VIC-20 User's Manual

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Welcome

Your VIXEN-32 has a Commodore VIC-20 inside it. Not a program pretending to be one: the VIXEN-32 has the VIC-20's own chips built in – its 6502 processor, its VIC picture and sound chip and its two VIA chips for the keyboard, the joystick and the timers. They run the VIC-20's own BASIC and KERNAL at the speed of a real PAL VIC-20, so VIC-20 games and programs behave exactly as they did in 1981.

This manual shows you, step by step:

- what you must put on your SD card first,
- how to start the VIC-20,
- how to choose and start a game from the game menu,
- why a game asks for a memory setting the first time you start it,
- how to see all of a game that uses a bigger screen (fit to screen),
- how to go back to VIC-20 BASIC with more or less memory.

You do not need to know anything about the VIC-20 to use it. If you do, you will feel at home at once: it is the same machine.

1. What you need

The VIC-20's ROMs

A VIC-20 cannot start without its three ROMs – the chips that hold VIC-20 BASIC, the KERNAL (the part that runs the screen, the keyboard and loading) and the character set. **They are not included with the VIXEN-32.** The ROMs are Commodore's software and still under copyright, so you must get your own copy: for example read them out of your own VIC-20, or get them from a source that is allowed to give them to you.

You need three files. Give them exactly these names:

File	Size	What it is
KERNAL.ROM	8 KBytes (8192 bytes)	the KERNAL, the PAL version (Commodore part 901486-07)
BASIC.ROM	8 KBytes (8192 bytes)	VIC-20 BASIC (901486-01)
CHAR.ROM	4 KBytes (4096 bytes)	the character set (901460-03)

Copies found on the internet often have names like `kernal.901486-07.bin` – just rename them. Use the PAL KERNAL: the VIXEN-32's VIC-20 is a PAL machine, like the VIC-20s sold in Europe.

Games

The VIC-20 understands two kinds of game files:

- **.PRG** – a program, as it would load from tape or disk;
- **.CRT** – a cartridge, as it would sit in the cartridge slot.

Like the ROMs, games are not included: use your own, or the many free games people still write for the VIC-20 today.

Some cartridges come as two files, one for each of the cartridge's chips. The name of each ends with the address it belongs at, for example `Gorf-6000.crt` and `Gorf-a000.crt`. Keep both: the menu shows them as one game.

Some games come in several parts, the way they did on tape: part one, then part two, and so on. Put all the parts of such a game in one folder of its own, in order.

Where everything goes on the SD card

Copy the files to your SD card (with a card reader on your PC), like this:

```
/VIXEN-32/VIC20/
    KERNAL.ROM
    BASIC.ROM
```

```
CHAR.ROM
GAMES/
    Blitz.prg
    Omega Race.crt
    Gorf-6000.crt
    Gorf-a000.crt
    Parachute/
        part 1.prg
        part 2.prg
```

Inside **GAMES** you may make as many folders as you like – by year, by publisher, one per game. The VIC-20 makes one folder of its own there, called **CFG**, where it remembers each game's memory setting (more about that in chapter 4). You never need to touch it.

A joystick

Most VIC-20 games are played with a joystick. Plug it into **port 2**. No joystick? The **cursor keys** work as one, and **CTRL** is the fire button.

Paddles

A game made for paddles can be played with the Amiga mouse in **port 1**. Press **HELP**, then **F5**: the line under the keys says **Mouse as paddles On**. Moving the mouse left and right turns the first paddle, up and down the second; the left button is the first paddle's fire button, the right button the second's.

F7 makes the paddles faster and **SHIFT+F7** slower, from 12% to 150%; they start at 50%. Both settings stay from game to game until you leave the VIC-20. The joystick in port 2 goes on working beside them. Real paddles are not read.

2. Starting the VIC-20

GO V20

Switch your VIXEN-32 on. When the VIXEN-32's BASIC says **Ready**, type

```
GO V20
```

and press RETURN. The machine asks **ARE YOU SURE (Y/N)?** – because the VIC-20 takes over the whole machine, a program you had typed into the VIXEN-32's BASIC is lost. Press **Y**. (**N** takes you back to Ready.)



