PHILIPS

PHILIPS

Belgique

P2000C
OPERATOR MANUAL

5103 993 30122

USER NOTE:

Fast data processing calls for high frequency control signals with short-rise times. Only in this way is it possible to meet the requirements of a modern, powerful computer.

Our device has been carefully designed and the shielded construction prevents radiated interference.

If you connect any peripheral device it is important, to preserve interference free operation, that only shielded cables are used. Metallic plug housings should have good contact to the cable shield and should be secured with two screws each.

Please, never switch on the computer with the cover removed or with unshielded or loose peripheral cables connected.

By FCC-Law we have to inform you:

W A R N I N G:

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications.

It has been tested and found to comply with the limits for a class "A" computing device persuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

PREFACE

We hope that, with the aid of this manual, you will quickly become familiar with your P2000C and discover how easy it is to use.
It contains all the information you need for the installation and operation of your P2000C.

Having the inexperienced computer user in mind, this manual is kept as simple as possible without the loss of any necessary information.

Additional, detailed, operating information is given in the manuals supplied with the various user (or application) programs.
Detailed technical information can be found in the System Reference and Service Manual P2599.

The P2000C portable computer is available in three different models:

P2010 with two 160 KBytes disk drives
P2012 with two 640 KBytes disk drives
P2009 with one 640 KBytes disk drive.

Each model can be upgraded with optional boards such as:

P2091 IEC/IEEE-Board
P2092 Memory Extension Board (RAM-Disk)
P2093 8088 Co-Power-Board (16-Bit Board)

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Contents

1 GETTING STARTED

1.1 UNPACKING AND INSTALLATION

The P2000C portable computer is available in different versions; the contents of the box depending on which model of the machine you have purchased.

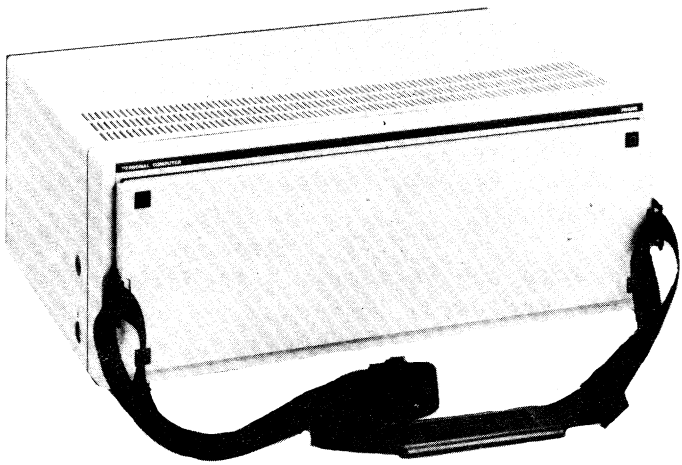
Subject to the version, various bundled software will be included.

The basic model consists of the following items:

- P2000C main unit
- Keyboard and carrying strap (attached to the main unit)
- Mains cable
- Keyboard cable (in the compartment at the back of the main unit)
- CP/M* Operating System (including diskette and CP/M User Guide)

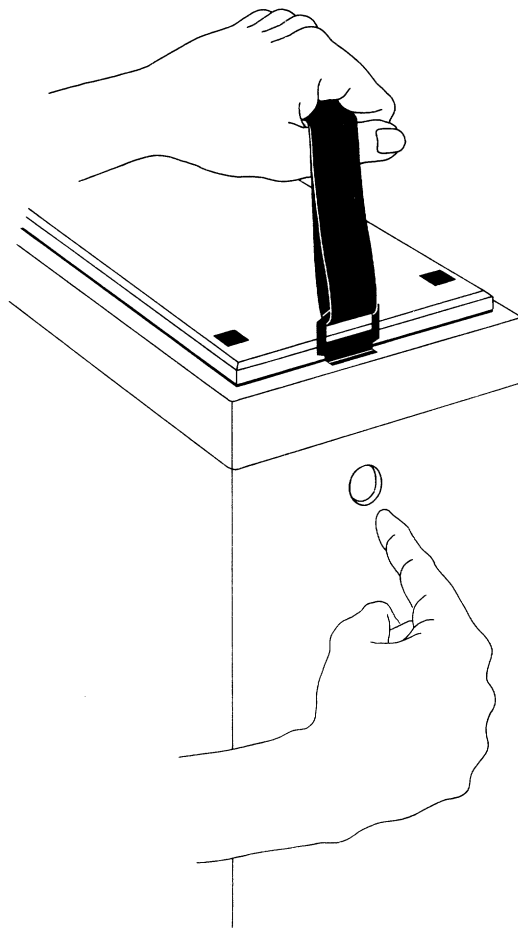
* CP/M is a trademark of Digital Research Inc. Pacific Grove, Ca.

Getting Started



Getting Started

Remove the P2000C Portable Computer from it's box and place it on a firm surface with the carrying strap uppermost.
Remove the carrying strap by pressing the strap release buttons on either side.



Getting Started

Lift off the keyboard and place it to one side. Open the disk drives (latch up) and remove the disk head protection cards.

Place the P2000C on it's working surface and open the cable compartment on the rear panel of the main unit. Take out the keyboard cable.

Inside the cable compartment you will find the identification plate (with type number e.g., P2012) and the power input socket. You will also see an indication of the mains voltage and frequency that your P2000C is set up for. Check that these figures match those of your local power supply.

If there is any difference in voltage or frequency, consult your dealer BEFORE connecting your P2000C to the mains supply.

Connect the power cable to the socket in the cable compartment and replace the lid.

