickly available series of programmes to be readily available to you for computer use. Probably as you gain experience, you will decide that the data storage and time saving warrants the purchase.

Printer

The printer plugs into the parallel and serial input/output extender and enables information to be transferred from the console memory banks onto paper in the normal way, at command from the keyboard. Various printers are also available to suit differing paper formats and information system requirements.

When you need a printer, consult your Rameses stock list. He can advise you.

As you progress through the RAMESES system, selecting and adding peripherals to your console as needed, you will increase both the entertainment and computing power of your home computing centre. Some of the items listed above may not be available at the time that you buy your RAMESES console. However, if you consult with your RAMESES retailer, he will soon be able to demonstrate most of these units to you and give you lots of helpful information.

Now, let's look at the words that you've struck, may be wondering about, and explain a few more "things" about computers. Here goes:

5 ABOUT THOSE WORDS!

(More-or-less in the order that you have struck them.)

CENTRAL PROCESSING UNIT
(C.P.U.) — see page 20

BIT — Binary digit

BYTE — 8-bits

MEMORIES — Mostly today you will read or hear of RAMs and ROMs, sometimes of EPROMs:

RAM — Random Access Memory. In other words, it can be used to put information into or out of, at command.

ROM — Read Only Memory. A memory that has information in it and which cannot have that information replaced by the computer programme.

EPROM — Electrically Programmable ROM. These devices are set up so that once a programme is determined for the device concerned, the connections between the various electrical and electronic components in the chip are "blasted" to ensure that the inter-connection is not changeable in normal use. There are several things which go under the general heading of Eproms, some of which have this blasting done by ultra-violet means, and some by electrical means. There are also some which can have it done acoustically.

BAUD or Cassette loading speed — Originally, this meant half the speed of telegraphic transmission, however, for computer terminology, it means the number of bits that can be handled per second.

INPUT and OUTPUT PORTS — Means for connection by plugs to the input or output of the computer.

PERIPHERALS — Things that are connected to the computer, i.e., at its periphery as a computing set up. They are the cassette drives, disc drives, printers, expanders, extenders, monitors, referred to in this book. They are part of the "hardware".

Why have we called "it" RAMESES? Firstly, we needed a name that nobody else had used for a computer. Then, as a certain degree of occult mystery has enshrouded computers since their inception, we looked for a name that implied this. And, of course, RAMESES is a strong name and "it" contains RAMs. We know that you will appreciate RAMESES' strengths. (Also follow the acronym of RAMESES, given at the end of the appendices).

Why are the cartridges and tapes "RAMs"? Again, a strong word, and belonging to RAMESES.

BASIC language: — see full description on page **35**

BALUN — A simple electronic device that matches your TV set's input impedance with RAMESES impedance.

ASCII — A standardised series of characters. (See fuller description on page **32**)

INTERFACE: — Something that faces between two other things (see later).

K — One thousand (1,000)

M — One million (1,000,000)

KHz — Kilohertz, or one thousand alternating cycles per second.

MHz — Megahertz, or one million alternating cycles per second.

Ns — Nanosecond, or $\frac{1}{1,000,000,000}$ of a second. The term 'nano' as applied to 1,000,000,000 is used more and more, whereas for many years, in Australia, 'pico' meaning one million million, was used predominantly. This is because of the original English terminology of a billion equals one million million, versus the American terminology of a billion equals one thousand million.

ACCESS TIME — The time to search out and then read from any type of memory. (Access time may be expressed as maximum, minimum or average).

DOS — Disk Operating System. The systems used to control the operation of disk memories, normally has some abbreviation as a — DOS. For example, the Tandy computers operate on TRS DOS. Again, don't worry about it but become familiar with what our computers are matched to perform with.

SOFT DISK — The same as Floppy disk.

RESOLUTION — Normally expressed as– – X– –. This means the number of discrete "squares" that can appear on the screen horizontally X vertically at the one time. It is an indication of the fineness of detail available on the screen. Resolution is often also defined as, e.g. 24 lines of 40 characters. This means there can be 24 lines across the screen and each of those lines may be composed of 40 characters.

OCTAL)
DECIMAL) — See Appendix #2
HEXADECIMAL)

CPS — Characters per second (applied to printers etc.)

6 WHAT IS A COMPUTER?

A computer is really a device for people. It enables people to get much more information than they have ever been able to have before. People put the information into the computer, and people get the information that is printed out by the computer. Let's now look at the parts of a computer.