Figure 1: GO V20 at the VIXEN-32's Ready

A moment later the VIC-20 starts, exactly as a real one does:

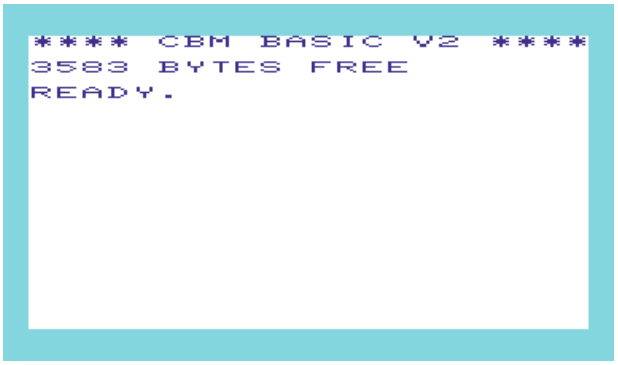


Figure 2: The VIC-20 has started: 3583 bytes free

3583 BYTES FREE is the memory of a VIC-20 with no memory expansion – that is what the VIC-20 starts with until you choose otherwise (chapter 6).

If a ROM is missing, the VIC-20 does not start and the VIXEN-32 tells you which one, for example

```
?/VIXEN-32/VIC20/CHAR.ROM NOT FOUND
?BASIC.ROM IS NOT 8 KBYTES
```

Check the name, the folder and the size of that file (chapter 1).

To leave the VIC-20 and go back to the VIXEN-32, press the **reset button** on the side of the machine.

Try VIC-20 BASIC

You are now in VIC-20 BASIC. Type

```
PRINT "HELLO"
```

and press RETURN. Then type this little program, a line at a time:

```
10 PRINT "VIXEN-32 ";
20 GOTO 10
```

and type **RUN**. Press **RUN/STOP** to stop it.

The keyboard

The VIXEN-32's keyboard is the VIC-20's keyboard, with a few extras:

- **F1, F3, F5, F7** are the VIC-20's function keys; F2, F4, F6 and F8 are SHIFT with them, as on the VIC-20.
- All four **cursor keys** work. (The VIC-20 itself had two, with SHIFT for up and left.)
- **RESTORE** is the VIC-20's RESTORE key. **RUN/STOP** and **RESTORE** together stop a program and clear the screen, as on a real VIC-20.
- **C=** is the key with the Commodore sign (MEGA on the VIXEN-32).
- **HELP** opens the game menu. The VIC-20 had no HELP key, so no game ever needs it.
- **ALT** with a cursor key moves the picture on the screen (chapter 5). The VIC-20 had no ALT key either: the game never sees these presses.

3. The game menu

Press **HELP** at any time, in BASIC or in the middle of a game. The VIC-20 stops where it is and its sound goes quiet, and the game menu opens over it:



Figure 3: The game menu

The menu has five parts:

- **The top line** shows the keys you need most, and on the right the memory the VIC-20 has right now (**Memory now: Unexpanded**).
- **Games** (left) is the list of what is in your GAMES folder: folders first, in brackets like **[Parachute]**, then the games. The line above the list shows which folder you are in.
- **Memory** (right) shows the memory setting of the game the bar is on (chapter 4).
- **Game** (bottom right) says what the bar is on: a folder, a BASIC program, machine code or a cartridge, where it goes in memory and how big it is.

- **The line under the keys** shows whether **F5**, the mouse as paddles (chapter 1), is on or off, and their speed, **F7**.
- **The bottom line** shows the memory **F1** restarts BASIC with, the **SHIFT+F1** key that changes it (chapter 6), and whether **F3**, fit to screen, is on or off (chapter 5). Under it, how many games and folders this folder holds – and messages, when there is something to say.

Moving around the menu

Key	What it does
Cursor up, cursor down	move the bar
RETURN	open the folder, or start the game the bar is on
DEL	go back up one folder
a letter or a digit	jump to the first game starting with it; again, to the next (M is the memory box)
CTRL + cursor up, down	a whole page up or down
CTRL + cursor left, right	the first or the last line
M	the memory setting of the game the bar is on
F1	restart the VIC-20 into BASIC (chapter 6)
SHIFT+F1	choose the memory for BASIC (chapter 6)
F3	fit to screen on or off (chapter 5)
F5	the mouse as paddles on or off (chapter 1)
F7, SHIFT+F7	the paddles faster, slower (chapter 1)
RUN/STOP, ESC or HELP	close the menu: back to the VIC-20 where it was

You can use the mouse as well: click a line to put the bar on it, and double click to open or start it.

Closing the menu with RUN/STOP, ESC or HELP changes nothing: the game you were playing goes on from the very same moment.

4. Starting a game

Put the bar on a game and press **RETURN**.

The first time: choose the memory

The VIC-20 was sold with very little memory – 3583 bytes for your programs – and people bought memory expansion cartridges of 3, 8, 16 or 24 KBytes to plug in. Games were written

for one of these: a game made for a VIC-20 with 8 KBytes extra does not work on one without, and some games written for a plain VIC-20 do not work with an expansion plugged in.

