


UCT Department of Computer Science
Computer Science 1015F

Hardware

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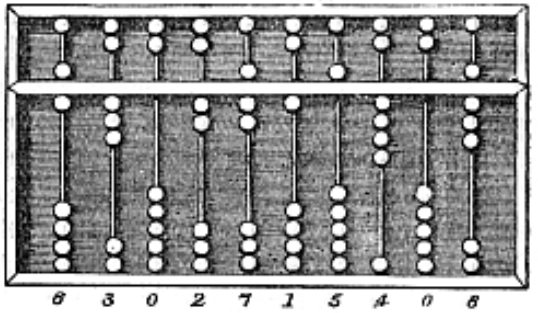
History of Computing

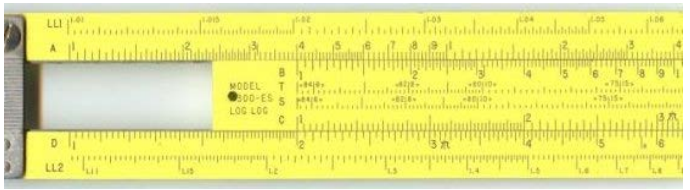
Early Calculation 1/2

Early Chinese abacus can be used to add, subtract, multiply and divide.



Mechanical calculators invented by Schickard, Pascal, Leibniz, etc. used cogs and wheel to compute.

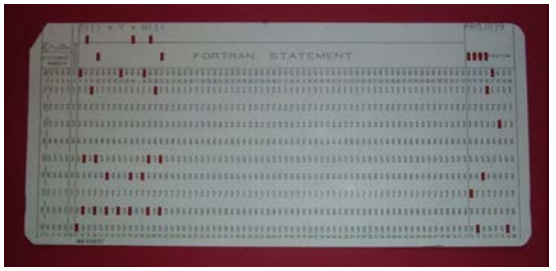
Slide rules performed multiplication and division using logarithms – in popular use until about 1970.

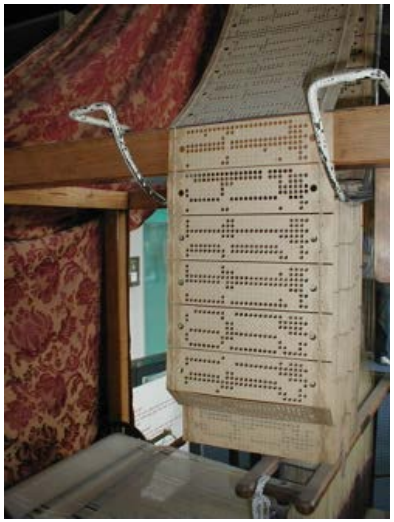


Reference: Wikipedia

Early Calculation 2/2

In early 1800s, Jacquard used punched cards to control a loom.





Hollerith used punched cards for the 1890 US census (his company eventually became IBM!).

Babbage's difference engine (1830) calculated tables of polynomial values.