First of all, we have all heard of main frames. We have also heard of mini-computers, micro-computers, personal computers, etc. In most of these terms, there is still some degree of flexibility as to what means what, except for the term "main frame". Probably all of us understand that the main frame is the main unit of a large computing system and from which a great variety of input/output devices, such as memory banks, printers, terminals, V.D.U.'s etc. are connected. The things that we are interested in fall into the personal computer range. The personal computer basically can be like RAMESES or many other well-known brands. But without various other things hooked up to it, of course, it cannot compute. First of all, it needs power to operate. Generally, for computers with the capacity of RAMESES, it is desirable to connect them to the normal power mains (although some small computers, nowadays, are battery operated.) This can be done by having an inbuilt power supply or by having a separate power supply. The separate power supply is, broadly speaking, an adaptor which consists of a transformer and various electronic devices to give the necessary direct current voltage output to suit the requirements of the unit concerned.

Once we have the power onto the main unit, it still won't work because we cannot feed information into it or take information out of it. To do this, we need an input mechanism, and we need an output mechanism.

In the case of RAMESES, we have inbuilt keypads. Additionally, we can have a cassette drive which is plugged into the left-hand port and, of course, we would connect to a TV set. The TV set is the output mechanism, but, of course, it cannot print — it can only be watched and read.

Then you come to that well-known word, the "programme", and its "language". Many computers operate on the BASIC language. This term "basic" does not mean the same as Basic English. (Basic English stands for British American Scientific Industrial Commercial English) whereas the Basic Computer language stands for Beginners All-purpose Symbolic Instruction Codes. Since BASIC was first introduced, the overall number of terms in that language have been expanded quite a lot and now it is probably the most common language used on all mini, personal etc. computers. Some computers such as the Apple II have facilities for plug-in modules so that they can be used for several different languages. In our case, RAMESES operates on a

basic language which is not expanded to the full extend of that computer language but is adequate for the purposes for which designed. (See RAMESES Basic Interpreter Cartridge, page **11**)

Now we come to what makes the computer behave relative to its programme language. In RAMESES, the Basic Interpreter cartridge includes a ROM that is programmed in such a way that the logic of the computer will operate with the Basic commands and control data fed into it. Here we come to one of the differences between the various models of personal computers:

a Those with inbuilt "language converters", which means that they can only be programmed in that inbuilt language;
b those with cartridge or similar devices which are plugged in to act as the language interpreter. RAMESES' is plugged in, therefore although BASIC is recommended, a cartridge using another language, and interpreting it, could be used.

The Basic language that RAMESES uses is the logic system of the computer.

Once we have a computer which has the language determined, then, of course, we need to feed something into it to use that logic. This is done by "commands" to the computer.

We are all familiar with the cash cards that various banks now have, and which uses a card with a magnetic stripe on it which is coded to indicate to the computer what is going on for security reasons, i.e. magnetically controlled input. The older computers and many modern ones use punched cards or tapes. Some computers use optical means, such as the bars that are now coming onto foodstuff etc. packaging and other articles. However, we will stick with keyboards for now.

Additional to this, we need to have the programme that will use the logic of the computer and this is stored, in our case, on magnetic tape. This programme is written so that it asks a series of questions which must have input to the blanks in those questions and then with that input (via the keyboard), it uses whatever is fed in to do its computation as commanded by the programme, and can make various decisions depending on the result of that computation. The decision may be to continue on to further computation with sub-programmes that are inbuilt into the data fed in by the tape, or to read out the result depending on what the programme instructs it to do. In our case, this would come onto the TV screen or later on, if it were given a "LPRINT" command, it would cause the printer to print out the data in a predetermined format.

So really, a computer is a "black box" which we have no reason to be scared of. It will only behave in the manner in which we tell it to behave. If we put garbage in, we get garbage out (GIGO).

7 HOW DOES THE COMPUTER WORK?

Being an electrical device, the whole of its circuitry can only operate in two conditions – ON or OFF. Each little silicon section that may constitute hundreds of transistors, or similar devices, in the chip can in effect pass current, or not pass current, depending on the voltage applied to it. So we therefore have a number of "yes" or "no" commands to the flow of current from one minute electronic component to another within the various chips. Of course, we also have a few discrete components, resistors, condensers etc. but the bulk of the work is done by those magical chips. If an instruction is given to any part of the chip to pass current, it will say, in effect, "yes", and if the instruction is given to it not to pass current, it will say "no". It is just as simple as that, but there are enormous numbers of these little switching devices within each chip.

The silicon sections within the chip are arranged in various patterns of interconnection by means which we won't go into here, and can be designed so that they become ROMs or RAMs or micro-processors etc. As the current required to operate all these little "yes/no" circuits is extremely small, there is nowadays very little power consumed by a computer even of quite large size in doing the actual computation. The circuits operate virtually at the speed of light (186,000 miles = 300,000 km per second), and because of the long chains of "yes/no" operations, this can take an appreciable time in the relative sense. Even in a slow device it is, compared to a mechanical calculator of the old-fashioned sort, extremely fast.

Once the computer has done its computation and got a result, and is commanded to display that result, then we need additional power and this comes, in our case, from the power supply of the TV set. This in turn activates the picture tube.