A game file does not say which memory it wants. So **the first time you start a game, the menu asks you**:

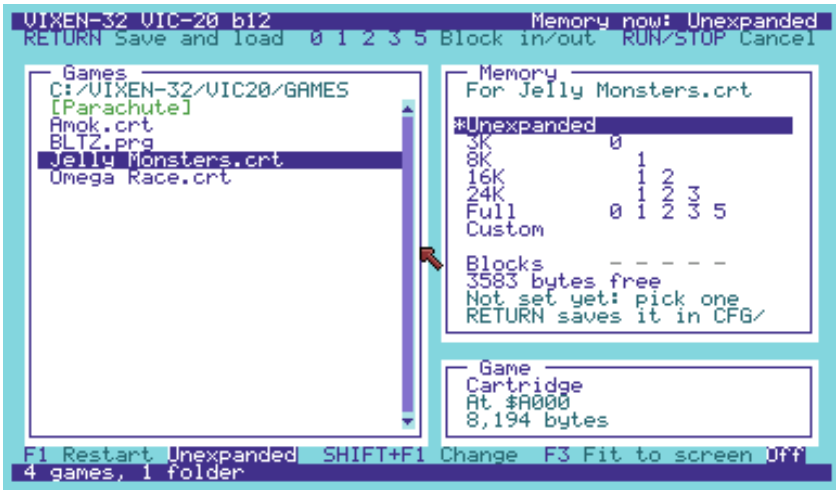


Figure 4: The first time: choose the memory for this game

The memory box now shows **For** and the game's name, and **Not set yet: pick one**. Move the bar to the right setting with the cursor keys and press **RETURN**. The menu remembers your choice for this game (in the CFG folder) and starts the game.

The next time you start the same game, it starts at once with that memory – no question asked. To change a game's memory later, put the bar on it and press **M**.

Which memory to choose

Setting	Blocks	Bytes free	Use it for
Unexpanded	–	3583	cartridges, games for a plain VIC-20
3K	0	6655	games for the 3 KBytes expansion
8K	1	11775	games for the 8 KBytes expansion
16K	1 2	19967	games for the 16 KBytes expansion
24K	1 2 3	28159	games for the 24 KBytes expansion
Full	0 1 2 3 5	28159	everything a VIC-20 can have
Custom	your own		any mix of blocks

- **Cartridges** almost always want **Unexpanded**.
- A game's name or instructions often say what it needs: "8K", "+16K", "needs 24K expansion".

- Not sure? Start with **Unexpanded**. If the game does not start, shows rubbish, says **?OUT OF MEMORY** or drops back to READY, press **HELP**, press **M** on the game, choose a bigger setting and try again.

The **blocks** are the places a VIC-20 can have memory added. In the memory box, the digits **0, 1, 2, 3** and **5** switch each block in or out by itself; doing that makes the setting **Custom**.

Block	Where	Size
0	$0400-$0FFF	3 KBytes
1	$2000-$3FFF	8 KBytes
2	$4000-$5FFF	8 KBytes
3	$6000-$7FFF	8 KBytes
5	$A000-$BFFF	8 KBytes – where cartridges sit; a few games want memory here

In the memory box, **RUN/STOP**, **ESC** or **M** go back to the list without saving anything.

Games in several parts

A game in several parts starts with its first part, just like any other game. When it is time for the next part, it does what it did on tape – and the VIC-20 loads the next file in the same folder for you. That is why the parts must be together in one folder, in order.

Machine code programs

A few programs are pure machine code that a VIC-20 user started with **SYS** and an address. The menu loads such a program but cannot know where to start it; the bottom line of the menu says where it went in memory. Close the menu and type the SYS its instructions give.

5. Seeing the whole screen

The VIC-20 shows its picture the way a TV of the time did: the normal screen with its border round it, in a picture that stays where it is. A game that moves its screen moves it inside that picture, smoothly, just as on a real VIC-20.

A normal VIC-20 screen is 22 columns by 23 rows, and it fits that picture with room to spare. But some games put their screen higher up, lower down or further to one side than usual, and some make it bigger – wider, taller, or both – to use every bit of the TV picture. This is called **overscan**. Then part of the game's screen runs off the edge of the picture. There are two ways to get it back.

Moving the picture: ALT and the cursor keys

Hold down **ALT** and press a **cursor key**: the picture moves a little in that direction. Hold the cursor key down too, and it goes on moving. **ALT** and **CLR/HOME** put it back where it was.