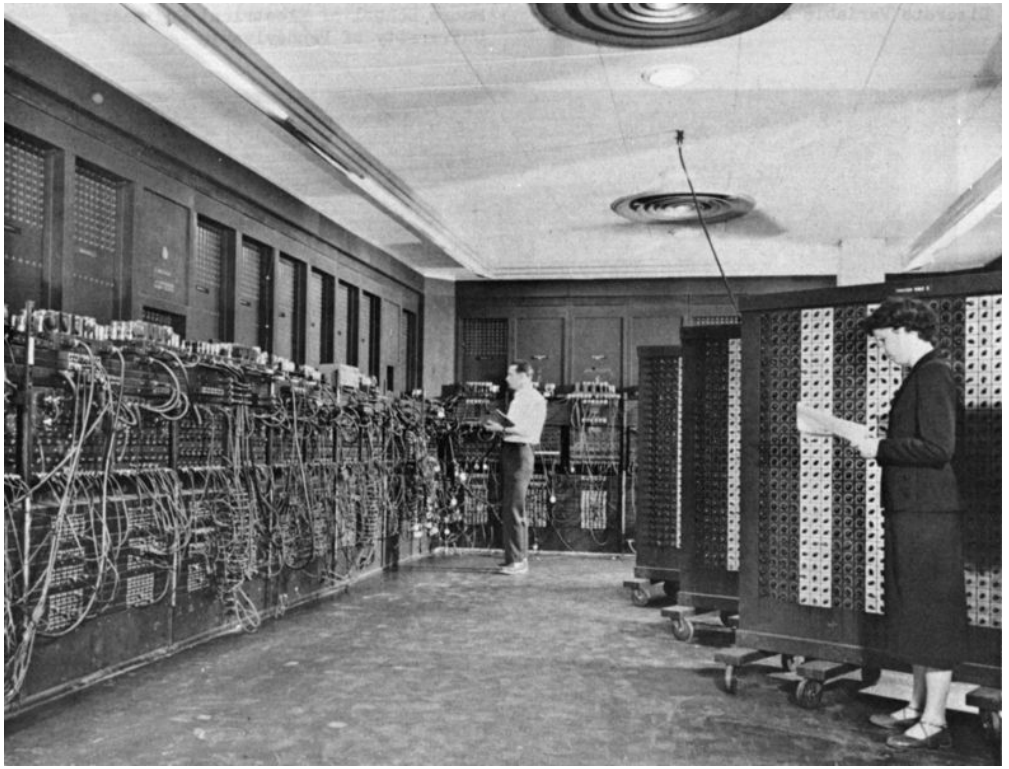
Analogue Computing

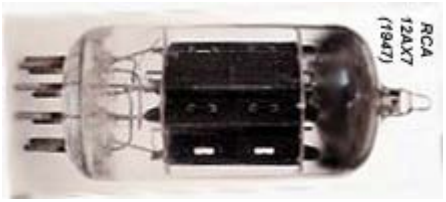
Babbage designed (but never built) the first general-purpose programmable computer – the analytical engine.

Vannevar Bush (1930) built a differential analyzer that used wheels/discs to perform integration.

Vacuum Tubes

ENIAC (1946) was one of many early programmable digital computers, using vacuum tubes for computation and patch cables for manual programming.





1960s to Present

First transistors and integrated circuits and finally microprocessors, revolutionised computing, made them small, cheaper and more general-purpose.

ZX80 (1980)

IBM PC (1980)

Apple MAC (1985)

Hardware and Software

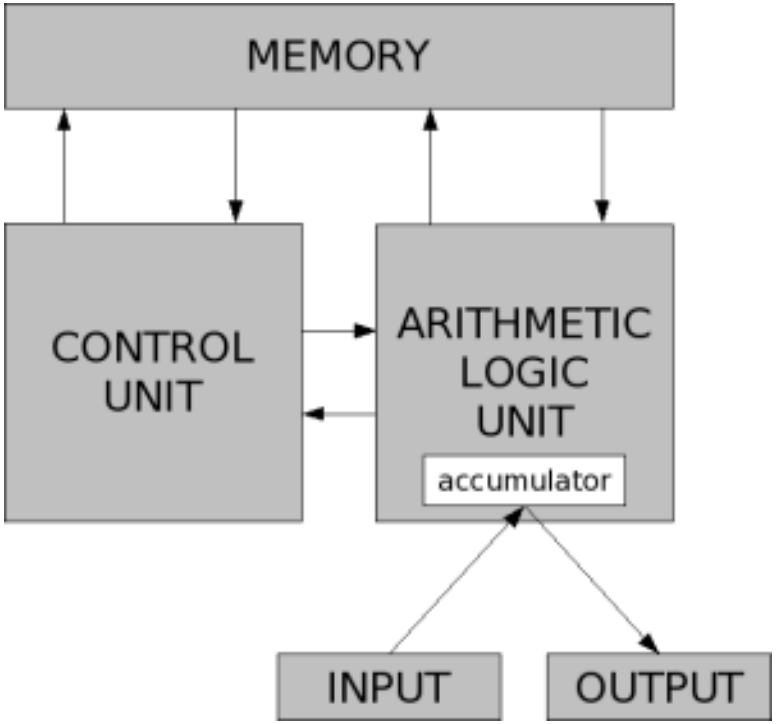
Hardware

- **Hardware** refers to the physical parts of the computer.
  - Hardware is sometimes referred to as computer components and peripherals.
  - E.g., Motherboard, Hard Disk/Drive
- **Software** refers to the set(s) of instructions given to the computer to execute one or more tasks.
  - Software is sometimes referred to as programs.
  - E.g., Microsoft Office, Firefox

The Von Neumann Architecture

- This describes how a conceptual computing device works:
  - Memory stores data and instructions.
  - Control Unit (CU) obtains and executes instructions.
  - Arithmetic Logic Unit (ALU) does calculations.
  - Accumulator is internal ALU storage for some data.
  - Input is process of getting data into machine.
  - Output is process of obtaining data from machine.

- Most modern computers are Von Neumann machines!