Keep the box, the packing materials and the disk head protection cards in a safe place. You may need them if you have to ship your P2000C in the future.

Study the Licence Agreement before opening the program diskettes.

Getting Started

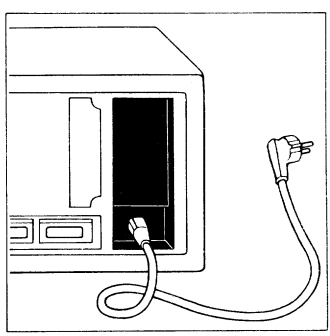
Pull out the supporting stand and position the machine as indicated in the following picture. The P2000C is designed to operate correctly at this angle.
Under no circumstances should you operate the computer in any other position, as this could affect the cooling or interfere with the operation of the disk drives.

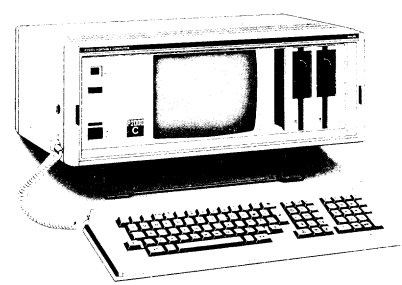
Position the keyboard in front of the main unit and connect the coiled keyboard cable to the keyboard and the main unit.

Connect the power cable to a suitable mains outlet.

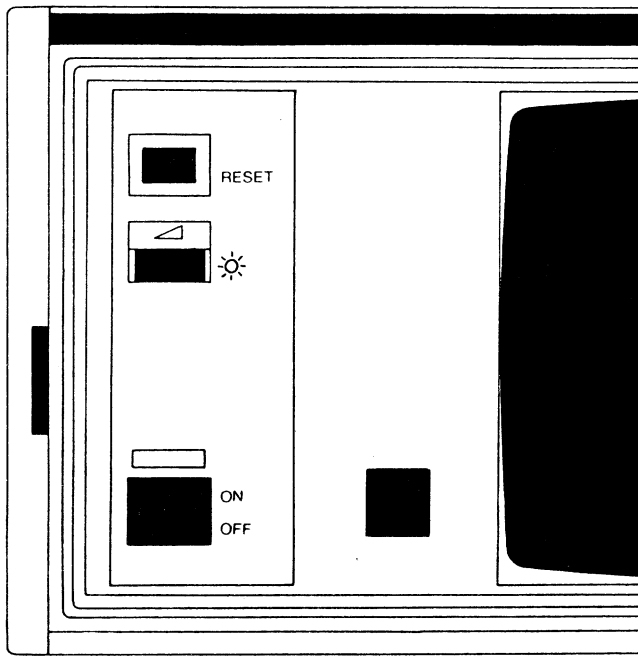
Finally, make sure that the screen is in a suitable position; i.e., facing away from windows and reflections.

Your basic P2000C is now installed and ready to start working for you. The connection of other equipment, such as a printer or a hard disk, is described later in this manual.





Getting Started

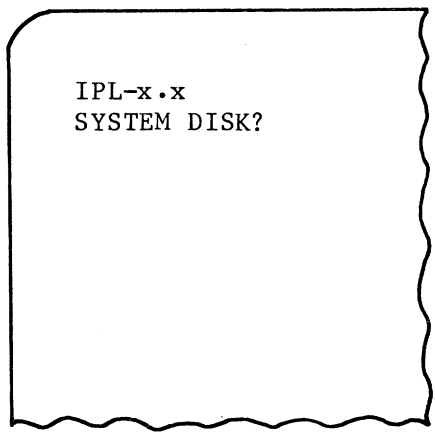


Switch on the computer by pressing the ON/OFF button. Power is indicated by the red light above this switch.
The disk drives will be activated as the computer tries to load it's operating system from disk.

After a short warm-up period you will see a two-line message as illustrated on the following page.

You can adjust the brightness of the display by turning the thumbwheel between the RESET and ON/OFF buttons.

Getting Started



The first line on the screen indicates the release and version numbers of the system (1.1, for example). This will mainly be of interest to system programmers and customer service personnel.

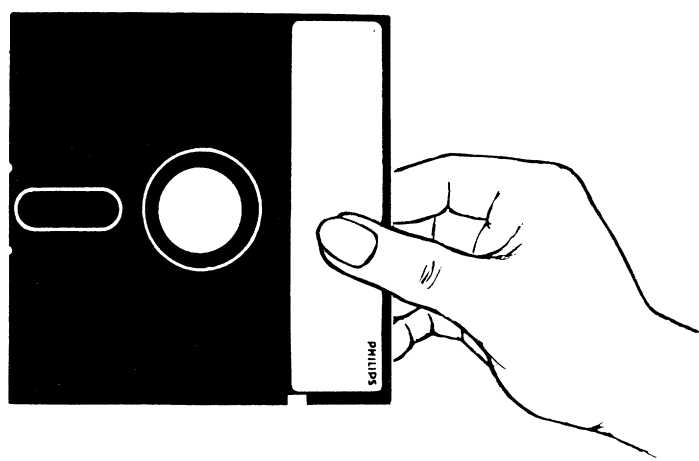
The second line of the message is the computer's way of asking for a DISK containing SYSTEM software to be put into a disk drive so that the P2000C can load it's operating system.

Your P2000C is now ready to use but before you run any programs you should read the next chapter, which describes how to handle and use the flexible disks.

2 DISKS

2.1 DISK HANDLING

Diskettes (also called disks or floppies) are the media on which the computer stores information. Bearing in mind that even minor damage on such a disk may destroy an expensive program, you must always handle them with care.