Here a game has put its screen a little too high, and its score line is cut off at the top:

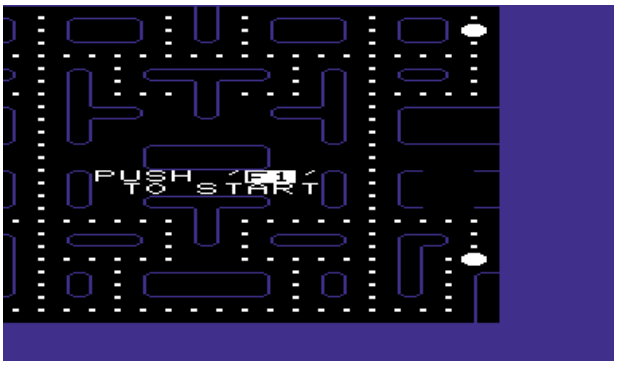


Figure 5: Before: the score line is cut off at the top

ALT and cursor down, ten times, and the score line is back:

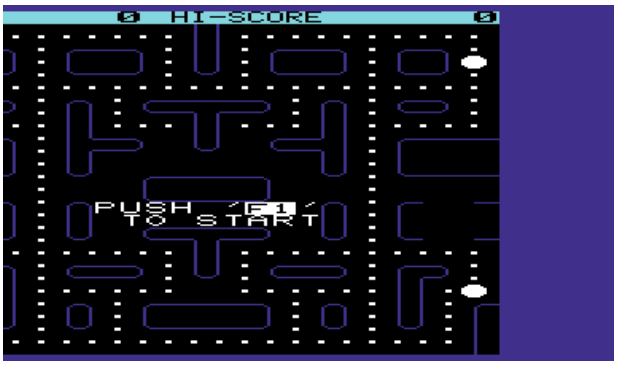


Figure 6: After ALT and cursor down: the whole top of the screen

The VIC-20 has no ALT key, so the game never sees these presses – you can move the picture in the middle of a game, and in VIC-20 BASIC too.

The picture stays where you put it while the game runs. It is not remembered: every time the VIC-20 starts a game – a new one from the menu, the same one again, or one chosen in a game's own menu – and when F1 restarts BASIC, the picture is back in its normal place.

Fit to screen: F3

A screen that is simply too big for the picture cannot be shown whole by moving it: whatever you move into view at one edge, you lose at the other. Here a game's screen is taller than the picture, and its two score lines are cut off at the top:



Figure 7: Fit to screen off: the top of a big screen is cut off

Press **HELP**, then **F3**: the bottom line now says **Fit to screen On**. Press **RUN/STOP** to go back to the game. Now the picture takes in the game's whole screen, however big, and makes it a little smaller so that it fits:



Figure 8: Fit to screen on: the whole screen, score lines and all

Fit to screen stays on – for every game, and the next time you start the VIC-20 – until you press **F3** again. It is off at first, because a normal game looks best as a TV showed it. Switch it on when a game's screen is too big, and off again afterwards.

Games that move their screen

Some games move their whole screen on purpose:

- to shake it when something explodes,
- to slide it in or out on the title screen or between levels,
- or to let you put it where you like on your TV – many games have an option for this, often worked with the cursor keys or the joystick.

The VIC-20 moves its screen in small steps: 4 dots sideways, 2 lines up or down.

With fit to screen off, the picture stays where it is and the game's screen moves inside it, exactly as on a real VIC-20 and a TV. The steps are small, and the movement looks smooth.

With fit to screen on, the picture follows the game's screen, to keep all of it in view. Every time the game moves its screen, the whole picture moves with it, step by step: the game's

screen seems to stand still while the border jumps around it, and the movement **stutters**. A game that changes the size of its screen as well makes the picture grow and shrink with it. This is not a fault – fit to screen does exactly what it is for – but it does not suit a game that moves its screen as an effect.

For such a game, switch fit to screen **off** (HELP, then F3). If part of its screen is then cut off, move the picture once with **ALT** and the **cursor keys** instead: the picture stays put from then on, and the game moves its screen inside it the way it was meant to.

Which one to use

What you see	What to do
The whole screen is there	nothing: fit to screen off, the normal picture
A little of the top, the bottom or one side is cut off	fit to screen off, and ALT + cursor keys
The screen is too big: whatever you move into view, something else goes	fit to screen on (F3)
The game moves its screen as an effect, and with fit to screen on it stutters	fit to screen off, then ALT + cursor keys if a part is cut off

6. Back to BASIC, with the memory you want

F1: restart into BASIC

Press **HELP**, then **F1**. The VIC-20 restarts at once, into VIC-20 BASIC, as if you had switched it off and on again. The game that was running is gone.

F1 restarts with the memory shown next to it on the bottom line of the menu – **F1 Restart Unexpanded** until you change it.

