Chapter I Historical

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CHAPTER - I

1) Microprocessor is an accident of technological development (1). The 1st transistor was discovered in 1948 and only 10 years later Jack St. Clair Kilby developed first working model for an IC. During the same period Jean Hoerni and Robert Noyce developed the planar process and around 1961 analog ICS were produced in bulk and digital ICS followed them soon. Digital ICS were labeled as follows (2).

SSI - Fewer than 10 gates.

MSI - Between 10 and 100 gates.

LSI - Between 100 and few thousand gates.

VLSI - Several thousand gates.

Actually LSI appeared in the market in 1971 as 1K-bit memory, UART and Intel 4004 chip. The chart of evolution of LSI shown in fig.1.

In 1972 Intel introduced the 8008 the 1st General purpose 8-bit microprocessor other companies also introduced their microprocessors during early seventies. The history of development is given in Table 1.

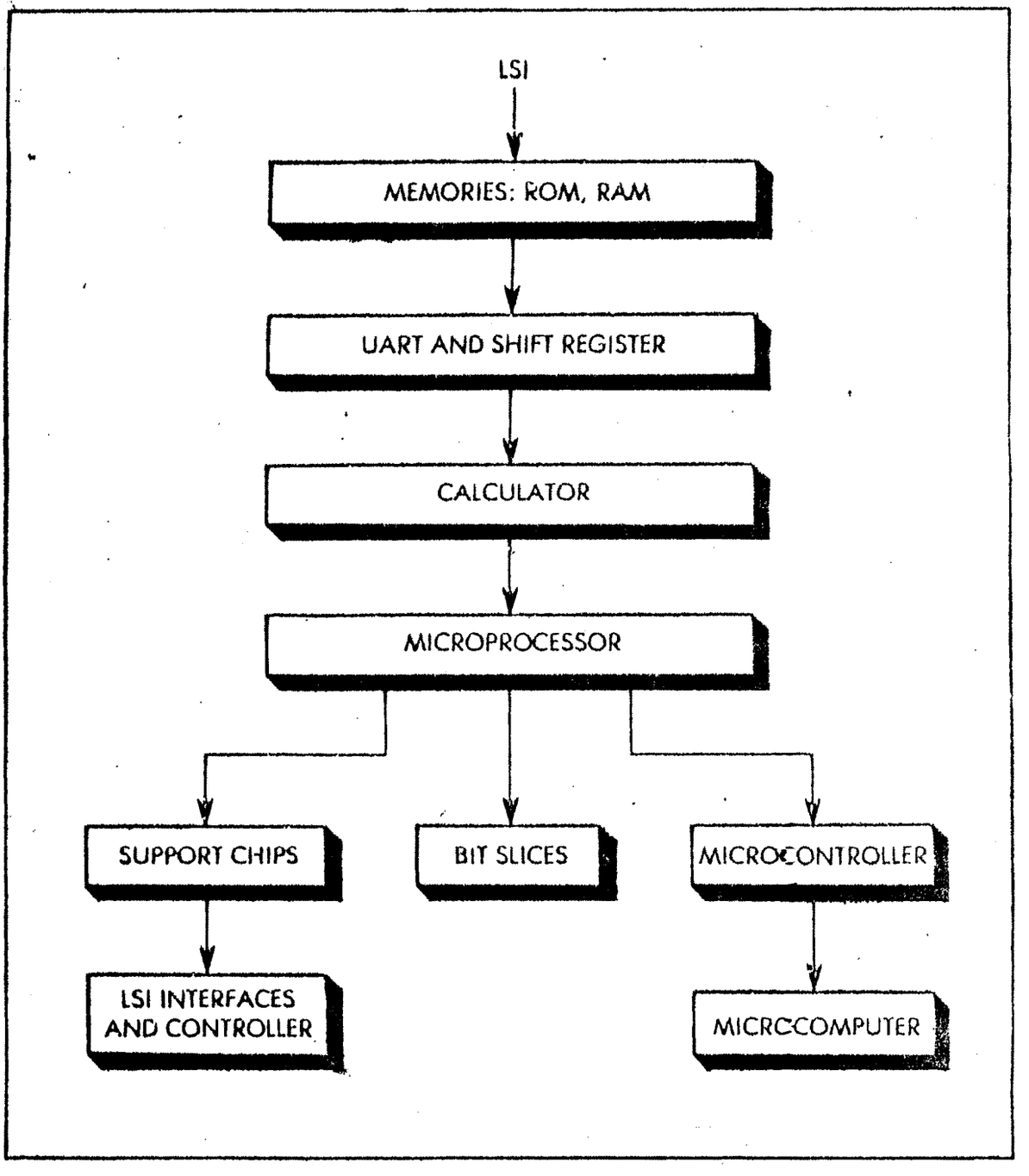


Fig.1·0 EVOLUTION OF LSI

Table - 1 : Evolution of microprocessor 3

UPS	No. of bits	Year	Company	Technology	Remarks
4004	4	1971	Intel	PMOS	Along with 4001 (ROM) 4002 (RAM), 4003 (I/O) 2300 transistor on the chip.
8080	8	1974	Intel	NMOS	4800 Transistors.
6800	8	1974	Motorola	NMOS	
8085	8	1976	Intel	NMOS	
Z-80	8	1976	Zilog	NMOS	
8086	16	1978	Intel	HMOS	Along with 8088, 8087, 80186, 80286, 80386 etc. 29,000 transistors.