NEVER TOUCH THE EXPOSED PART OF THE DISK !!!

Disks

In order to prevent any damage to your disks it is important to follow these rules:

- never touch the exposed surface of the disks (the picture on the previous page shows exactly how you should hold a disk)

- insert the disks carefully

- don't bend the disks

- always replace disks in their protective sleeves when not in use

- keep disks away from magnetic fields (power supplies, telephones, electric motors, etc.)

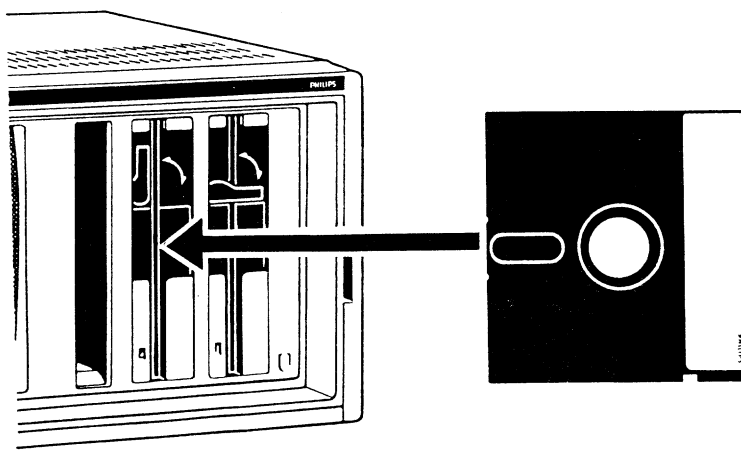
- use a felt-tip pen to write on the label - a sharp point could damage the surface of the disk

- store disks in a cool place, do not expose to direct sunlight

- don't switch the computer on or off with a disk in a closed disk drive

Disks

The picture below shows you how to insert a disk into a disk drive.



2.2 DISK FORMATTING

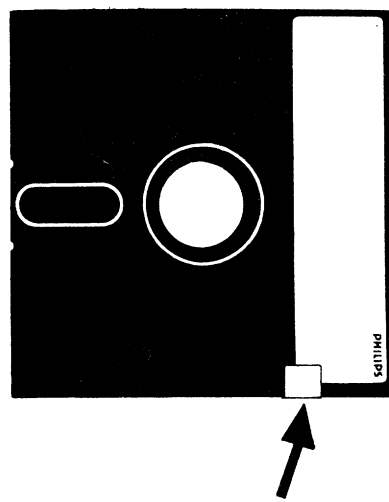
A flexible disk (or disk or floppy) is a disc of soft plastic with a magnetised coating, closely resembling the material used to make the tape for a normal tape (cassette) recorder.
In use, information is stored on the disk in a series of concentric tracks (not like a record, which has one long track on each side).

Before any diskette can be used, it must undergo a formatting process which sets up the position of the tracks and separates each track into a number of sectors.
The Philips diskettes mentioned in the section 2.4 are supplied ready-to-use on your P2000C, providing you have the correct type for your model.

Diskettes other than those mentioned may have to be formatted and the facility for doing this is contained within the UTIL program on your system disk.

2.3 DISK WRITE PROTECTION

In some circumstances you will wish to prevent the contents of a diskette from being erased or over-written. This may be a diskette containing your system software, programs or data.
You can protect a diskette by covering the 'write-protect-notch' with a self-adhesive tab.
A supply of these special tabs will be found in any packs of diskettes purchased.



Remember that the write-protect-tab will prevent writing to the diskette even if you wish to write to it. This may be the case with your system software diskette if you are changing the configuration of you system, when the system will WRITE the new configuration back to the diskette. It will also occur in the case of a diskette containing DATA (information) that is being updated. Make sure that the 'write-protect-notch' is uncovered if you wish to write to a diskette.

2.4 BACKING-UP DISKS

The first thing you should always do is to make 'back-up' copies of your original disks!
Working with copies will help you to save a lot of time and money because 'lost' software is expensive to replace.

The best way to get a 'back-up' is to use the UTIL program you will find on your CP/M DISK.

In order to create a 'back-up' disk you will need an empty but 'formatted' disk or a used disk that you no longer require. The copy process will erase the original contents of the disk you are copying TO! (The destination disk).

It is recommended that you use the following ready-formatted Philips disks:

- P2631-4 diskette (48 tpi, single sided, 160KB), with a yellow label; for the P2010.

- P2631-5 diskette (96 tpi, double sided, 640KB), with a blue label; for the P2009 and P2012.

If you have any disks of another manufacturer, or possibly Philips disks with a different format, please follow the instructions for formatting a disk, given in chapter 2.7 - DISK FORMATTING.
The process can also be used for 'cleaning' a disk that is no longer required.

2.5 COPYING YOUR SYSTEM SOFTWARE DISK

First put a write-protect-tab on the original CP/M SYSTEM DISK.
Insert the disk into disk drive 1 and close it.
Insert the empty disk into drive 2 and close it.
Press RESET (the button on the top left corner)

Your computer will display the message 'IPL-x.x', followed by system configuration details.
An explanation of the display is given in the CP/M User Guide.

It will then give you the CP/M prompt followed by the cursor. A> .

Now call up the 'UTIL' program by entering UTIL followed by Carriage Return. (↵)

Disks

The computer will access disk drive 1 and load the program. You will then have to enter some information to let the system know exactly what you want it to do.

