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Cartridge Port
If a ROM cartridge (up to 16 Kbytes) is plugged in here, it will effectively override any other memory that occupies the same locations. If the first nine bytes of the ROM contain a specified sequence of values then the program will 'automatically start' when switched on. This is how games cartridges work

Audio/Video Socket
A composite video signal is provided to drive a colour monitor (though not an RGB monitor), and there is a separate audio output that can connect with a hi-fi system. There is also an audio input line that allows you to mix recorded music with synthesised sounds

TV Output
Unlike the Vic-20, the Commodore 64 contains a built-in RF modulator, so that the output can be connected directly to a TV

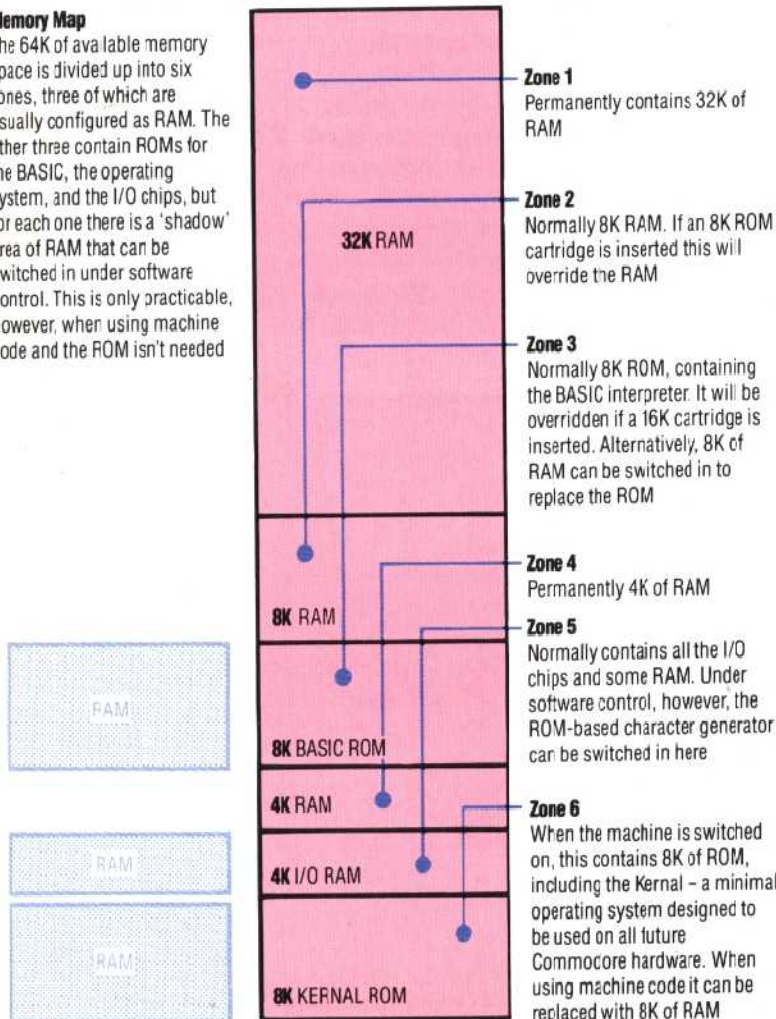
Serial Bus
This is a special interface designed by Commodore to drive several devices (including their disks and printers) simultaneously. The protocol is similar to the IEEE48 standard, except that there is just one (serial) data line instead of eight parallel ones

Cassette Port
All Commodore computers require the manufacturer's cassette unit. When it was first marketed, the Commodore system was faster and more reliable than a domestic unit. Now the opposite is true

User Port
This port has two functions. First, it can implement a full RS232 serial interface, though an add-on is needed to convert the 64's voltages to those used on most serial devices. It can also double up as a parallel port that can be used for experimentation

Memory Map

The 64K of available memory space is divided up into six zones, three of which are usually configured as RAM. The other three contain ROMs for the BASIC, the operating system, and the I/O chips, but for each one there is a 'shadow' area of RAM that can be switched in under software control. This is only practicable, however, when using machine code and the ROM isn't needed



performed in machine code.

Three other chips between them account for the rest of the 64's features. There is a 6526 CIA (Complex Interface Adaptor), which is a more sophisticated version of the PIAs and VIAs previously mentioned. In addition to the usual programmable input/output lines, it includes timers and shift registers to convert between serial and parallel data. There is also a 24-hour clock with a programmable alarm, of which the BASIC interpreter appears to make no use at all.

The graphics and video display are handled by another chip, the 6566, which is a further development of the Video Interface Chip, from which the Commodore Vic-20 derives its name. This delivers different modes for both textual and high resolution graphics displays, and the sprite graphics have been well documented. Though it can handle only eight sprites at once (compared with 32 on the Memotech MTX512, for example), it is possible to simulate rather more. Sprites are defined as a block of bytes in memory, and their location is indicated by POKEing the address into the Vic-II chip's registers. It is relatively easy to switch the pointer rapidly and repeatedly between different sets of values to simulate more than eight units.

The 6581 chip is referred to as the SID, or Sound Interface Device, and contains functions a great deal more advanced than some of the early purpose-designed music synthesisers. As well as full ADSR control over the volume envelope of each sound, the functions include filtering, different waveforms and ring modulation - modifying one sound with another.