Z 8000	16	1980	Zilog	HMOS	17,500 transistors.
68000	16	1980	Motorala	HMOS	70,000 transistors.
IAPX 432	32	1983	Intel	HMOS	2,25,000 transistors.
Z 80000	32	1984/85	Zilog	HMOS	
MCS	8	1976	Intel		First microcomputer on a single chip.

2) What is a Microprocessor ?

The microrpocessor is a semi-conductor device containing delectronic logic circuits manufactured by LSI or VLSI method (4). It is capable of performing and computing functions and making decisions to change the sequence of the program exceution. In large computers the CPU performs all the computional functions and it is implemented on one or more PCBs. The microprocessor is a CPU on single chip.

3) Architecture :

In Fig. 1.1 - Internal architecture of general microprocessor is shown (5). The microprocessor is divided in to 3 segments as fallows.

i) Arithmetic and Logic Unit :

In this section the arithmetic operations like addition, substraction and logic operations like AND, OR EX-OR are performed. The results are stored either in the registers or in the memory or sent to I/O devices.

Register Section : The section consists of special purpose and general purpose registers. The GPRS are used for the temporary storage of the data or the result of the computation or the address of the operand. These are available to the users. However the special purpose registers like program counter, stack pointer, instruction register have fixed task. They are not user accessiable.