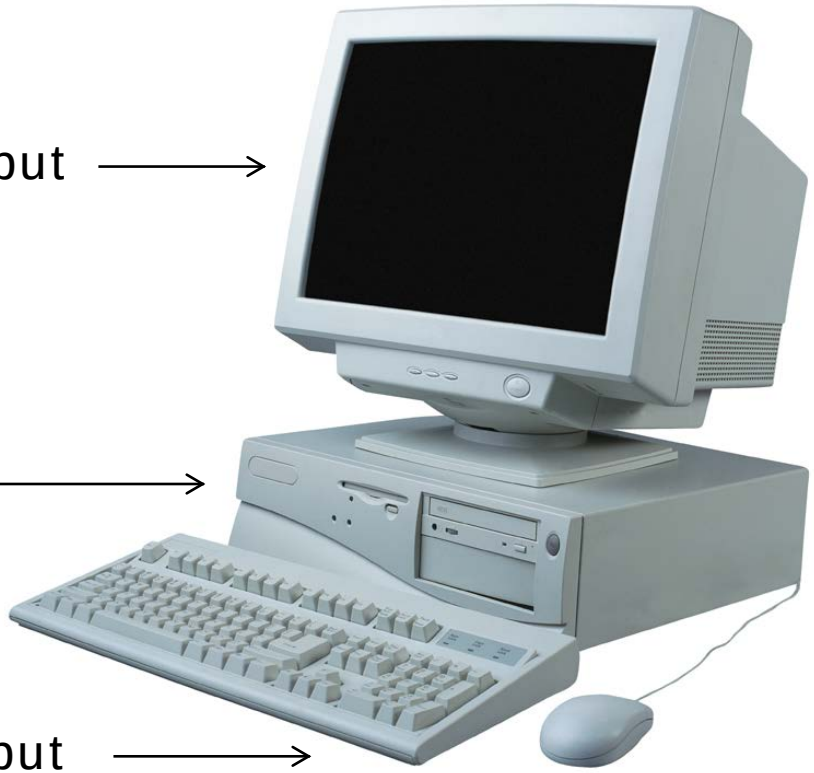


Parts of a Modern Computer 1/2

Monitor: for displaying output

System Unit: CPU, Memory,
Hard drive, Floppy drive, …

Keyboard and Mouse: for input



Parts of a Modern Computer 2/2

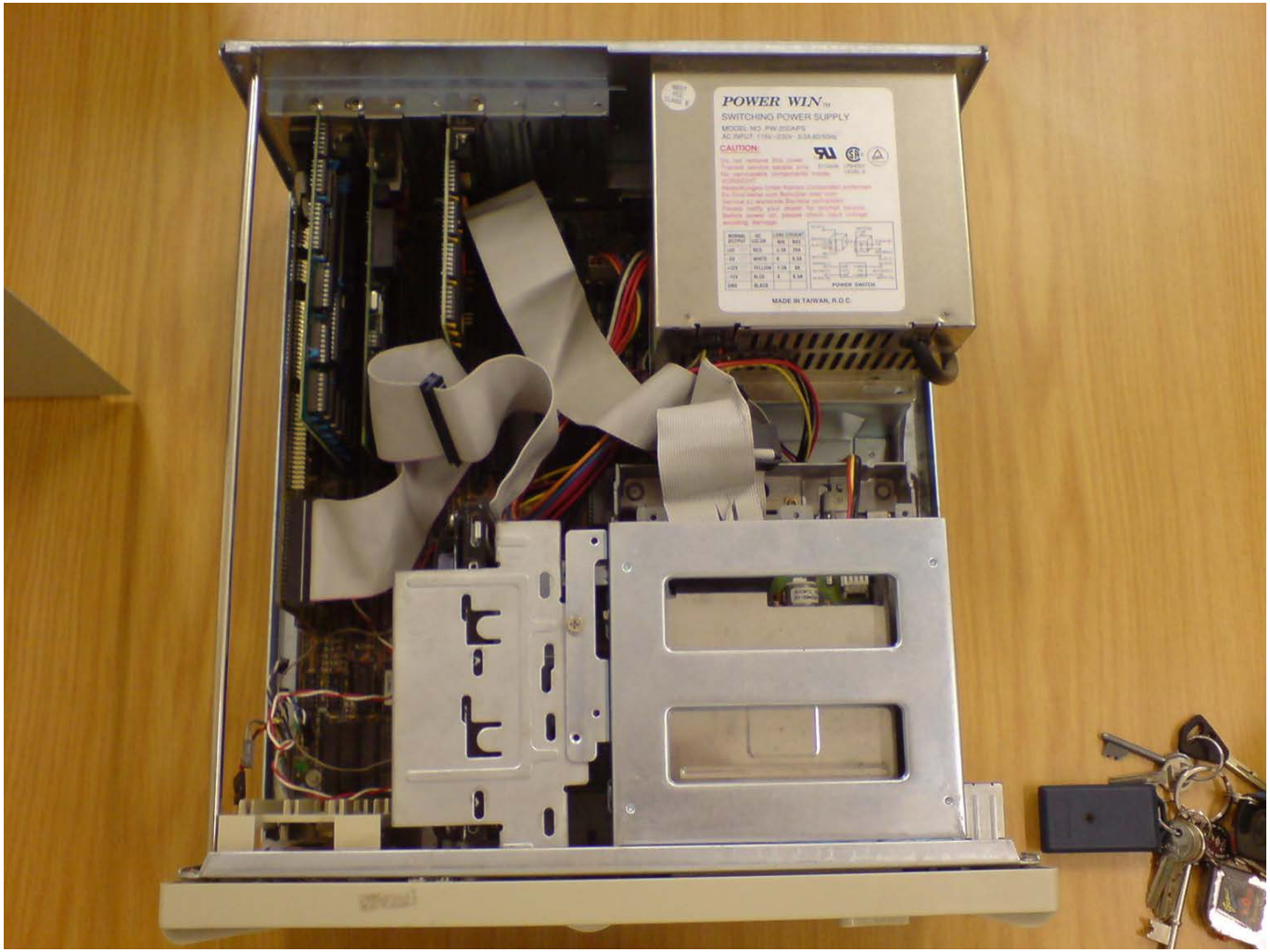
- **Central Processing Unit (CPU)**: microchip that performs core computation. It usually contains the ALU and CU.
- **Memory** (**primary storage**): microchips that store data which can be accessed while computer is switched on.
  - **Random Access Memory (RAM)** is volatile and modifiable.
  - **Read-Only Memory (ROM)** cannot be changed.
- **Hard drive**, **Floppy drive** (**secondary storage**): store data on magnetic discs permanently i.e., the data is not lost when the computer is switched off.
- **Input/Output devices**: transfers data from operator to machine and vice versa.