ENTER 3 (to copy floppy)

ENTER 1 (indicating master floppy)

ENTER 2 (indicating empty floppy)

ENTER Y (for check while copying)

ENTER 1 (if working with 640 KByte disks)
or ENTER 2 (if working with 160 KByte disks)

When you have given the required information, pressing any key will initiate the copy process.

The process can be stopped at any time by pressing 0 or ESC.

When the copy process is complete, remove and store the original disk and WORK WITH THE COPY.

Remember to write all the necessary information (including the date) on the label of your copy, using a soft-tip pen.

2.6 COPYING ANY OTHER DISK

Call up the 'UTIL' program as described above.
DO NOT ENTER 3 YET!

Remove the system software disk from drive 1 and insert the disk to be copied (don't forget the write-protect-tab!).
Insert the empty, or redundant, disk in drive 2.

Now...

ENTER 3 (to copy floppy)

ENTER 1 (indicating master floppy)

ENTER 2 (indicating empty floppy)

ENTER Y (for check while copying)

ENTER 1 (if working with 640 KByte disks)
or ENTER 2 (if working with 160 KByte disks)

When you have given the required information, pressing any key will initiate the copy process.

The process can be stopped at any time by pressing 0 or ESC.

When the copy process is complete, remove and store the original disk and WORK WITH THE COPY.

Remember to write all the necessary information (including the date) on the label of your copy, using a soft-tip pen.

2.7 DISK FORMATTING

The 'UTIL' program will format diskettes to the format of the drives which are fitted to your machine. If you have a mixed configuration, ensure that the correct drives are defined within the UTIL program. (Select 4 - Define Drives).

The procedure for formatting is as follows:

Call up the program by entering UTIL followed by Carriage Return. DO NOT ENTER 1 YET!

Remove the system software disk from drive 1 and place the disks to be formatted in the appropriate drives. The write-protect-notches must be UNCOVERED!

ENTER 1 (to format floppies)

ENTER (drive numbers e.g., 1 2)

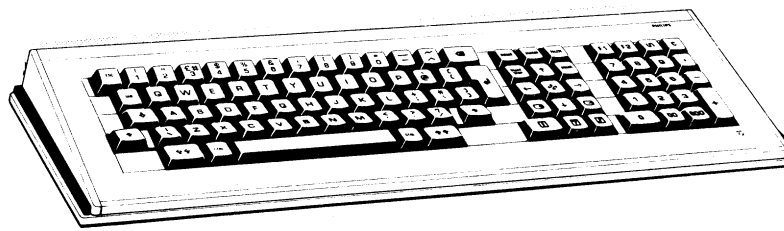
Pressing any key will now initiate the formatting process, which can be stopped with 0 or ESC.

The disk being formatted is indicated by the red access light on the drive. When the formatting process on the first drive is complete the system will automatically proceed to format a disk in the next drive. When a disk in the last drive is formatted it will start again with the first drive. Once a disk is formatted (i.e., the light on the next drive comes on) it should be removed from the drive. Another disk can then be inserted for formatting on the next cycle.

3 HARDWARE

3.1 THE KEYBOARD

You have set up your machine and you have made copies of your system disks. Before you go any further it would be a good idea to familiarise yourself with some of the computer's features. Let's start with the piece of equipment that you will be using most of the time - the keyboard.



Hardware

The keyboard is divided into three parts:

- the alphanumeric block
- the function keypad and
- the numeric keypad

The alphanumeric block is similar to a standard typewriter keyboard.

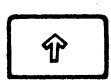
The function keypad holds the function keys; the use of these keys is dependent on configuration and will be described in the manual supplied with any program that you may be running.

The numeric keypad contains mainly numbered keys. These have the same effect as the keys on the main part of the keyboard; they have been duplicated only for efficiency in programs requiring a high proportion of numeric entries.

Hardware

The alphanumeric block resembles a normal typewriter keyboard except that pressing a key simply causes a 'code' to be sent to the computer. The computer then interprets the code and converts it to a character or a control instruction. For this reason it is possible for the P2000C to produce many more characters than a normal typewriter!

We feel that it is worthwhile spending a little time explaining some of the keys. These do not cause a character to be displayed but may modify the effect of some other key or cause some other action, depending on the software.



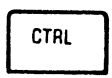
The shift key, as on a conventional typewriter, produces capital (or upper case) letters or the upper symbol printed on the keys with two symbols.

A shift key is provided at each end of the keyboard for the more proficient typists.
The shift key gives a second level of codes for each key.

The shift-lock key gives a permanent 'SHIFT' state. The 'SHIFT-LOCK' state is indicated by the red light built into the key and can be released by pressing the shift-lock again or by pressing either of the shift keys.

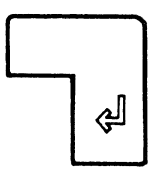
The supershift key enables third and fourth levels of codes to be produced by the keyboard. Each key can be set up to produce a third level code when the supershift key is pressed and a fourth level code when the supershift and the shift are both pressed.
Once again, a key is provided at each end of the keyboard.

The setting of codes is carried out in the CONFIG program, which is described briefly in the CP/M User Guide and in more detail in the CP/M Reference Manual.



The control key works in conjunction with alphanumeric keys. Applications use the control key in different ways, but in general it is used to convert normal key-codes to special (or 'control') codes. The CTRL key must be pressed and held while the second key is pressed.

Two keys are provided and use of the CTRL key will be explained in the application program documentation.



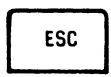
This is the carriage return key and is sometimes called CR, RETURN or EXECUTE.
It's primary role is the same as that of the carriage return on a typewriter.
It is often used to let the computer know that you have completed an entry. In some applications it is used to 'execute' a command or action and, sometimes, it 'confirms' an action.

