

Chapter-1

The role of computer peripherals

Chapter-2

Peripherals/Computer Connections

Book

Computer Peripherals

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Introduction

- The CPU performs arithmetic and logic operations and controls the operation of the entire system.
- Some tasks are completely controlled by CPU, but for some others, it merely initiates a sequence of events which are controlled elsewhere, such as in a peripheral device.
- The peripheral devices permit communication of information and storage of information.
- Peripherals normally communicate through the CPU.
- Some may communicate themselves and memory bypassing CPU
- The number and types of peripheral devices depend on the main applications for which the computer system is intended.

Typical Computer System

- Excluding CPU and Memory all other Input Output devices connected with the computer systems are altogether referred to as peripheral devices

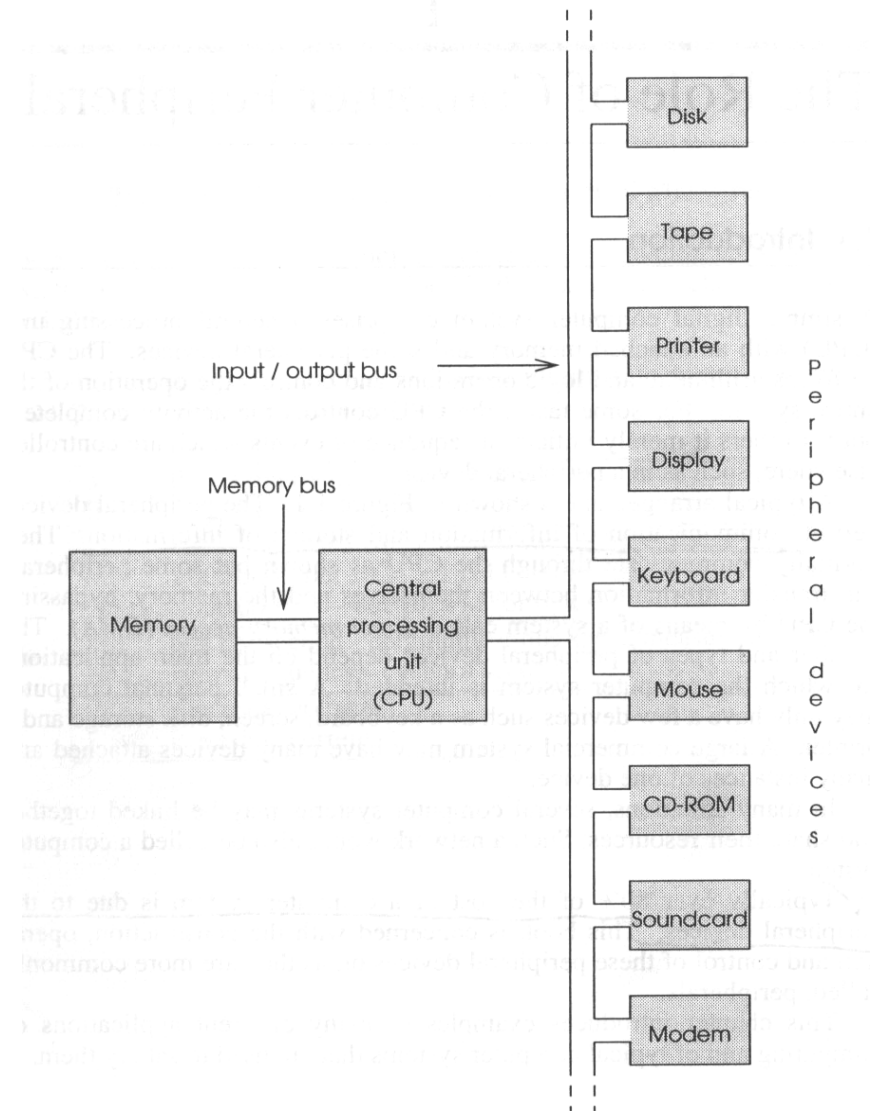


Figure 1.1 Typical computer system

Peripheral Adapter

Modern computers perform operations very much faster than most peripherals can generate or accept data. Programs and data are moved between memory and the CPU at such a speed that it would be inappropriate to connect peripherals directly to the CPU. So some form of interface (Peripheral Adapter) is required to convert between the fast internal communications and the relatively slow external devices.