Printers also have additional power requirements to drive the motors etc. that operate the paper movement, carriage movement, daisy wheel or printing head, in printing out whatever is determined. Let's look a little more at other bulk storage devices:

We have nearly all seen or heard of floppy disks, and a lot of us have heard of Winchester disks. The floppy disk was invented so that it would withstand the handling etc. in the mail. It is a high capacity device that can be slipped into a slot on the disk drive and rotates in a similar manner to an ordinary gramophone record, but at a much higher speed. It has on its magnetic surface, a number of concentric paths, each of which can be charged with information by applying current to "write", or pick up the magnetic form by being told to "read". The disk itself is protected by a stout paper jacket and in this jacket is a slot where the sensing heads can move from the periphery in towards the centre, at command. The "read" and "write" heads do not actually touch the disk but float at a very small dimension above the magnetised surface.

Some disks are indexed in such a way that a portion of the paths cannot be eliminated by a "write" command and are there, in effect, as a ROM (Read Only Memory). Those concentric paths that are not so protected, in effect, can be re-written if required. Most computers have circuitry etc. inbuilt which ensures that no path will be re-written except at a suitable command which ensures that if something is on the disk already, it will not be wiped off inadvertently.

Winchester disks are not of a mailable variety and are housed in a completely sealed casing which includes the mechanism and one or more suitable disks. The sealing is to protect them from changes of humidity, smoke, dust, etc. etc.; they rotate at a higher speed than the floppies, and have a much higher capacity of registration of bits. Winchester drives are also appreciably more expensive than floppy disk drives.

Due to the high speed of rotation and very quick access of the "read" and "write" heads to disks versus the cassette or open-reel type of computer tape, the disks are able to feed information into the computer at a much higher rate than from the tape. However, a number of large units of computers do use open reel tape, and these have got very sophisticated high speed drives and indexing mechanisms. Depending upon the overall design and operating system of the computer, the data from the input may be dumped in total into the memory of the computer or with rapid access to the input (disk drives etc.), a section of the recorded data may be fed into the computer's memory and used, and then the programme may instruct the input mechanism to search for and then read the next portion of the data that is required.

8 WHAT IS A C.P.U.?

Really, in its essential parts, the C.P.U. consists of a "micro-processor". A micro-processor is a single chip which has input, output, memory, and a processing complex all built into it. In RAMESES, the C.P.U. is quoted as type "6502" and that is why its Model No. is HVC 6502. These chips are what is called an "8-bit" processor. From this micro-processor, the various functions can be expanded in effect in all directions from the central processing unit. In RAMESES, the memory of the C.P.U. has been expanded both in RAM and ROM and the input and output sections of the C.P.U. are connected to other devices which in turn are fed in from the cassette tape drive and out to the TV set or printer etc. The tiny little currents that are allowed to pass through the 6502 to the input and output devices, instruct those input and output devices just what to do.

The "8-bit" registers of the C.P.U. refer to the number of digits that can be used in the "addresses" of the micro-processor. In turn the processor can be instructed to locate those addresses when fed with certain digital information. In other words, the "on/off" or "yes/no" process operates to a definite and precise pattern, under instructions or commands and tells it "where to go" in its registers.

The data that may be put into each address is controlled by the programme that is written and fed into the memory of the computer and is so designed to suit the capacity of memory in each section that is allocated as an address. In other words, the "address" becomes a means of locating data in the computers memory.

The data that is in an address may then be read into the appropriate part of the programme and used in the total combination of computations, and then depending on the programme requirement the result may be fed back into another address in the memory and stored at that address. This process is repeated until the whole programme is complete. It is just like simple arithmetic, where a lot of little sums, logically used, can give the answer to a complicated sum. The computer can do it extremely fast.

9 WHY IS IT CALLED A DIGITAL COMPUTER?

Simply because it deals with digits. The digits that we are all used to which are based on the decimal system, are the things that we read, but the computer does not work on a decimal system — it works on a binary system. In other words, it only has the two conditions of "on" or "off" and as normally written for binary numerals, zero and one are the only two numbers involved in the way in which the computer "thinks". The fact that the computer can have output in decimal digits or in words is determined partly by its logic in the language concerned and partly by the inbuilt operating system and overall programme. The structure of each character that is printed (and some computers nowadays will print Chinese, Arabic, Japanese etc. characters) is controlled again by the "on/off" series of electrical pulses that are fed into the electronics of the output mechanism. This then brings us to "bits" and "bytes"

10 BITS AND BYTES

BIT = Binary digit BYTE = 8-bits

A bit is basically an "on" or an "off" condition. A byte is defined as 8-bits. If you look at your calculator, you will see that the display of any number is composed of a maximum of seven individual bars. You can easily imagine that for almost any character you would like to think of, bars can also make up that character. Each bar is instructed to show by a bit, and hence we allow 8-bits to make a byte and one byte equals one character. Therefore, if you read of a 32K ROM, it means that ROM would hold 32,000-odd characters. (Look now at the powers of 2 on page **31** and you will notice that $2^{16} = 65,536$, and this is the total number of bits or bytes that is capable of being handled or stored by something which is normally called 64 K. In other words, it will handle 1,536 more bits than you would think it can by the fact that it is 64 K [64,000].)