- **Operating System**: software system that manages resources on computer and executes application programs, e.g., Windows XP, Ubuntu Linux.

Fully Assembled

Cover off

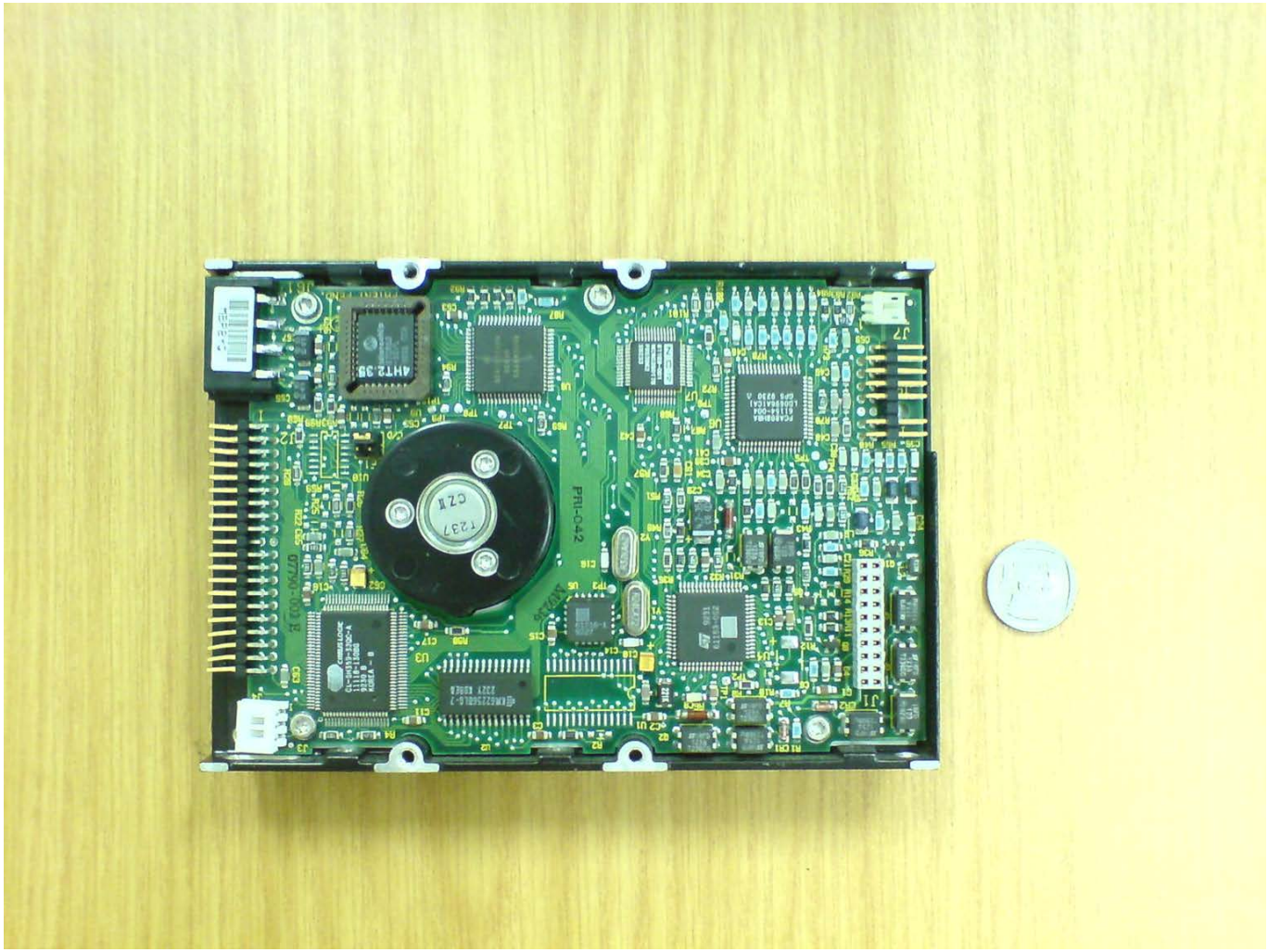
Top view


POWER WIN
SWITCHING POWER SUPPLY
CAUTION:
MADE IN TAIWAN, R.O.C.

