8087 [Co-processor] Architecture

Control Unit

Numeric Execution Unit

Exponent Bus   Fraction Bus

register {
Control Word
Status Word
}

Exponent Module

Programmable Shifter

64

Interface

16

Arithmetic Module

Data ←→ Data Buffer

New instruction

Micro code Control unit

Temporary register

status ←→ Address Bus track
address ←→ Exception pointer

Operand Queue

16

64

Tag Word

Register stack	
0	
1	
2	
3	
4	
5	
6	
7	

← 8bits →

Control unit

↳ handles the communication between processor & memory.

↳
  receives and decodes the instruction
  reads and writes memory operands
  maintains parallel queue

*) All co-processor instructions are ESC instructions

(i.e they start with F)

1) Co-processor → ESC instructions

2) Micro-processor → other instructions

Numeric Execution unit

↳ Handles are numeric processor instructions like
arithmetic, logical, transcendental & data transfer instructions

↳ Has 8 register stack

    ↳ holds all the operands for instruction

    ↳ result

General   Math co-processor

↳ 8087 ⟨ Numeric processor extension
              Floating point unit

↳ Designed by intel along with 8086/8088 for faster calculation

Data-types ⟨ Binary integers
            Packed decimal Numbers
            Real Numbers
            Temporary Real Format

Features

↳ Processing speed is too high; can calculate multiplication
of two 64 bit real numbers in ~27 μs

square root in ~35 μs

↳ IEEE floating point standards