Be careful when you are talking of things like 32 K, 64 K etc. **Be sure whether you are talking of bits or bytes.** Normally for things of a memory type (RAMs, ROMs, EPROMs etc.) wer are talking of bytes. Incidentally, the same principal of the power of 2 is applied when we are talking of megabits or megabytes. The figures are rounded off, usually to one decimal place. If we have 16.7 M bytes, it would normally mean 16,777,216 bytes due to the power of 2 which results in that figure.

If you are wondering about the powers of 2, then get a reasonably modern calculator – probably all LCD calculators would be suitable – turn it on, press 2, then press the multiplication sign, then keep repetitively pressing the 'equals' sign and see what happens. There are more sophisticated ways of doing this, and if you have a scientific calculator, which has a Y^X button, then press 2, Y^X, 16, =, and you will get 65,536. In the Y^X sense, the ^{X}th power is called the exponent. You will strike this again when learning more about programming and use of the keyboard.

11 OUTPUT DEVICES

RAMESES will normally be used on a TV set as mentioned before. To do this, we have to feed signals into the TV set in the range of frequencies which they are capable of being tuned to. To do this, we take the signal output from the computer and modulate it in such a way that it will make the TV set operate normally. The various signals that come from the computer, control the sound, the colour, the disposition of the characters on the screen, and their movements etc. etc. Some personal computers have the modulator inbuilt (as does RAMESES) and some have to have the modulator connected separately.

You will also be wondering about printers. You will have heard of daisy wheels, of line printers, of dot-matrix printers, of page printers etc. Undoubtedly you will have seen some in action somewhere, but not necessarily taken much notice of them. The best way is to have a look at some in action in one of the computer stores, and ask a few questions, and when you feel like buying a printer, then consult with your RAMESES stock list, buy the RAMESES Input/Output extender and the printer that best suits your purpose.

The daisy wheel is composed of a plastic moulding with the characters at the end of its petals, and this petla-like device rotates as instructed, to bring the character underneath a striking mechanism, then it prints. The indexing backwards, forwards, up, down etc. of the carriage is controlled depending on what is instructed to it from the output of the computer.

The dot-matrix type of printer comprises a series of dots which, depending on the instructions by the bits, will print the characters of the shape concerned.

Line printers, as the name implies, operate on similar principals but set up a complete line of the characters concerned before the striking/printing exercise occurs. Page printers take the operation another stage further.

There are various widths of printers which will handle full computer paper, or normal letterhead A-4, etc. sizes. There are tiny printers which will handle only about 5-inches wide. There are a variety of different brands and types of printer but the most commonly used one is of the Centronix connection type and the RAMESES Input/Output Extender has a Centronix port for connection of that type of printer.

You may also have read or heard of serial or parallel ports. Don't worry about it — just read the brochures and remember what is plugged into what. There are a number of different possible serial or parallel connections within the constructional configuration of a computer and each has their particular advantages or disadvantages in the way in which the information is handled. This in turn can affect access speed of a computer depending upon its configuration, but we stress, don't worry about it. By all means, learn as you go.

12 COLOR

As RAMESES is a color computer, obviously the means by which color can be commanded to appear on the screen is very important. The variety of colors available are laid out in the computer manual and also the means of determining the color in any one of the hundreds of positions on the screen. Just as with the cursor, the position is determined by column and line number, and the appropriate color number on the keyboard is pressed after giving a "COLOR " command, followed by the screen position number.

To draw a picture on the screen, firstly the correct programme has to be determined and then when the image part of the programme is being written, a layout of the pictures is done and divided into squares with the color nominated, and then that is interpreted into digital data (which the manual will tell you how to do) and which is fed infrom the keyboard. Once this has been proven and the sound has also be programmed, then the whole of the programme can be "put to bed" and recorded on the bulk storage.

13 SOUND

As we all know, sound is dependent upon the frequency of vibration of the air that impinges upon our ear drums. Similarly, these frequencies can be generated by electronic means as has been amply demonstrated during the last two decades or so. Just the same in a computer.

The computer has electronic sound generating devices in it, and these cover several octaves of frequency. Most personal computers that are equipped for sound programming have a minimum of two, and very often three or four, channels of sound. RAMESES has 3-sound channels, and the sound comes from your TV set.