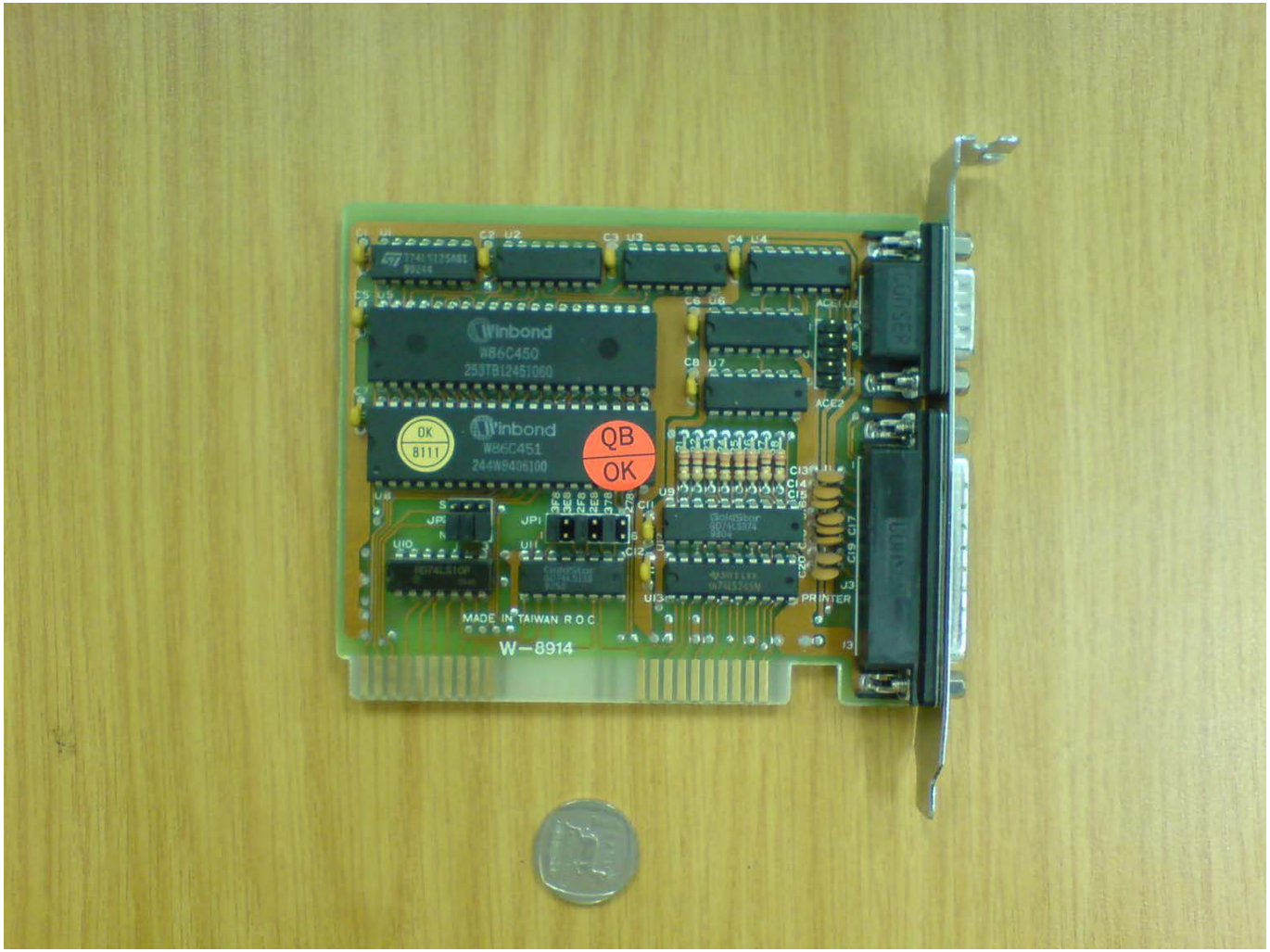
Drive cage

Hard drive – top view

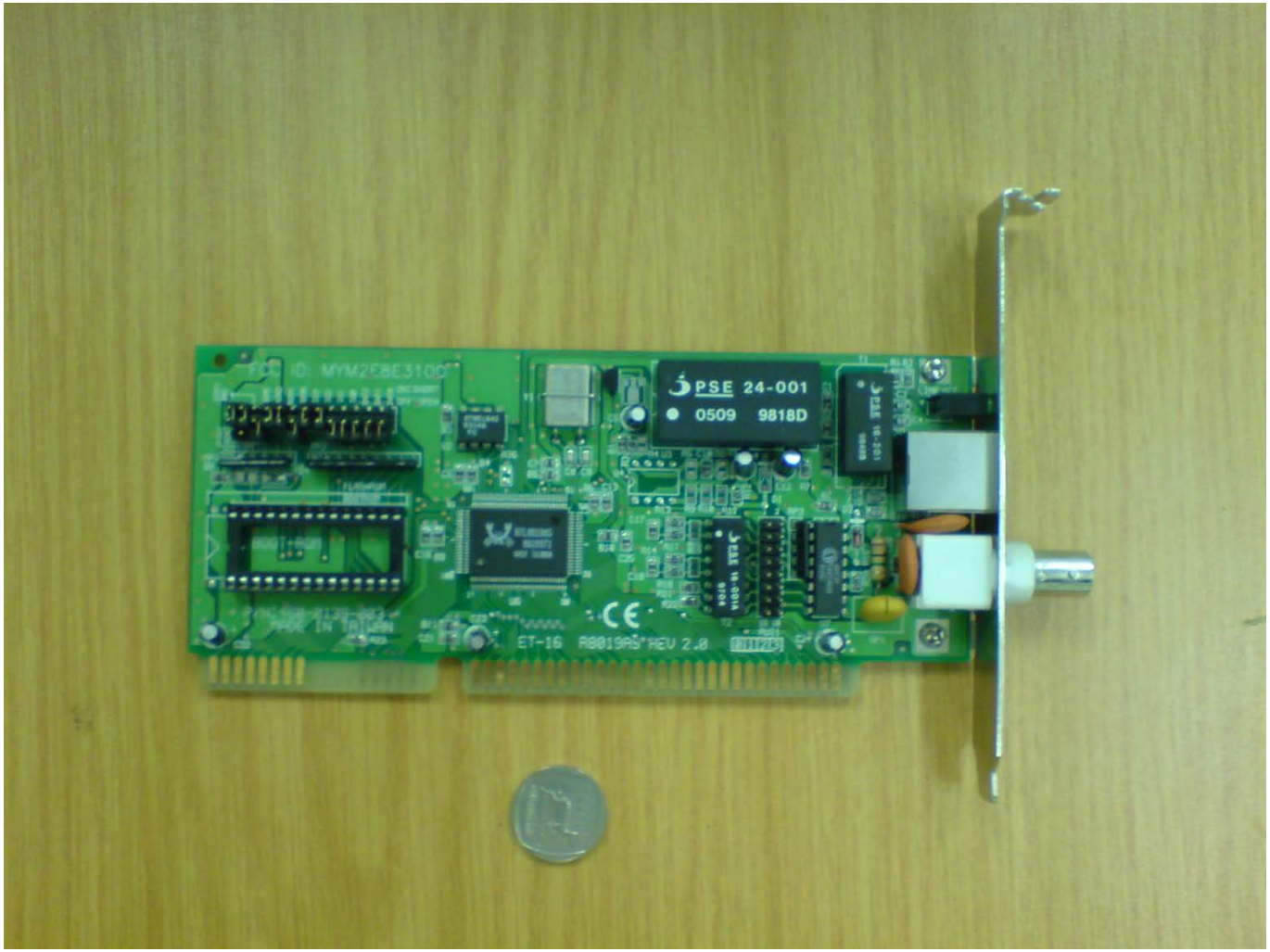
Hard drive – bottom view