Hardware

The backspace key also has a similar function to it's counterpart on the typewriter. It moves the cursor one position to the left, deleting what was in its path. However, some applications use this key in a different way.

Notice that the backspace key does the same as the cursor key, but the cursor key does not delete.

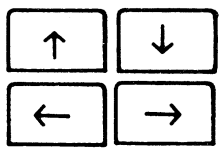
The TAB key, as on the typewriter, lets the cursor skip to pre-defined positions. You would usually use the TAB key when you are working with columns of figures, or when 'filling in' data in a displayed 'form'.



The ESC key has no standard or uniform meaning. Instead, it's function depends on the particular application. Refer to the appropriate user manual.

Hardware

The keypad immediately to the right of the alphanumeric block is the function keypad. You will find that the usage and meaning of these keys will vary according to the program you are running. Some keys, however, perform a standard function.



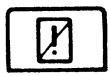
These are the cursor movement keys: up, down, left and right

The Jump (or Home) key is normally used in conjunction with one of the four cursor movement keys. For example:

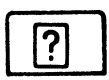
means go to the end of the line. If the Jump key is pressed by itself, it will normally have no effect.

Hardware

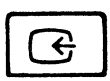
This is the 'DO' key. It is used to start a command or function. Sometimes, it can be used to end a procedure or to confirm some action.

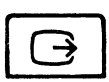


The 'UNDO' key, as its name implies, will cancel the effect of an action or command. It will abort the previous instruction and take you back to the original situation.



This is the 'HELP' key. When it is pressed you may see a message on the screen giving the courses of action open to you.

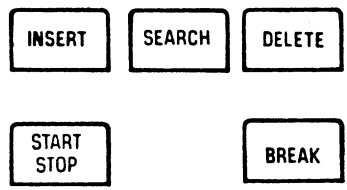




These are the 'INPUT' and 'OUTPUT' keys. A typical application might need the 'INPUT' key to be pressed when data has to be transferred from memory onto the screen. (The data comes IN.) If you want to print the contents of the screen, maybe, you could press the 'OUTPUT' key. (The data goes OUT.)

Hardware

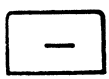
The other keys in this pad are self-explanatory. (For example, in a typical word processing program the 'SEARCH' key could be programmed to repeat a 'search' function and the 'INSERT' key to switch the 'insert character' function on or off). However, their function can alter depending on the application software.

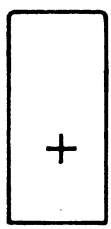


Hardware

The second keypad, the numeric keypad, is intended mainly for you to enter numbers. If you want to type a list of figures, for instance, this part of the keyboard is designed to let you do it quickly and easily.

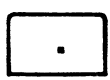
You will find that the '5' key has a small raised bump on its surface. This helps you to find the key by touch and locate the other keys in the group. With a little practice, you will soon see how easy this is.



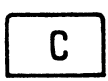


These keys are associated with the entry of numeric data, but their particular usage depends on the program that is running.

Note that a '+', a '-', the '00' and the '000' will only appear if the program was designed for it. In other words, their usage is not standard but depends on the software.

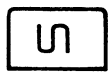


The decimal point.



The 'CORRECT' key is often programmed to operate in the same way as the 'C' key on a pocket calculator; it's actual use depends on the particular application.

These are general purpose function keys and have no pre-defined meaning.


This is the Inversion or Toggle key. It may be used in accounting programs to alter the sign of a number.

It also has two system functions. The first function, when the key is pressed alone, is to change (or toggle) the 'Capslock'.

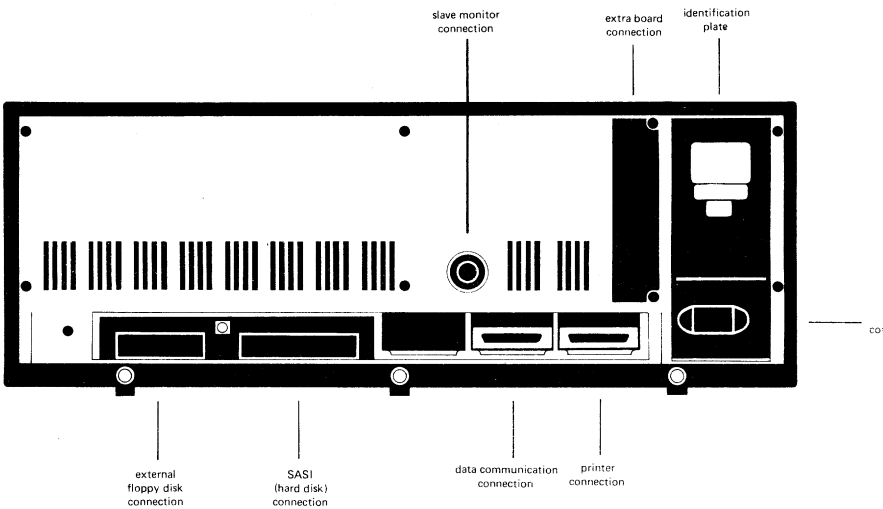
Capslock (CAPitalS LOCK) is a system function that causes capital letters to be produced without altering the output of other (e.g., number) keys. When capslock is ON, small (lower case) letters can still be produced by pressing the SHIFT key!
Depending on system configuration (see CP/M User Guide) this facility may be ON or OFF when the system software is read from disk.

The second system function, when the Toggle key is pressed at the same time as the supershift key, is to print the contents of the screen.