Peripheral Adapter

A peripheral adaptor works as an interface between CPU (very fast) and a peripheral device (relatively slow) for data communication.

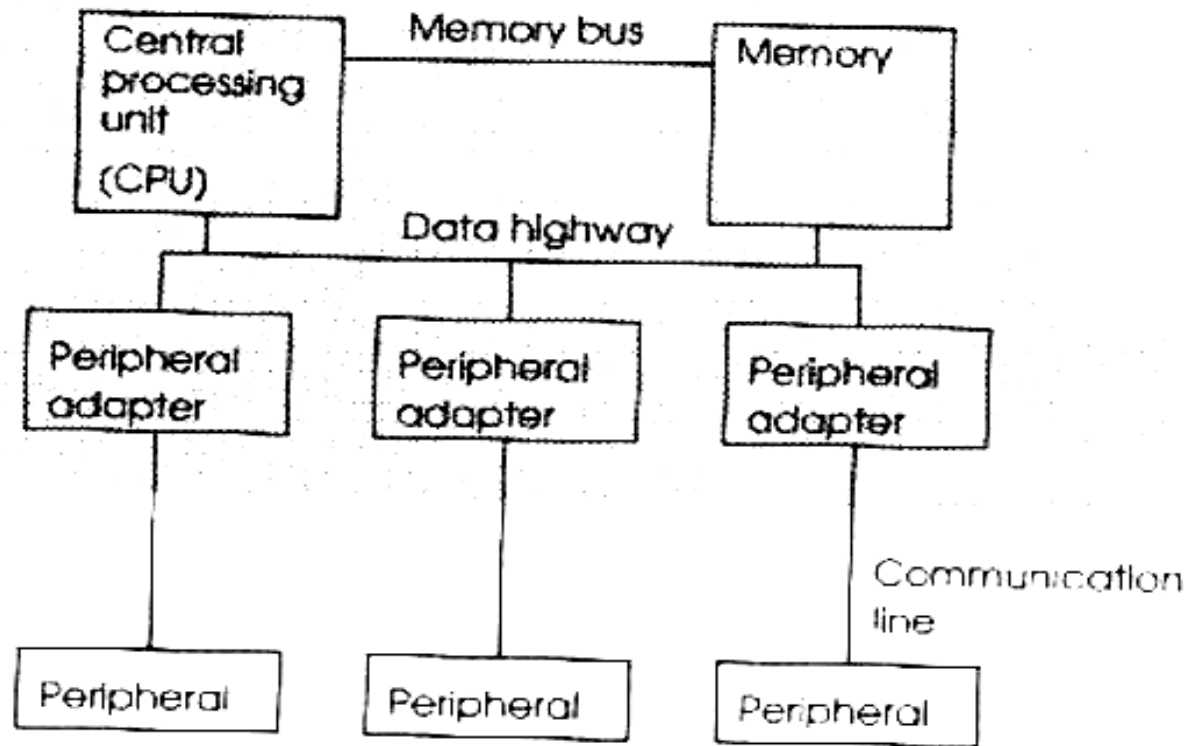


Figure 2.1 *Components of a digital computer*

Data Highways

- Data (including programs) are moved around the computer on a set of wires forming a data highway (Bus).
- Address Bus, Control Bus, Data Bus