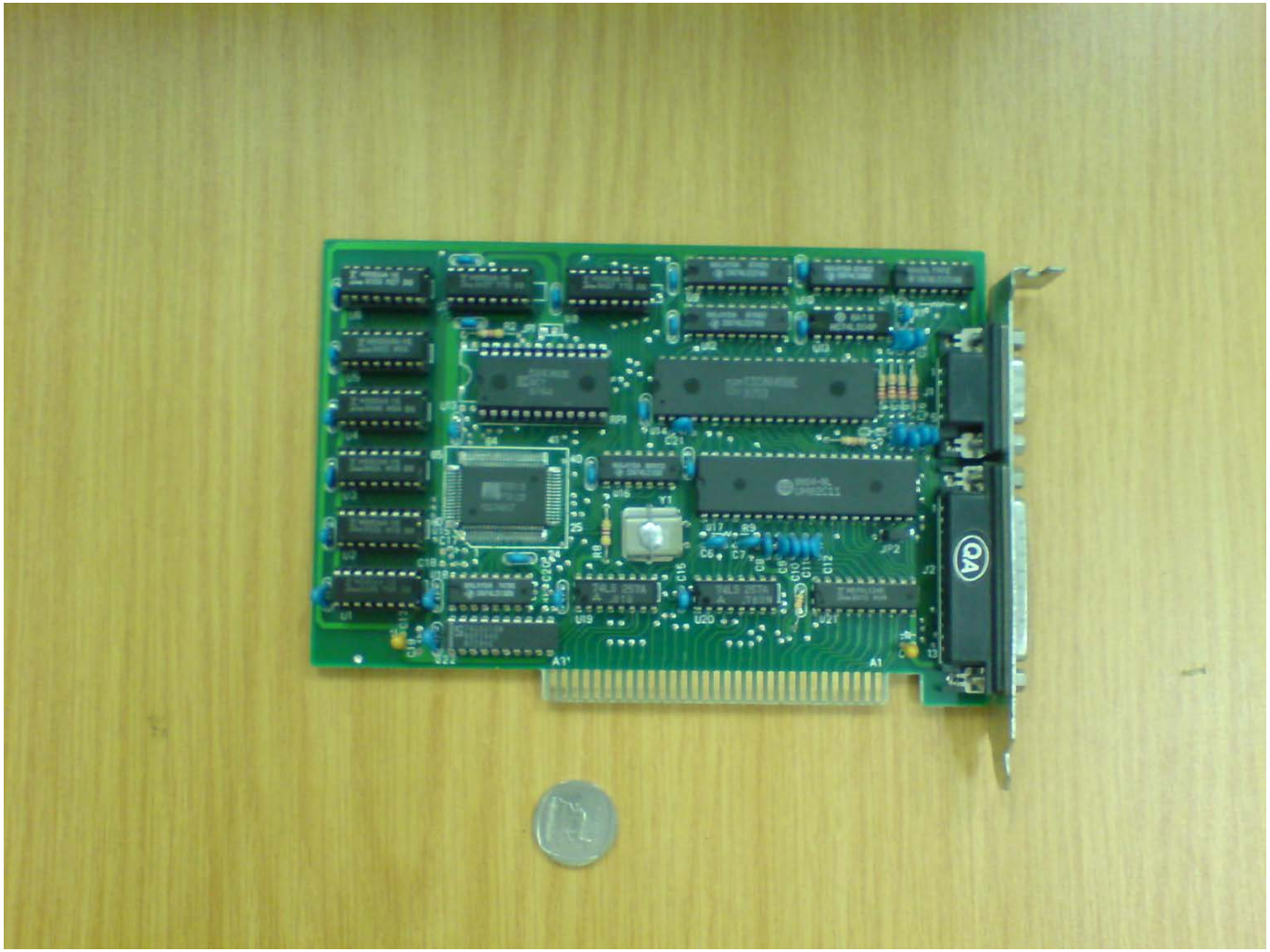
IO Card


Winbond
W86C450
Winbond
W86C451
OK
8111
QB
OK
MADE IN TAIWAN R.O.C
W-8914
PRINTER