Note that all the keys on the P2000C keyboard can be programmed to produce a variety of codes.
To do this, you will have to use the 'CONFIG' program. The CP/M User Guide has all the details.

3.2 EXTENDING THE P2000C

The usefulness of your P2000C can be increased with the addition of some 'optional extras'!
The picture below shows the rear panel, with the connections for devices that can be connected.



Chapter 5 will give you some idea, in not too technical terms, of the peripheral devices and options that are available.
You will find all the technical instructions that you may need in the System Reference and Service Manual.

3.3 THE CONFIGURATION PROGRAM

In order for the system software to operate, 'it' has to be aware of the equipment that it can 'talk' to. For example, it is unable to 'feel' a printer and must be told how fast it can send data for printing.

Information of this nature is given to the system by running the Configuration program. In the case of the CP/M operating system this is the program called 'CONFIG'. The purpose of this program is to adapt the system software to a specific hardware configuration.
Depending on your operating system, you will find all the information you need in the relevant operator and reference manuals.

4 HANDLING THE MACHINE

4.1 TRANSPORTATION

The P2000C Portable Computer is just that. It is a compact machine which can be packed up and taken to another work station (or even taken home for the weekend). This is what you should do:

1 - Remove any disks from the disk drives and switch off the power (i.e., press the ON/OFF button). Fit the disk head protection cards.

2 - Disconnect the mains cable from the mains outlet and THEN from the socket in the cable compartment.

3 - Disconnect the keyboard cable and stow it in the compartment at the rear of the machine.

4 - Stand the machine with the screen facing upwards. Place the keyboard in position on top of the main unit (the back of the keyboard to the bottom of the machine).

5 - Push the supporting stand flat against the bottom of the main unit.

6 - Slot the carrying strap into position on both sides. Listen for the 'click' and make sure that the carrying strap is secure before you lift up the computer.

7 - Don't forget the mains cable!

Handling the Machine

The P2000C is a very sturdy machine - but within limits. You should not bump it against anything and on no account must you drop it. (Take care that you do not accidentally press the strap release buttons while you are carrying the computer.)

Avoid direct sunlight and damp, dust and undue vibration.

An optional cover is available for the computer and it is recommended that such a cover is used if the P2000C is to be transported in inclement weather.

Handling the Machine

TRANSPORTATION COVER

Prepare the machine as described above as far as point 3.

- Place the keyboard in the front recess.

- Slip the cover over and around the machine.

- Stand the machine with the screen facing upwards and the supporting stand facing you. Push the stand back into its 'closed' position.

- Slot the carrying strap into position through the two strap holes. Listen for the click. Make sure that the strap is fixed securely on both sides.

- Fix down all the flaps.

Unpacking the computer is simply a matter of reversing the procedure.

Before connecting the power cable, check that the electrical supply is suitable - especially if you have taken your computer to another country. You will find a note of mains voltage and frequency inside the cable compartment.

Connect the power cable to the socket in the cable compartment. Connect the keyboard cable to both the keyboard and the main unit. Plug the power cable into the mains.

Now you are ready to start work.

5 OPTIONS AND PERIPHERALS

You will probably wish to connect a printer to your P2000C. This is possible, but there are also many other ways of extending the uses of your 'system'. This chapter will give you an idea of these possibilities and the basic technical details to help you to decide exactly what would be of help to you.

To clear-up the question 'what is the difference?' we will first define OPTIONS and PERIPHERALS.

An OPTION is an extension of the capabilities of the machine which is made possible by adding circuitry inside the P2000C.

For example, although the P2000C is basically an 8-bit machine it can operate as a 16-bit machine with the addition of the OPTIONAL 8088 Co-Power Board.

A PERIPHERAL is a device which is connected to the outside of the P2000C and which can be driven by the machine.

For example, the P2000C is always able to output data to it's printer interface. It requires a PERIPHERAL printer to be connected to make use of this output.

Full technical details can be found in the P2000C System Reference and Service Manual.

5.1 P2000C OPTIONS

There are three options available for the P2000C.

P2091 - IEC/IEEE Board

This option provides an IEC/IEEE bus interface. It allows the P2000C to be used in conjunction with a range of programmable instruments such as measuring devices. In this way the P2000C can be used to control small industrial processes or to analyse the results of laboratory experiments.

With the addition of the P2091 IEC/IEEE Board, the P2000C can control up to 15 separate devices at a range of up to 20 metres.

It complies with IEEE 488 and IEC 625 standards.

P2092 - Memory Extension

The P2092 Memory Extension provides the user with an additional 256 KBytes of Random Access Memory. This can be used as a RAM FLOPPY, where the system treats the board as an additional diskette but permits a much faster access to the data.

The RAM Floppy must be indicated by use of your operating system's configuration program. For CP/M this is described in the CP/M User Guide.

For the advanced user the memory extension can also be used as cache-memory, with 15 additional banks of memory.

Options and Peripherals

P2093 - 16 Bit Co-Power Board

With the addition of the 16 Bit Co-Power Board and it's associated software makes it possible to convert the P2000C to a mixed 8/16 bit computer.

As a 16 bit machine the P2000C is capable of running the MS-DOS operating system at the same time as the CP/M-80 operating system on the original (Z80) processor.

The 16 bit P2000C can run many applications designed for other 16 bit personal computers.

5.2 P2000C PERIPHERALS

There are, basically, six peripheral interfaces which can be seen on the rear panel of the P2000C.

Printer Interface

This is probably the first peripheral device that you will be interested in!
The printer is controlled through the Serial Interface (V24/RS232) of the computer and is connected by a 25-way connector. Only 7 of these connections are used. Details of the used pins are given below.