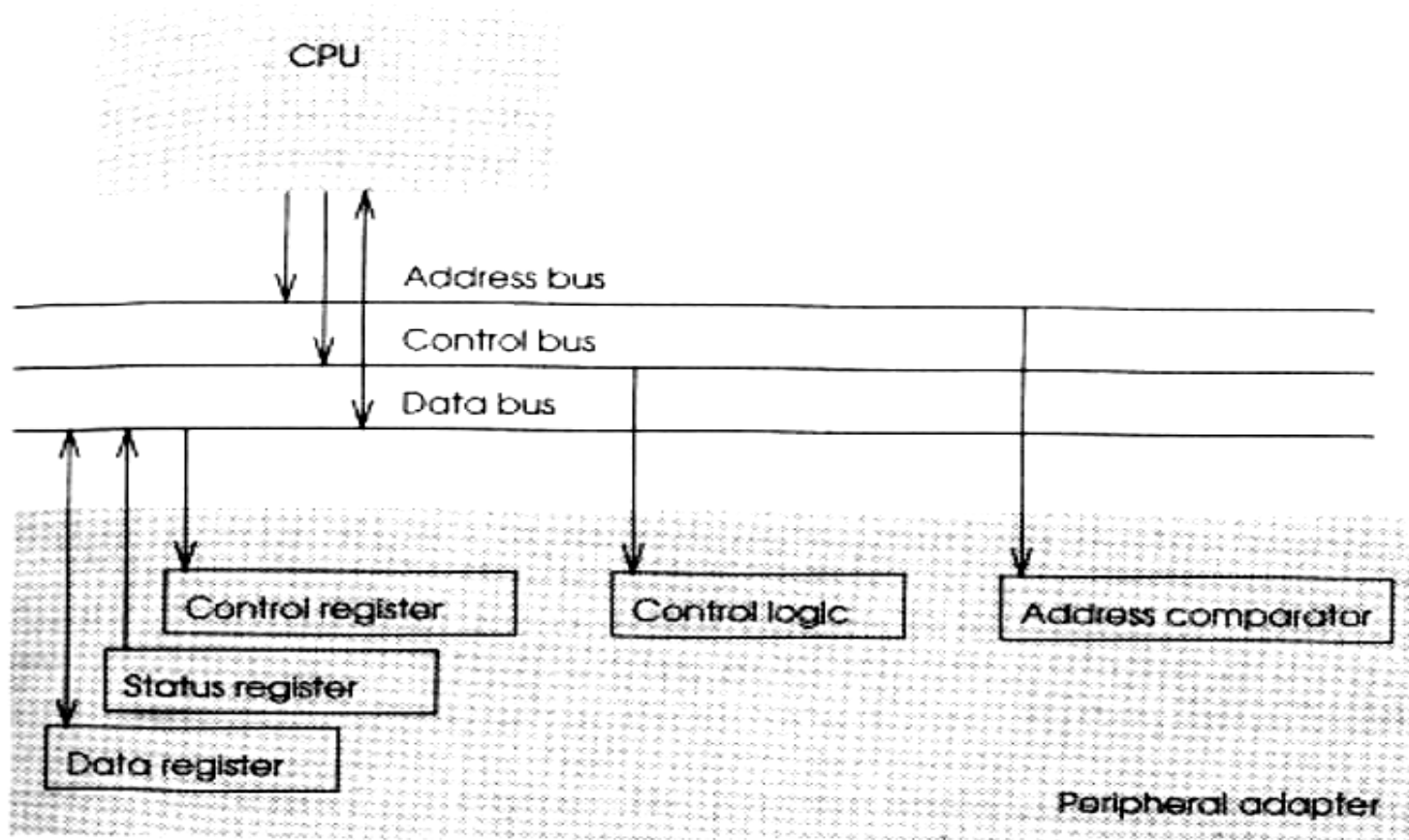


Figure 2.2 Connection of peripheral adapter to highway

Data Highways

■ Data Bus:

- It contains the information or program instructions required by the CPU.
- The speed of operation of a computer on the rate at which data can be made available and a good way to improve the speed is to add more data lines to transfer more data at a time.
- Small systems use 8-bit data bus. They are relatively slow but of low cost.
- 8086 uses 16-bit and 80386 uses 32-bit bus.

Data Highways

■ Address Bus:

- It contains address information.
- The number of lines available for this determines the maximum amount of physical memory that can be addressed.
- If there are n lines , then 2^n locations can be addressed.
- 8086 has 20 address lines and thus it can address $2^{20}=1048576$ (1 Mega bytes) memory locations.

Data Highways

■ Control Bus:

- It contains control signals.
- Control signals are required to maintain orderly flow of data along the bus. It is necessary to indicate whether to read or write data during a transfer, Timing signals. It also indicates whether a transfer is to memory or a peripheral adaptor.