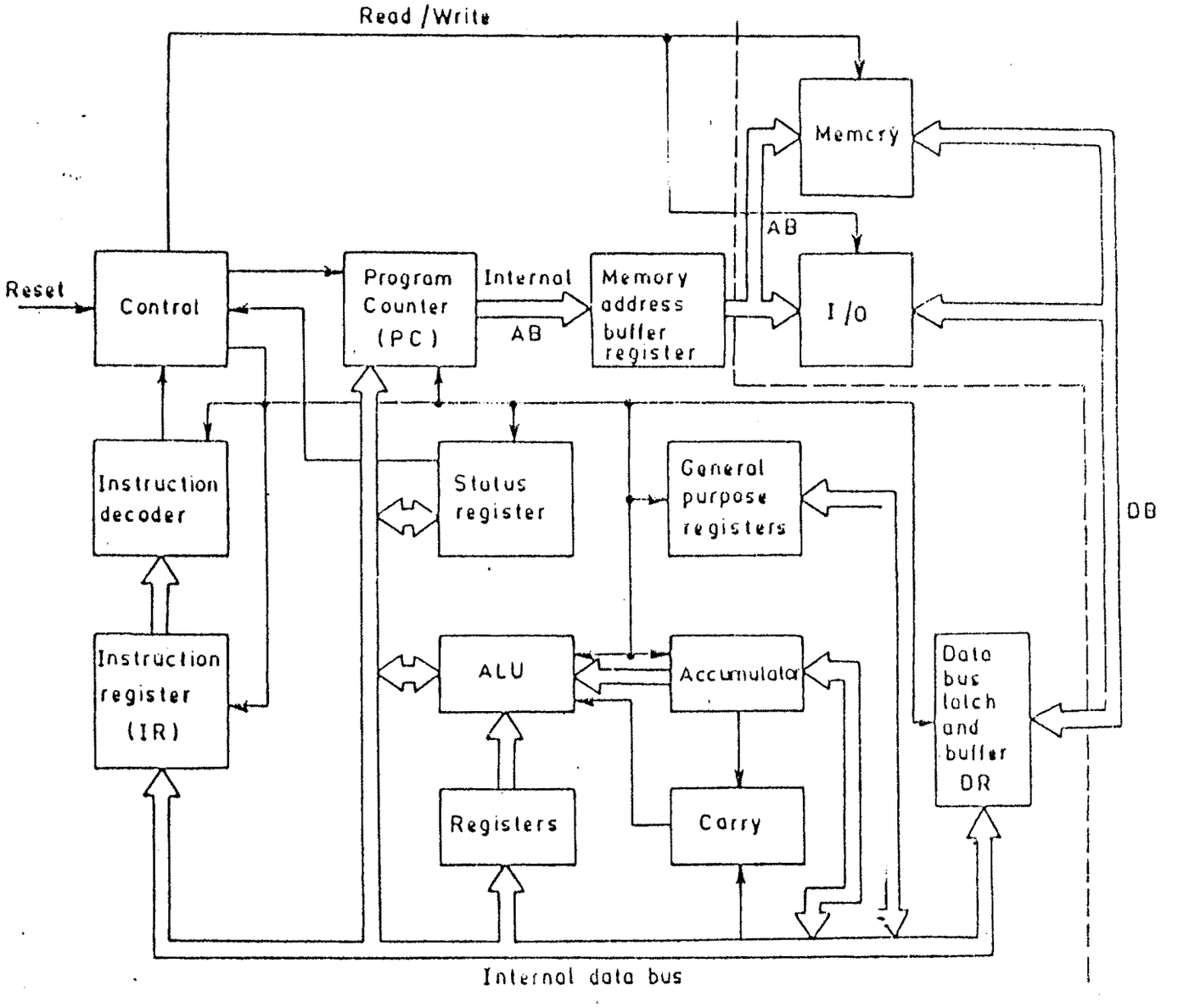


Fig.1·1 INTERNAL ARCHITECTURE OF GENERAL MICROPROCESSOR

Timing and the Control Section :

The functions are given below.

a) Fetch, decode and execute successive instructions of a program in the memory.

b) Generate and manage the control signals necessary to synchronize operations.

c) Control the flow of information on the address and data buses.

4) The Microcomputer Organisation :

The general block diagram of a μP is given in Fig..1.2. Its elements are the CPU, The Memory and the I/O^{S}.

5) BUSES :

The buses link the memory, the CPU and I/O devices.

Address Bus :