In order to operate a printer it is necessary to 'match-up' the signals that are passed between the computer and the printer. The documentation that you recieve with your printer should allocate a standard signal name to each pin that should be connected.

If in doubt, please consult your dealer.

From the P2000C the standard V24 signals are as follows:

PIN 2	- TxD	(Transmit Data)
PIN 3	- RxD	(Receive Data)
PIN 4	- RTS	(Request To Send)
PIN 5	- CTS	(Clear To Send)
PIN 6	- DSR	(Data Set Ready)
PIN 20	- DTR	(Data Terminal Ready)
PIN 7	- GND	(Connected to Ground)

It may also be necessary to reconfigure your system to select the type of printer and to set-up the correct print-speed for your printer. This is done within the 'CONFIG' program (see CP/M User Guide), where you can select a print-speed between 75 and 19200 baud.
The documentation with your printer should give you the correct figure.

It must be pointed out that even though the correct printer may be selected there may be variations in the printable character-set, which may be brought about by different daisy-wheels. In such cases it may be necessary to modify the appropriate printer table. Information to help you do this can be found in the CP/M Reference Manual but if in doubt you should consult your dealer.

Data Communication Interface

This interface provides the possibility to connect a V24 device (i.e., a MODEM) in order to allow the P2000C to 'converse' with other computers. This would allow you to access data stored in a distant computer via telephone lines. It is controlled through the Serial Interface and uses 12 pins of a 25-way connector. Details of the used pins are given below.

As with the printer, the matching of signal lines is necessary for correct operation of communications devices. The standard V24 pinning on the P2000C is as follows:

PIN 2	- TxD	(Transmit Data)
PIN 3	- RxD	(Receive Data)
PIN 4	- RTS	(Request To Send)
PIN 5	- CTS	(Clear To Send)
PIN 6	- DSR-N	(Data Set Ready-Inverted)
PIN 8	- DCD	(Data Carrier Detected)
PIN 15	- ECLK1	(Clock 1 IN)
PIN 17	- ECLK2	(Clock 2 IN)
PIN 20	- DTR	(Data Terminal Ready)
PIN 24	- CLKOUT1	(Clock 1 OUT)
PIN 25	- CLKOUT2	(Clock 2 OUT)
PIN 7	- GND	(Connected to Ground)

Note:
To use the DSR signal it is necessary to have one extra component fitted.
Please consult your dealer.

Options and Peripherals

It may also be necessary to reconfigure your system to set-up the communication-speed of your device. This is done within the 'CONFIG' program (see CP/M User Guide), where you can select a speed between 75 and 19200 baud.
The documentation with your device should give you the correct figure.

External Terminal

For special projects the P2000C may be used with an external terminal instead of the built-in terminal. In this case it would be necessary to disconnect the internal terminal.
The external terminal can be connected to the mainboard of the P2000C.
No further information will be given on this subject here, but further information can be found in the System Reference and Service Manual.

External Monitor

It is possible to connect a 12" external monitor which will 'copy' the display on the internal screen. Connection is via a 7-way DIN connector using 5 pins. Details of the connections are given below.

The external monitor signals that are available on the 7-way DIN connector are as follows:

PIN 1 - Timing
PIN 2 - Ground
PIN 3 - Vertical Synchronisation
PIN 4 - Composite Video
PIN 5 - Horizontal Synchronisation

SASI Interface

The SASI (or Shugart Associates Standard Interface) is an 8-bit parallel bus which is able to control a maximum of seven additional devices. The main purpose of SASI is to connect computers to storage devices, such as floppy disks or hard disks, which require an intelligent interface.
The SASI is connected via a 50-way edge connector on the mainboard of the P2000C.
Devices connected via the SASI interface must be made known to the system by use of the CONFIG program.
No further information will be given on this subject here, but full details can be found in the System Reference and Service Manual.

External Disk Interface

The P2000C includes up to two built-in flexible disk drives which may be 160 or 640 KB, depending on the model. These are designated Drive 1 and (if fitted) Drive 2.
It is possible, via the external disk interface, to connect additional drives up to a maximum total of four.
These drives may be either 160 KByte or 640 KByte. These are normally designated drive numbers following the internal drive(s) but it is possible to re-assign drives in any order.
Connection is via a 34-way edge connector on the mainboard.
Details of the connections are given below.

Connecting any compatible 5¼" external disk drives is simply a matter of connecting the drives to the correct edge connector.
However, it is possible that a disk drive may have a 'terminator' fitted. As one of the internal drives already has this device fitted, it is important that any 'terminators' on the external drive(s) should be removed. It is also necessary to set up various jumpers and switches on the drives. Please ask you dealer for advice.

It should not be necessary to be aware of the signals carried by the Flexible Disk Drive connector but, just in case, the signal names are listed below:

PIN 2 - DISC CHG	PIN 20 - STEP
PIN 4 - HDL	PIN 22 - WD
PIN 6 - DS4	PIN 24 - WRT GT
PIN 8 - INDEX	PIN 26 - TRK 0
PIN 10 - DS1	PIN 28 - WRT PR
PIN 12 - DS2	PIN 30 - RDD
PIN 14 - DS3	PIN 32 - SIDE
PIN 16 - MOTON	PIN 34 - 2 SIDE
PIN 18 - DIRECTION	

All odd numbered pins are taken to ground for signal screening.

It will also be necessary to reconfigure your system to take account of the additional drives. This is done within the 'CONFIG' program.
(See CP/M User Guide - Disk Table Editing).

