

Topic 4: Processor Fundamentals

Keyword sheet - Cambridge AS & A Level Computer Science 9618. Tick each term once you can define it from memory.

Keyword	Definition	Know it?
Von Neumann architecture	Stored program computer in which instructions and data share one memory and are accessed over shared buses.	
ALU	Performs arithmetic and logical operations on data.	
Control unit (CU)	Decodes instructions, generates control signals and manages timing.	
Program counter (PC)	Holds the address of the next instruction.	
Memory address register (MAR)	Holds the address of the location to be accessed.	
Memory data register (MDR)	Holds data that has been fetched from, or is to be written to, memory.	
Current instruction register (CIR)	Holds the instruction currently being decoded and executed.	
Accumulator (ACC)	Holds the intermediate result of ALU operations.	
Index register (IX)	Holds a value that is added to the base address for indexed addressing.	
Status register	Holds flags that record the outcome of operations, e.g. carry, zero, overflow.	
Address / data / control bus	Unidirectional bus carrying addresses / bidirectional bus carrying data / bus carrying control signals.	
Fetch-execute cycle	Fetch: PC to MAR, memory read to MDR to CIR, PC incremented. Decode: CU interprets the opcode. Execute: operation is carried out.	
Clock speed	Number of clock cycles per second; sets the rate of processor operation.	
Cores / cache	Independent processing units on one chip / fast memory between the CPU and RAM; both affect performance.	
Interrupt	A signal causing the processor to suspend the current task and run an interrupt service routine; the register state is saved and restored afterwards.	
Opcode / operand	The part of an instruction specifying the operation / the data or address it acts on.	
Addressing modes	Immediate (operand is the value), direct (operand is an address), indirect (address of an address), indexed (address plus IX), relative.	
Assembly language	Mnemonic representation of machine code with one-to-one correspondence to instructions; specific to a processor.	
Two-pass assembler	First pass builds a symbol table of labels; second pass translates mnemonics and replaces symbols with addresses.	
Bit manipulation	Using shifts and bitwise AND, OR and XOR with masks to test, set or clear specific bits.	