SHIFT+F1: choose the memory for BASIC

Typing in a program from a book or a magazine that needs more memory? Press **HELP**, then **SHIFT+F1**. The memory box opens, now saying **For BASIC (F1 restarts)**:

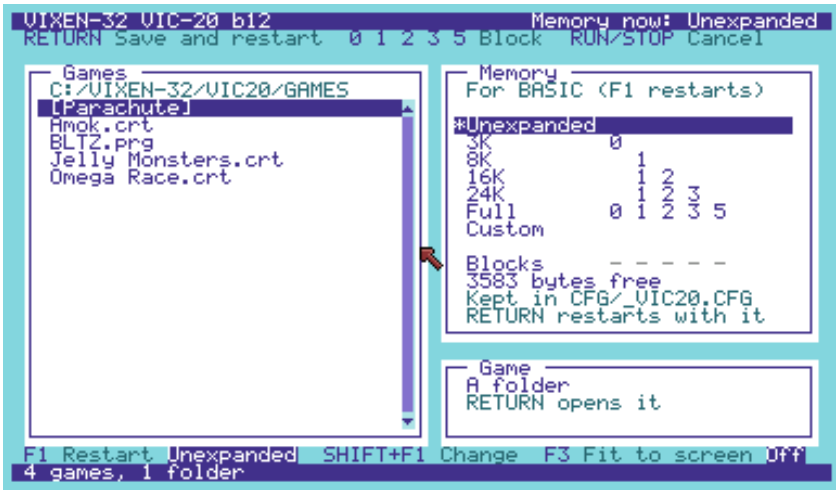


Figure 9: SHIFT+F1: the memory for BASIC

Choose a setting just as you do for a game and press **RETURN**. The VIC-20 restarts into BASIC with that memory, and **BYTES FREE** on the screen shows how much you now have.

The menu remembers this setting: from now on **F1** restarts with it, and the VIC-20 starts with it every time you type **GO V20**. Press **SHIFT+F1** again to change it.

Appendix A: All the keys

While the VIC-20 runs

Key	What it does
HELP	open the game menu
ALT + cursor keys	move the picture (until the next game is started)
ALT + CLR/HOME	the picture back in its normal place

In the menu's list

Key	What it does
Cursor up, cursor down	move the bar
RETURN, double click	open the folder / start the game
DEL	up one folder
a letter or a digit (not M)	the first game starting with it; again: the next
CTRL + cursor up, down	a page up, down

Key	What it does
CTRL + cursor left, right	the first line, the last line
M	the memory box for the game the bar is on
F1	restart into BASIC, with the memory next to F1
SHIFT+F1	the memory box for BASIC
F3	fit to screen on, off
F5	the mouse as paddles on, off
F7, SHIFT+F7	the paddles faster, slower
RUN/STOP, ESC, HELP	back to the VIC-20

In the memory box

Key	What it does
Cursor up, cursor down	choose a setting
0 1 2 3 5	a block in or out
RETURN, double click	save it (and start the game, or restart BASIC)
RUN/STOP, ESC, M	back to the list, nothing saved

Appendix B: Messages

When you type GO V20

Message	What to do
`?/VIXEN-32/VIC20/KERNAL.ROM NOT FOUND`	the file is not there: check its name and folder (BASIC.ROM and CHAR.ROM the same)
`?KERNAL.ROM IS NOT 8 KBYTES`	the file is the wrong size: it is not the right ROM (CHAR.ROM must be 4 KBytes)
`?UNMOUNT A: AND B: FIRST`	unmount the VIXEN-32's disk drives A: and B:, then try again

In the game menu

Message	What to do
There is no /VIXEN-32/VIC20/GAMES folder on the card	make the GAMES folder and put your games in it
The card cannot be read	check that the SD card is in
This file cannot be read	the file is damaged or not a VIC-20 game
The memory setting could not be written to the card	the card is full or locked: the game still starts, but you will be asked again next time
Not loaded: the VIC-20 never got to READY	the game could not be put in: try another memory setting
Loaded at ...: start it with SYS	machine code: type the SYS its instructions give (chapter 4)
The next file is not a BASIC program	the next file in a game's folder is not its next part

Appendix C: The CFG folder

The CFG folder inside GAMES holds one small file for each game you have started, with the memory you chose for it – **Blitz.CFG** for **Blitz.prg** – and one called **_VIC20.CFG** with the memory for BASIC (SHIFT+F1) and whether fit to screen is on.

Delete a game's file, and the menu asks for its memory again the next time you start the game. Delete the whole CFG folder, and every game asks again; the VIC-20 then starts unexpanded, with fit to screen off.