Obviously, it helps to be a musician when composing sounds, however, in order to compose sounds, it is something like composing color on the screen. The "SOUND" command is typed in, which brings the sound generation into circuit and then by hitting the appropriate numeric key the appropriate note in the usual musical scale may be fed into the programme. Then when the programme is RUN, the sound comes out the loudspeaker. By combining different frequencies (tones) and duration of those frequencies — also controlled by the keyboard — different effects, as of organs or bells, or saxaphones etc. can be fairly closely simulated. The duration of the tone and the means of controlling that duration, are described in the manual.

14 A VERY LITTLE BIT ABOUT PROGRAMMING

As mentioned before, programmes are the things which tell the computer what to do. They enable the computer to ask questions on its cathode ray tube, and they then proceed in a pre-determined manner to use the answers to those questions. They must conform to the rules that are laid down by the operating system and the language concerned. The languages available for computer use are many and varied and a brief description of some of these languages is shown in appendix #3. The logic of the programme must follow the capabilities of the language and operating system of the computer and this is fairly adequately described in various simple texts (in our case, about the Basic computing language). The language, or the language interpreter section of the computer, contains a number of standard arithmetic, trigonmetric, etc. functions and these can be brought to bear on what needs to be computed by instructing the computer to go to the appropriate section of its memory, extract that particular data or formula, and then use it in conjunction with the information input from the program or the keyboard.

In Basic computer language, there are a number of instructions which are common or garden English words or logical abbreviations, and which are described and illustrated in RAMESES' Operating Manual, which you will obtain when you purchase the RAMESES Basic Interpreter.

If you want to become more familiar with computer programming (which is not necessary for USING a computer), there are a number of books available and, of course, various computer programming courses are run by various institutions etc. The best way to become familiar with the RAMESES system you are going to use is to learn the terminology to about the detail that is in this instruction book, and then to set up with a simple RAM programme in it which asks various questions so as to give a certain result, and to practice in its use. Once you have done that, then I am sure you will find it quite easy to go on ... and on. Good luck!

APPENDIX #1 CHARACTERS AND CODES

The use of "characters" to instruct any computer to store, operate, etc. and the way in which the character is to be represented to and by the computer is of great importance — remember, it's a very fussy and precise device that will only do EXACTLY what its Systems Software has told it to do!

A character may be:

NUMERICAL	(1, 2, 3, etc.)
ALPHABETICAL	(A, B, C, etc.)
SYMBOLIC	(?, :, *, <, >, @)
GRAPHIC	(Spacemen, etc.)
CONTROLLING	

Controlling characters are those that are sent to particular parts of the whole computing system to instruct those parts in a particular function. (For example: to instruct a printer that the printing head should go to the start of the next line, the symbol transmitted could be the "carriage return/line feed" character, that has been built into its Operating System, and is specified in the Operating Manual. However, if you typed in "PRINT ON NEXT LINE", it wouldn't do it, because it has not been programmed to recognise that instruction — but the appropriate symbol does it all!)

Several codes exist for transmitting characters (the earliest electrical code being the morse code), and one of the commonest is that devised by ASCII (American Standard Code for Information Interchange).

This code uses a numerical reference to denote a particular character, and can be referred to by the Binary, Octal, Decimal, or Hexadecimal ("Hex") numbering systems (see appendix #2). The table below shows the standard set of ASCII characters and the Hex and Octal numerical reference. (If you use this table by writing in the decimal number of each character, you will soon begin to remember the Hex equivalent. DON'T FORGET TO START FROM ZERO (0). This will be useful to you as you get into more advanced programming in a little while.)

Character representation in the ASCII code

Hex	7-bit Octal	ASCII	Hex	7-bit Octal	ASCII	Hex	7-bit Octal	ASCII
00	000	NUL	2B	053	+	56	126	V
01	001	SOH	2C	054	,	57	127	W
02	002	STX	2D	055	–	58	130	X
03	003	ETX	2E	056	.	59	131	Y
04	004	EOT	2F	057	/	5A	132	Z
05	005	ENQ	30	060	0	5B	133	[
06	006	ACK	31	061	1	5C	134	\
07	007	BEL	32	062	2	5D	135	]
08	010	BS	33	063	3	5E	136	↑
09	011	HT	34	064	4	5F	137	←
0A	012	LF	35	065	5	60	140	
0B	013	VT	36	066	6	61	141	a
0C	014	FF	37	067	7	62	142	b
0D	015	CR	38	070	8	63	143	c
0E	016	SO	39	071	9	64	144	d
0F	017	SI	3A	072	:	65	145	e
10	020	DLE	3B	073	;	66	146	f
11	021	DC1	3C	074	<	67	147	g
12	022	DC2	3D	075	=	68	150	h
13	023	DC3	3E	076	>	69	151	i
14	024	DC4	3F	077	?	6A	152	j
15	025	NAK	40	100	@	6B	153	k
16	026	SYN	41	101	A	6C	154	l
17	027	ETB	42	102	B	6D	155	m
18	030	CAN	43	103	C	6E	156	n
19	031	EM	44	104	D	6F	157	o
1A	032	SUB	45	105	E	70	160	p
1B	033	ESC	46	106	F	71	161	q
1C	034	FS	47	107	G	72	162	r
1D	035	GS	48	110	H	73	163	s
1E	037	US	4A	112	J	75	165	u
20	040	SP	4B	113	K	76	166	v
21	041	!	4C	114	L	77	167	w
22	042	"	4D	115	M	78	170	x
23	043	#	4E	116	N	79	171	y
24	044	$	4F	117	O	7A	172	z
25	045	%	50	120	P	7B	173	{
26	046	&	51	121	Q	7C	174	|
27	047	'	52	122	R	7D	175	}
28	050	(	53	123	S	7E	176	~
29	051	)	54	124	T	7F	177	DEL
2A	052	*	55	125	U			