PA Registers

Peripheral adaptors are directly connected to the buses. PA contains: **Control register, Status register, Data register, Control Logic, Address Comparator.**

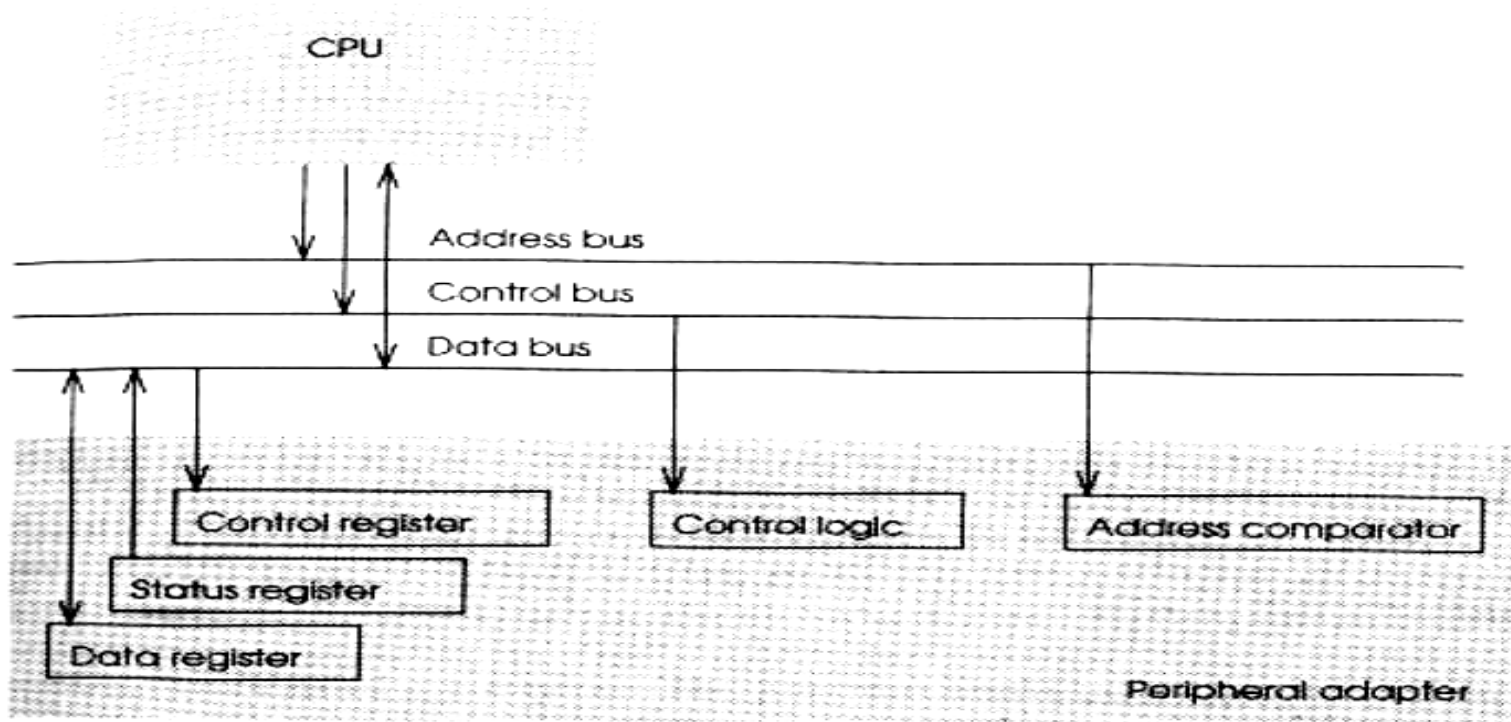


Figure 2.2 Connection of peripheral adapter to highway

PA Registers

■ *Address Comparator*

- It is necessary to distinguish between adapters used for different peripherals. So a value is allocated to the adaptor (*Often set with switches or jumpers*).
- An adaptor may recognize a single address or a small group of address.
- It compares the address on the address bus with the peripheral adapter's address.
- If the address on the bus matches that of the adapter then the control lines are interpreted by the ***control logic*** to perform the required function, typically to read from or write to a ***register*** (may be data register) connected to a data bus.

PA Registers(Cont....)

- Control Register

- Stores values written to it to control the operation of the adaptor.

- Status Register

- Can be read by the CPU to determine the status of the device (e.g. whether it is ready for use, busy, switched on/off etc.)
 - Each piece of information stored in the control and status registers usually needs only a single bit and several such bits are stored in each register, each bit is often known as a *flag*.

- Data Register

Used to hold temporarily a value to be transferred to or from the peripheral so that it is not necessary to synchronize the computer with the peripheral.