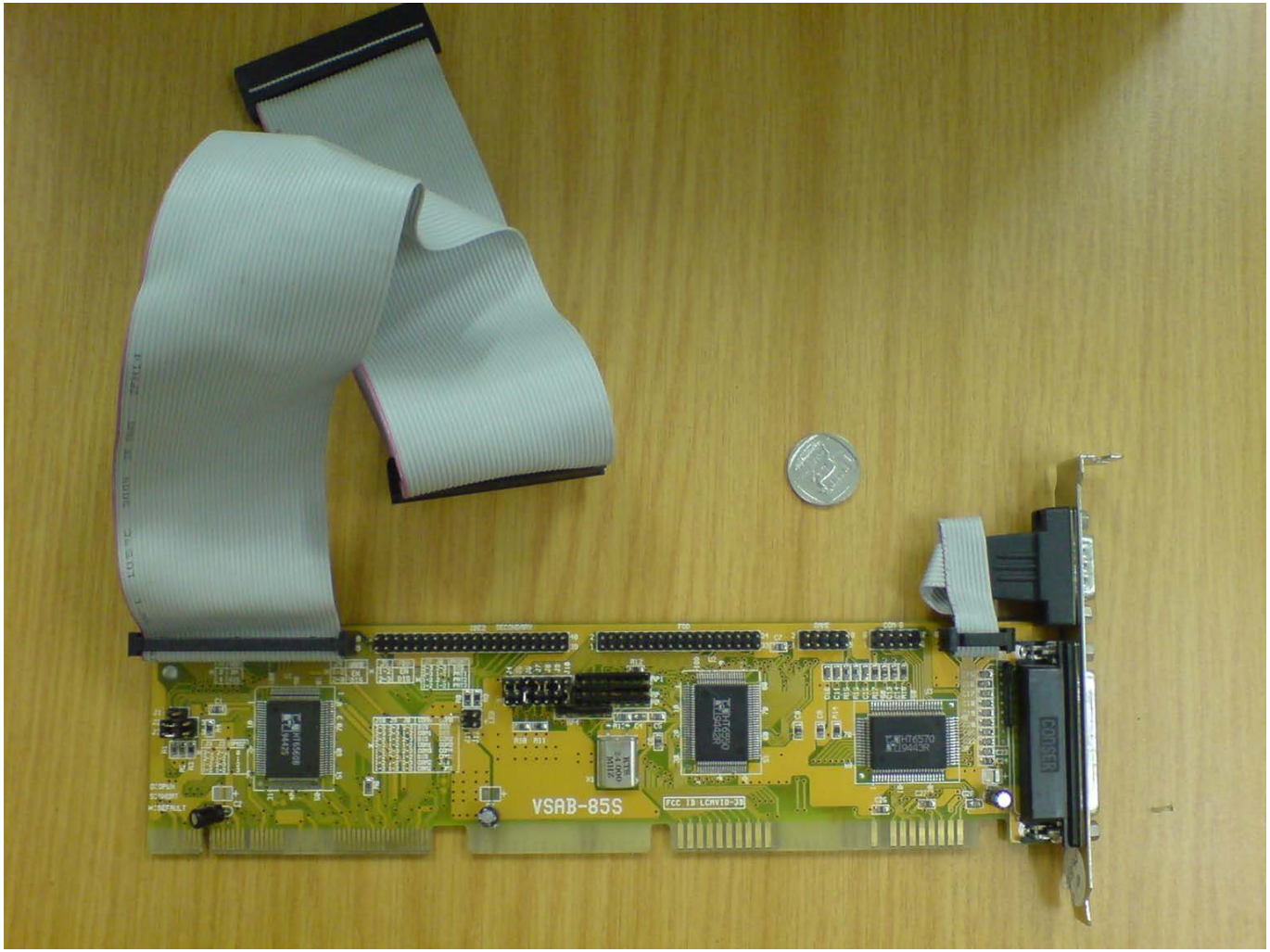
Network Card