Thus if a computer has its memory set up to insert these ASCII characters at command, to give instructions to other parts of its logic, and its internal reference "mechanism" is e.g., set up in Hexadecimal code, then instruction "26" (Hex) would produce an "&" symbol,
"2B" (Hex) would produce a "+" symbol.

These symbols, depending on the MODE in which the computer is set, might in turn tell the yes/no circuits to:
for '&' combine 2 statements ... '&' ....
to form a chain of words, or if '+' to add 2 numbers together. (The two parts would be extracted from an appropriate index of the memory.)

APPENDIX #2 NUMBERING SYSTEMS

The early Australian aboriginals could only count to '2' and then 2 x 2 .... then stopped. The Babylonians used a system to the base '12' (instead of '10') — known as duodecimal — because they counted on the three bones of each finger of one hand and controlled the base by the other hand. Their "top score" was 12 x 12. Hence we have a gross. (Later they learned to write, and went on and on — but to the base 12.)

In computers, because of the on/off possibilities, we use the binary system, the same as the aboriginals; but because we can write, and have developed maths quite a bit, we can comprehend logical progression of numbers or characters, and what they represent. We easily understand:

ROMAN I II III IV V VI VII VIII IX X XI XII XIII
ARABIC 1 2 3 4 5 6 7 8 9 10 11 12 13

It is not difficult to follow this through to numbering systems of a different base:

DECIMAL	BINARY	OCTAL	HEX
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F
16	10000	20	10
17	10001	21	11
18	10010	22	12
19	10011	23	13
20	10100	24	14
21	10101	25	15
22	10110	26	16
23	10111	27	17
24	11000	30	18
25	11001	31	19
26	11010	32	1A
27	11011	33	1B
28	11100	34	1C
29	11101	35	1D
30	11110	36	1E
31	11111	37	1F
32	100000	40	20

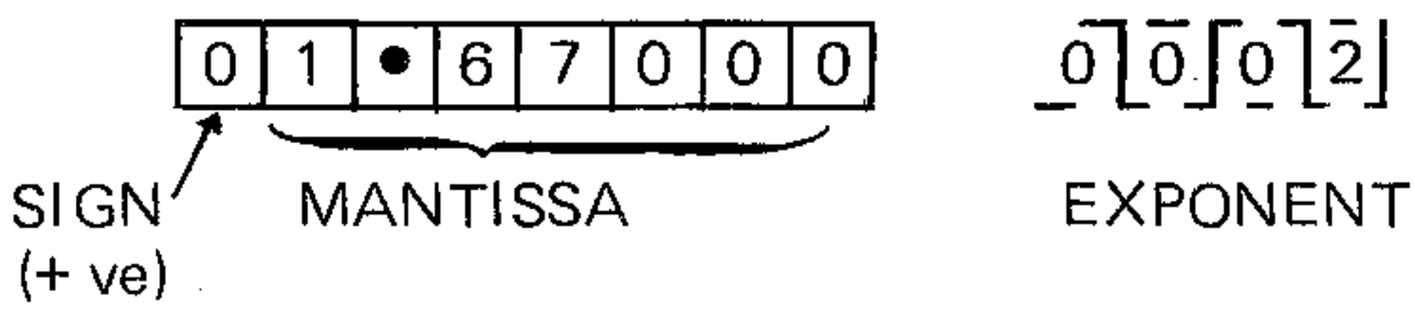
Obviously, if we are to use only "on" and "off" symbolisation of numbers, and hence binary base, we will have an awful lot of bits being used in the computer's memory, as each digit takes up one bit.

To overcome this, the FLOATING POINT FORMAT of representation is used which is, $A \times 10^k$ where, in DECIMAL floating format, A lies between 1 and 9 = the MANTISSA, k is the power of 10 = the EXPONENT

and the sign (+/—) of the number is shown by 0 = positive
1 = negative

(The same idea as logarithms you learnt at school.)