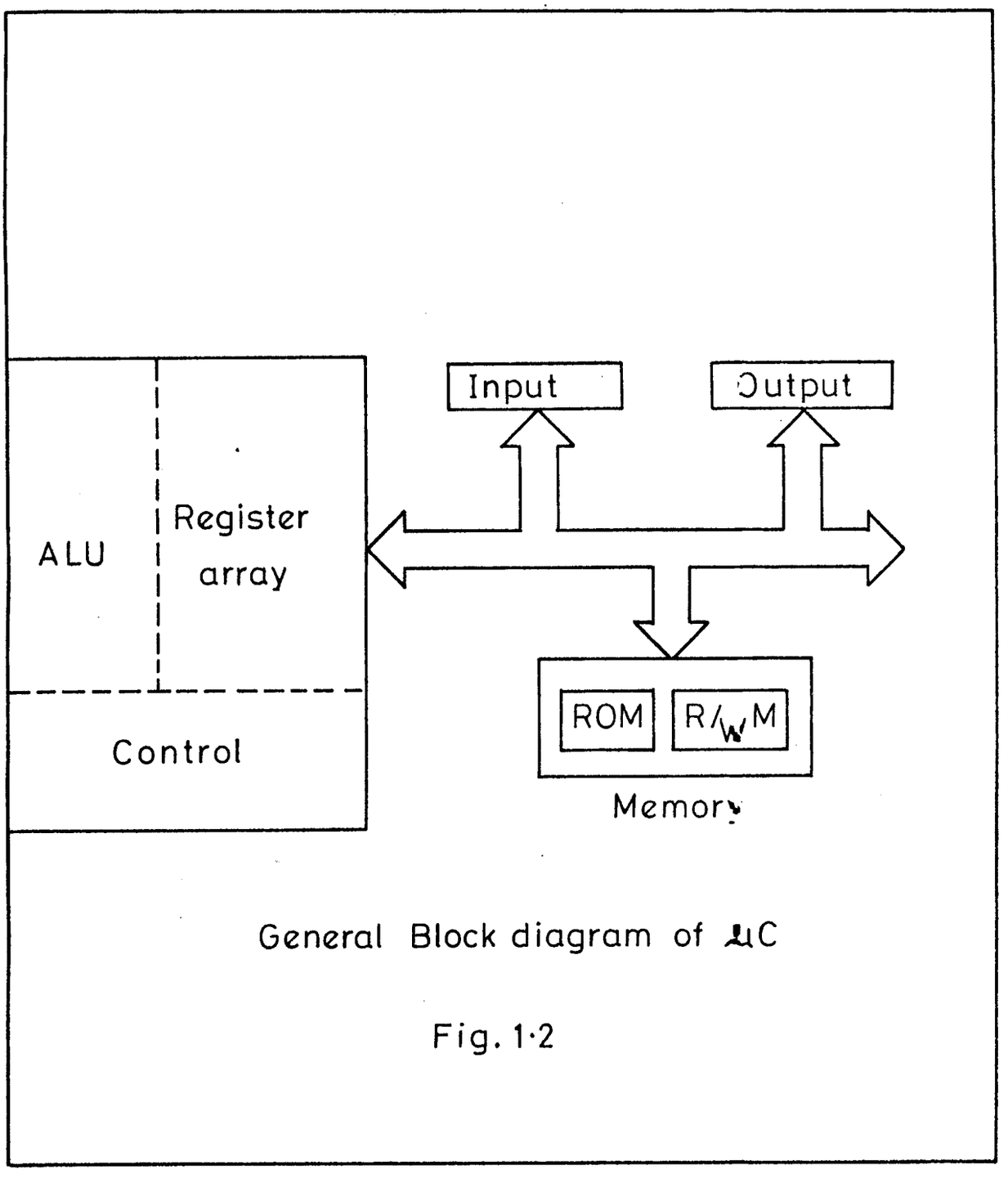
It is unidirectional, CPU sends on this bus, the address of memory location or I/O to be read or written in to.

Data Bus :

It is bidirectional, Data flows from CPU to memory or I/O and vice versa on this bus.

Control Bus :

The control bus carries signals such as memory



General Block diagram of μC

Fig. 1·2

read, memory write, input read, output write. These signals are useful for proper operations.

Memory section : It generally comprises ROM and R/W memory, and magnetic disk or tape. Memory is used to store instruction sequences or user programmes. It is also used to store the data to be processed by MC or the result of the computation.

I/O section :

This I/O allows communication with External World. The input section allows entry of data from a keyboard, teletypes. A/D coverter etc. in to CPU. The C/P section transfers the data from the MP to O/P devices such as LED^{s}, CRT^{s}, printers, magnetic tapes etc.

6) Why MP :

The advantages of using microprocessors are fewer components, low cost and programmibility.

i) There are many advantages of fewer components, these are.

- reduced physical volume and system miniaturization often resulting in portability.
- reduced power consumption.
- reduced power dissiptation.
- Increased reliability.

ii) MP based systems can be programmed for many tasks. To change the programme for new task only requires. substitutions of the memory-chip containing the required programme. There is no necessity of changing the hardware.

7) Orientation of the Present Work :

Temperature control is very important process and is used in industries for controlling the chemical reactions, for heat treating various metals and alloys etc. Impurity diffusion for IC fabrication and so on. Temperature is also necessary for conducting the Experimentsaat various temperatures. eg. : XRD patterns at various fixed temperatures of the materials, crystal growth etc.

Various temperature control systems which are Electrical and Electronic in nature are available. The earlier temperature control systems were analog in nature but now a days they are digitized. The various types of controllers are two position, Multiposition and floating controllers, the proportional integral controller and proportional integral derivation controller.

We have carried out the temperature control by proportional integration technique using a MP 8085 based system. The use of MP has the advantages of

1) Increased speed and accuracy.
2) Flexibility of control.
3) Control at various places and environments.
4) The system is compact and has low cost.

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