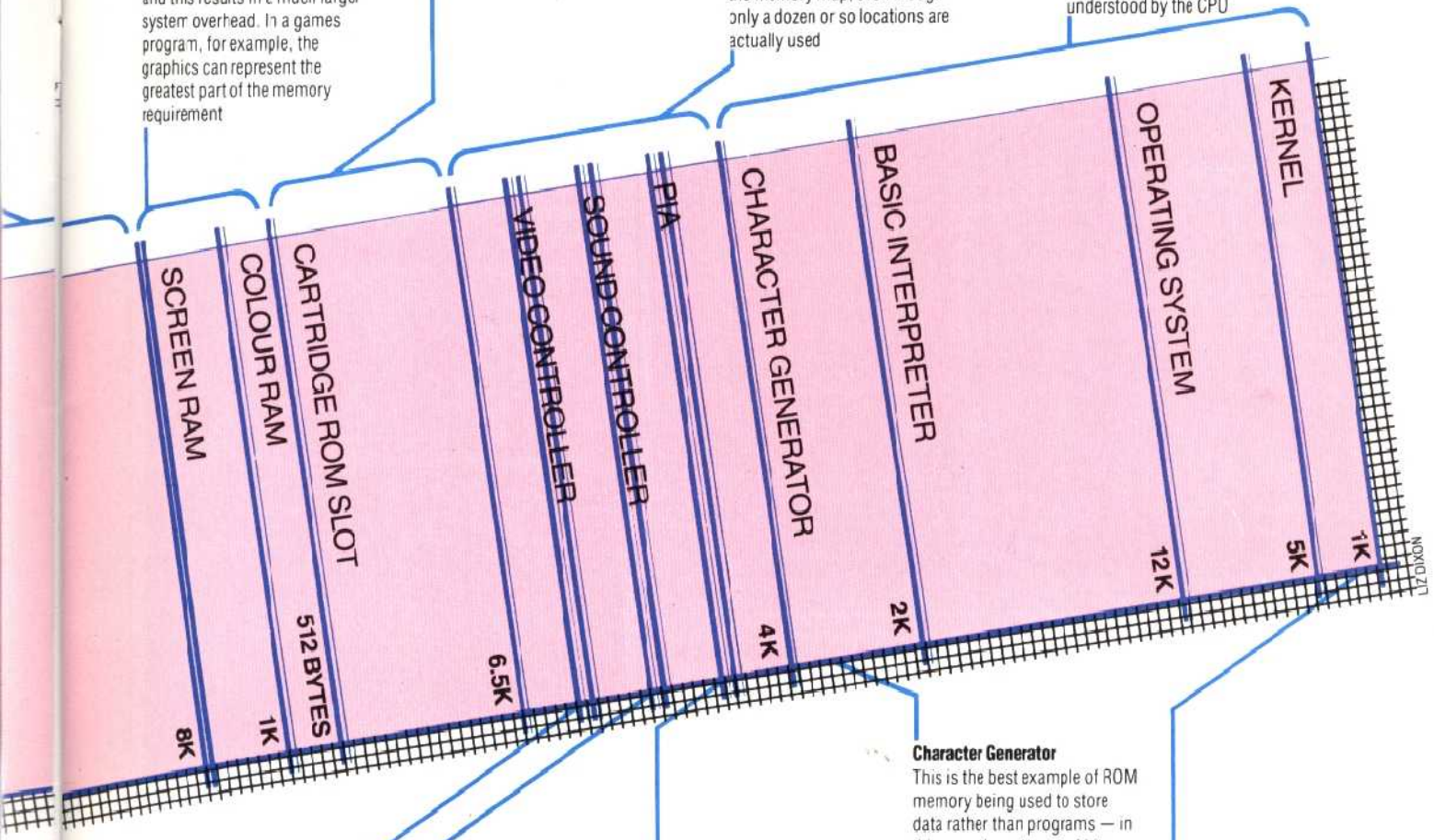
System RAM
Some computers have system RAM that is not listed as part of the user RAM. This is generally used for the screen RAM (where one byte corresponds to each character location on the screen) and the colour RAM (where one byte specifies the foreground and background colours for a single character position). Computers with a wide variety of graphics modes and resolutions will need to use memory from the user RAM, and this results in a much larger system overhead. In a games program, for example, the graphics can represent the greatest part of the memory requirement

Empty
When you use a program from a cartridge, it appears in the memory map as expansion ROM. Some machines have spare ROM sockets on the printed circuit board for plugging in additional languages. These will also be reserved in the memory map

Input/Output Chips
The CPU can communicate only with devices that appear as locations in the memory map, so all interface ports and other chips must be included on the map. These will include the interfaces for keyboard, cassette deck, the video controller, and external interfaces such as the printer. The CPU generally addresses memory in the form of blocks (typically 4 Kbytes each). Therefore, the Input/Output chips may occupy 4 Kbytes of the memory map, even though only a dozen or so locations are actually used

System ROM
In a home computer, ROM is used to store information that is always needed and never changes. The most fundamental component of the ROM is the operating system, which is the set of machine code programs that look after the operation of the computer. These programs perform functions such as scanning the keyboard, and storing or retrieving information on cassette. Another component is the BASIC interpreter, which translates programs from BASIC into the low-level instructions understood by the CPU



Video Controller
The most sophisticated graphics, such as sprites and multiple-mode resolution, are increasingly handled in hardware rather than in the software. The video controller(s) will appear in the memory map as a dozen or so single-byte registers, which determine every visual component, from the background screen colour to the exact position of each sprite

Sound Controller
Crude sound effects can be achieved in software, but computers with multiple voices, or with ADSR sound control, invariably have a dedicated sound controller — the output of which is fed into a small amplifier

PIA
Peripheral Interface Adaptors are used to handle most simple interfacing with keyboards, cassettes, joysticks and printers. The most sophisticated chips (such as the 6522 Versatile Interface Adaptor) can convert between parallel and serial data, and have built-in timers, which can be used in programming or to control transmission rates

Character Generator
This is the best example of ROM memory being used to store data rather than programs — in this case the patterns of bits that define how the characters appear on the screen. Some computers allow all or part of the character set to be copied into RAM, and this permits other characters to be defined by the user

Kernel
The 'kernel' (it has a different name on almost every machine) is the heart of the operating system. When the machine is switched on, the CPU will automatically jump to this location and begin executing the kernel program. It will search through the RAM area to determine how much memory is available, and check to see if a program cartridge is plugged in. The kernel also handles the most elementary forms of input and output