Thus $167 = 1.67 \times 10^2$. And if we KNOW that the number may be expressed in this format, and arrange the computer's logic accordingly, then the computer would recognise this as:



(the 0's and decimal point **would not** be fed in, only the mantissa and exponent, to the appropriate memory section allocated to that purpose).

IN COMPUTERS, WE USE FLOATING FORMAT BINARY OR HEX OR OCTAL. Usually, there are other things that also happen in the computer AUTOMATICALLY, to simplify the storage of decimals and exponents, so don't worry too much about all this; but DO try to understand re **minimising** the "bits" that are used, by the reducing of the binary digits that are stored to represent a number:

e.g. DECIMAL = BINARY
16 = 10000
= FLOATING FORMAT 0 1•6 x 10 (2^4) (EXPONENTIAL 4)
= 1, 6, 1 10 100

If HEX were used, 16 in Hex floating format would be '1' (and a binary representation of hex, also '1') but in an appropriate register to denote the power of the exponent.

OCTAL is not used as much as Hex, but has the same advantage relative to the exponent of '2', as do all the systems. It is a matter of form of characters to represent what is meant.

DECIMAL	BINARY, OCTAL, OR HEX
1	1
2	2^1
3	$2^1 + 1$
4	2^2
5	$2^2 + 1$
6	$2^2 + 2^1$
7	$2^2 + 2^1 + 1$
8	2^3
9	$2^3 + 1$
10	$2^3 + 2^1$
11	$2^3 + 2 + 1$
12	$2^3 + 2^2$
13	$2^3 + 2^2 + 1$
14	$2^3 + 2^2 + 2^1$
15	$2^3 + 2^2 + 2^1 + 1$
16	2^4
17	$2^4 + 1$
18	$2^4 + 2^1$
19	$2^4 + 2^1 + 1$
20	$2^4 + 2^2$

NOTE: 2^{16} = (65,536 (= 64K) ..... 2^{24} = 16,777,216 (= 16.7M)

IN BINARY, OF COURSE, using only 1 and 0 as digits, 2^2 would be written as 10^{10} — it takes practice!

In cases where Octal or Hex is used, often it may be used to refer to a "squard off" reference to symbols or graphics.

e.g. If we have 64 graphic commands available ex keyboard in a suitable MODE, and a further 64 also available in another mode, then with an Hex reference, we can get a square format (of 8 x 8 = 64) but cross-reference it (by an inbuilt converter in the operating system logic of the computer) into binary code, similar to the table below (which is shown on a 8 x 16 format starting from zero).

Character representation in the ASCII code

bits				7	0	0	0	0	1	1	1	1
				6	0	0	1	1	0	0	1	1
				5	0	1	0	1	0	1	0	1
4	3	2	1		0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P		p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	A	LF	SUB	*	:	J	Z	j	z
1	0	1	1	B	VT	ESC	+	;	K	[	k	{
1	1	0	0	C	FF	FS	,	<	L	\	l	|
1	1	0	1	D	CR	GS	-	=	M	]	m	}
1	1	1	0	E	SO	RS	.	>	N	^	n	~
1	1	1	1	F	SI	US	/	?	O	_	o	DEL

3 left-most bits of the ASCII Code

← Hexadecimal equivalent

8 x 8 = 64
say in first mode

8 x 8 = 64
say in second mode

↑ Hexadecimal equivalent

4 right-most bits of ASCII Code, (as determined by systems programme).

NOTICE how the bits are shown in binary.

(The Operating Manual will outline all this for you in more detail.)

e.g. if we indexed on this table, to decimal abscissa 7, ordinate 7, we would get a (lower case) "w". For (capital) "W", the index would by 7 x 5.

(Remember "AHOP" = abscissae horizontal, ordinates perpendicular.) The binary equivalents can be read from the table.

All this undoubtedly seems complicated and confusing. DON'T WORRY — If you've digested half of this stuff on numbering systems (and practiced the logic a bit), you will be in a better position to quickly learn the things that come into making up good computer programmes, than a number of computer salesmen that we have met.

APPENDIX #3 BRIEF DESCRIPTION OF COMPUTER LANGUAGES

Historically, before languages were invented for computer purposes, the person in charge of writing a programme had to be an expert mathematician and very often, had several degrees in philosophy before he could fully come to grips with the task of programming. As the computer expanded in its development and inbuilt conversion electronic means were made from binary programming to decimal programming, there were also various words originated and hence, ultimately, the various languages. These words that were originated were designed so that the depressing of a key would instigate a sub-programme or micro-programme which in turn would give certain digital data to the operating part of the computer to instruct it what to do for that key depression. Similarly, the words were naturally composed of more than one letter in most cases and sometimes just one character such as "?" and it was arranged so that the succession of letters in turn would make the myriads of "yes" and "no", or "on" and "off" circuits perform a controlling function in what happened next.