6 TECHNICAL DATA

6.1 SAFETY STANDARDS

The P2000C is a Class I equipment and meets the following safety standards:

- IEC publication 435, Draft 1983

  Safety of data processing equipment

- OVE-EM 42 part 1, dated 1970 and
  part 2 (1600) dated 1974

  Requirements for electrically energised equipment for domestic and similar purposes

  - part 1/1970 General requirements
  - part 2(1600)/1974 Office machines

6.2 EARTHING

It is essential for safe operation that all components are connected to an earthed mains supply. Also, to remove the risk of errors caused by different earth potentials, all system hardware components must have a common ground. Two ground connections are provided on the rear panel for use of the printer or other peripherals.

6.3 SPECIFICATIONS

Dimensions:	540 x 360 x 210 mm	
Weight:	15 kg (approx)	
Power Consumption:	95 W (max)	
Mains Voltage:	90-130 V, 47-66 Hz or 180-260 V, 47-66 Hz	
Mains Power Cable:	3 core (earthed) with moulded plug Length - 1.8 metres	
Keyboard Cable:	6-pole DIN 45 322 (240°) 6 cores + screen Length - 1.3 metres	
5¼" Floppy Disk Drives:	160 KByte	640 KByte
° Recording method:	MFM	MFM
° Used surfaces:	1	2
° Tracks per side:	40 (48 tpi)	80 (96 tpi
° Sectors per track:	16	16
° Bytes per sector	256	256
° Storage capacity:	160 KB	640 KB

6.4 CONDITIONS FOR OPERATION

The system components will operate in environments where the conditions are within the ranges specified in the following table. These figures assume that the combined effect of temperature and humidity changes preclude condensation in any part of the unit or on any storage or printing media.

Condition for Storage and Operation

Temperature range	- storage	-40°C to 70°C
	- operating	10°C to 35°C
	- disks	10°C to 52°C
Maximum temperature rate-of-change	- storage	5° per minute
	- operating	.5° per minute
Relative humidity	- storage	5% to 95%
	- operating	20% to 80%
Absolute humidity	- storage	less than 35g per cubic metre
	- operating	3 to 20 grams per cubic metre
Maximum dew-point temperature		28°C
Atmospheric pressure	- storage	45kPa to 110kPa
	- operating	70kPa to 110kPa
Normal maximum altitude		2900 metres

Technical Data

Condition for Storage and Operation (continued)

Non-conductive dust particle size	- 0.5/m	4.10 part/m
	- 1/m	4.10 part/m
	- 5/m	4.10 part/m

Gaseous pollution - Continuous exposure to sulphur dioxide and hydrogen sulphide. Open air concentrations of 0.1 ppm will not adversely affect operation of the equipment.

Sea proximity - The equipment has been operated with an air concentration of up to 2.7/ug of salt (NaCl) per cubic metre of air.

7 QUESTIONS AND ANSWERS

This chapter looks at a few common problems which may arise when using your P2000C. If you are a newcomer to the world of personal computers, you will often find that what you think is a problem is not one at all. It is very easy to overlook things. If, however, our suggestions don't work, you should consult your dealer straight away.

I switched the machine on and nothing happened. What's gone wrong?

Maybe it's obvious, but did you plug it into the mains and switch on the mains socket? If you did, is the power cable properly plugged into the socket in the back compartment of the computer? Check that the ON/OFF switch is set to the 'ON' position - it should be pushed in fully.

I've switched on the machine, the power light is on, but there's nothing on the screen!

Try adjusting the brightness control, just under the RESET button. If it is turned all the way to the left, the screen will be black. Turn it all the way to the right and you should have maximum brightness. Now, adjust the brightness to the level that suits you.

Questions and Answers

I've switched everything on, and put my system disk into the drive, but I see only a message saying 'SYSTEM DISK?' What's happening?

You have put your disk into the drive the wrong way round. It must go in with the label facing towards you and the notch facing downwards. And, as this is your system disk, the notch should be covered with a write-protect tab.

I did everything correctly. Then I put a brand-new disk into drive 2 and it didn't seem to work.

Your disk is not formatted. Unless it is a Philips disk, it must be formatted before you can use it. This means that the system puts certain information onto the disk, which it will need later when it reads from and writes to the disk. The utility program 'UTIL' will do this job for you. By the way, the format program will erase all the information on a disk, so make sure you format the right one!

I tried to write to my disk, but nothing happened. I keep getting an error message. What's going on?

Your disk was probably write protected. Remove the write-protect-tab from the notch on the side of the disk, and try again.

Questions and Answers

I dropped a cigarette on my system disk and I haven't got a copy. What shall I do?

Buy a new one. It is sad but true. If you don't make copies of your disks, not only your system disks, you could come to grief. What you must do is throw your disk away and get a new one - AND THEN COPY IT. And, by the way, why don't you give up smoking? It's bad for your health, and it doesn't do your disks much good either!

A computer must be very sensitive. How can I avoid damaging it?

This is very simple. The answer is by using your common sense. Portable computers are very robust machines but there are limits to the amount of rough handling they will take. Try not to drop your P2000C - this will certainly not improve its peformance. Keep it away from extremes of heat and cold. Excessive humidity could cause condensation inside the computer. So, don't use it in the bath.

Always handle your disks properly and, like your P2000C, they will give you years of service.

Manual Status Control Sheet

P2000C Hardware Operator Manual

12 NC: 5103 993 30122

This issue comprises the following updates:

No updates

Manual Comment Form

P2000C Hardware Operator Manual

12 NC: 5103 993 30122

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