Originally, there were a whole host of programming languages, many of which have since almost disappeared, and nowadays there are a handful of languages which are in common commercial and home computing use.

Most of the languages used today fall into what are known as high-level languages but one in particular, known as Assembler (sometimes Assembly language), has come back into greater use due to the very small memory capacity and logic systems of some of the relatively cheap personal computers. Equally as much, Assembler can be used with somewhat more sophisticated personal computers so as to simplify the entry into understanding of a computer language. As you know, RAMESES is designed to use BASIC.

We will now list out the main languages for computer programming, where their name springs from, and what they are mainly used for:

FORTRAN: (Formula Translation Language) is a scientific language which means that it has powerful mathematical and computational features suitable for use by engineers, scientists, etc.

COBOL: (Common Business Oriented Language) is known as a commercial language — in other words, it was devised for programming in a commercial or organisational context and may be used for all types of business organisation whether they are operating strictly commercially or not. It is designed to extract and to present information held on files. It is fairly low on computational ability (i.e., not very suited to engineers etc.) but it has a very high file manipulation standing.

RPG: (Report Programme Generator) is also a commercial language and the remarks regarding COBOL generally apply. It relies on the commonality of structure of most commercial computer programmes so that they can be built around a common skeleton and then provide only significant details. It was originally designed for report programmes and the details are provided in a set of separate forms very near to programming by questionnaire or "filling in the blanks".

PL/1: (Programming Language 1) was designed to combine the best of COBOL and FORTRAN in a block structured language that would be all-purpose and efficient. It was originated by IMB but even within IBM hasn't become highly popular.

PASCAL: was originated by a university scientist and it was named after Pascal, who was a famous mathematician some time ago. It was designed for teaching computing in universities etc. and beyond this, it's main claim to fame is that it is available on some micro and mini or personal computers because of its mathematical ability.

BASIC: (Beginners All-purpose Symbolic Instruction Code) was designed to introduce people to computer programming. Because of its relative simplicity of understanding and remembering, it has progressed a long way and has become a much more extensive language than its original structure. It is now classed as a high-level language and is almost exclusively used in personal and mini computers, and is also used in some main-frame applications. Due to its relative simplicity and the fact that the BASIC INTERPRETER can be relatively simply included or plugged into personal computers, thus giving a fair degree of flexibility in all types of computation, it has become quite cost effective for writing of programmes and hence can often be used for throw-away programmes quite economically. Due to its similarity in command to several of the other languages, the writing of the programme in BASIC is often the simplest way to get going on a programme and then have it translated into another language that is more suitable to the particular end use of the programme, and for the computer concerned.

For a full understanding of the BASIC language, begin with RAMESES Operating Manual then go on to other books on the subject (or go through the various instruction courses now available). The main thing to remember is that as long as you know how to make the computer "behave" when a programme has been written and is in use on the computer, then you should have no fears in using it.

REMEBER:
Always
Make
Every
Step
Exactly
Specific

EPILOGUE

Now, give yourself a quiz:

1 Bit =
2 Byte =
3 K =
4 M =
5 8K =
6 RAM =
7 ROM =
8 EPROM =
9 ASCII =
10 BASIC =
11 BAUD =
12 Ns =
13 C.P.S. =
14 D.O.S. =
15 OCTAL =
16 HEXADECIMAL =
17 DUODECIMAL =
18 C.P.U. =
19 V.D.U. =
20 'BASIC' English =
21 Speed of light =
22 EXPONENT =
23 RAMESES' Sound Channels =
24 RAMESES' Colors =

INTERNATIONAL LIMITED WARRANTY

MODEL: HVC 6502

This product is warranted to be free from defects in workmanship and materials for a period of 6 months from the date of purchase. If repairs are necessary during this period, because of any such defects, then at our option the product will be either repaired or replaced free of charge with an equivalent product. SATISFACTORY PROOF OF THE PURCHASE DATE MUST BE FURNISHED AT THE TIME OF NOTIFICATION OF THE DEFECT FOR ANY CLAIM UNDER THIS WARRANTY TO BE ENFORCEABLE.

This warranty will become invalid if the product has been subjected to modifications, abuse, improper treatment and/or if any defect is caused by repairs made by any unauthorised person. There are no warranties express or implied except for those which are stipulated herein and those which are implied and cannot be excluded in law provided that in those countries and states where it is possible to limit the implied warranties of merchantability and of fitness for a particular purpose to the duration of this warranty they shall be regarded as being so limited.

This warranty does not cover batteries, damage caused by batteries, film, damage to film, lamps, flashlamps or flashbulbs, where applicable. FURTHERMORE, INCIDENTAL AND CONSEQUENTIAL DAMAGES OF ALL KINDS WHATSOEVER ARE EXCLUDED IF AND TO THE EXTENT TO WHICH IT IS POSSIBLE TO DO SO IN LAW.

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