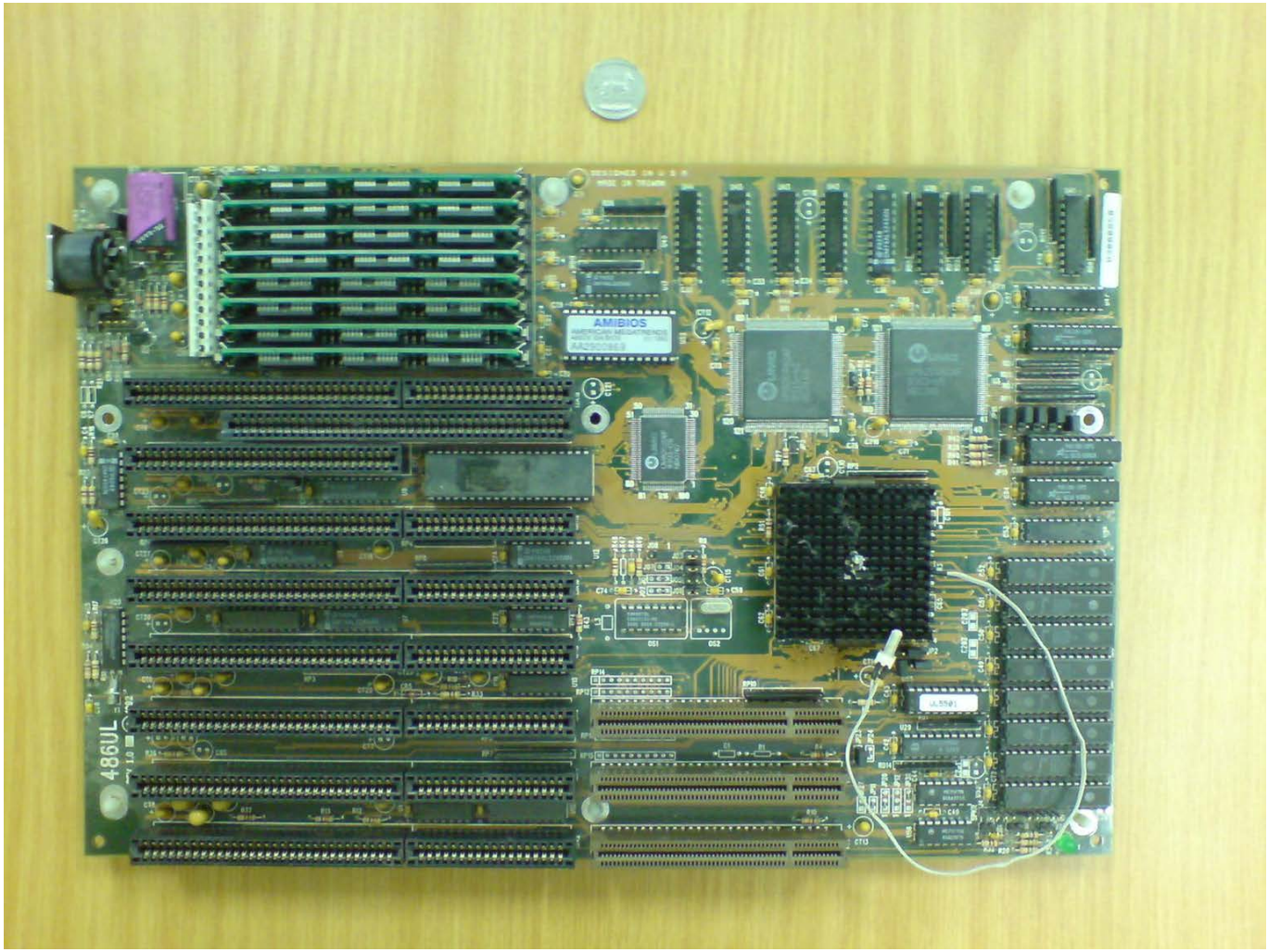
Graphics Card



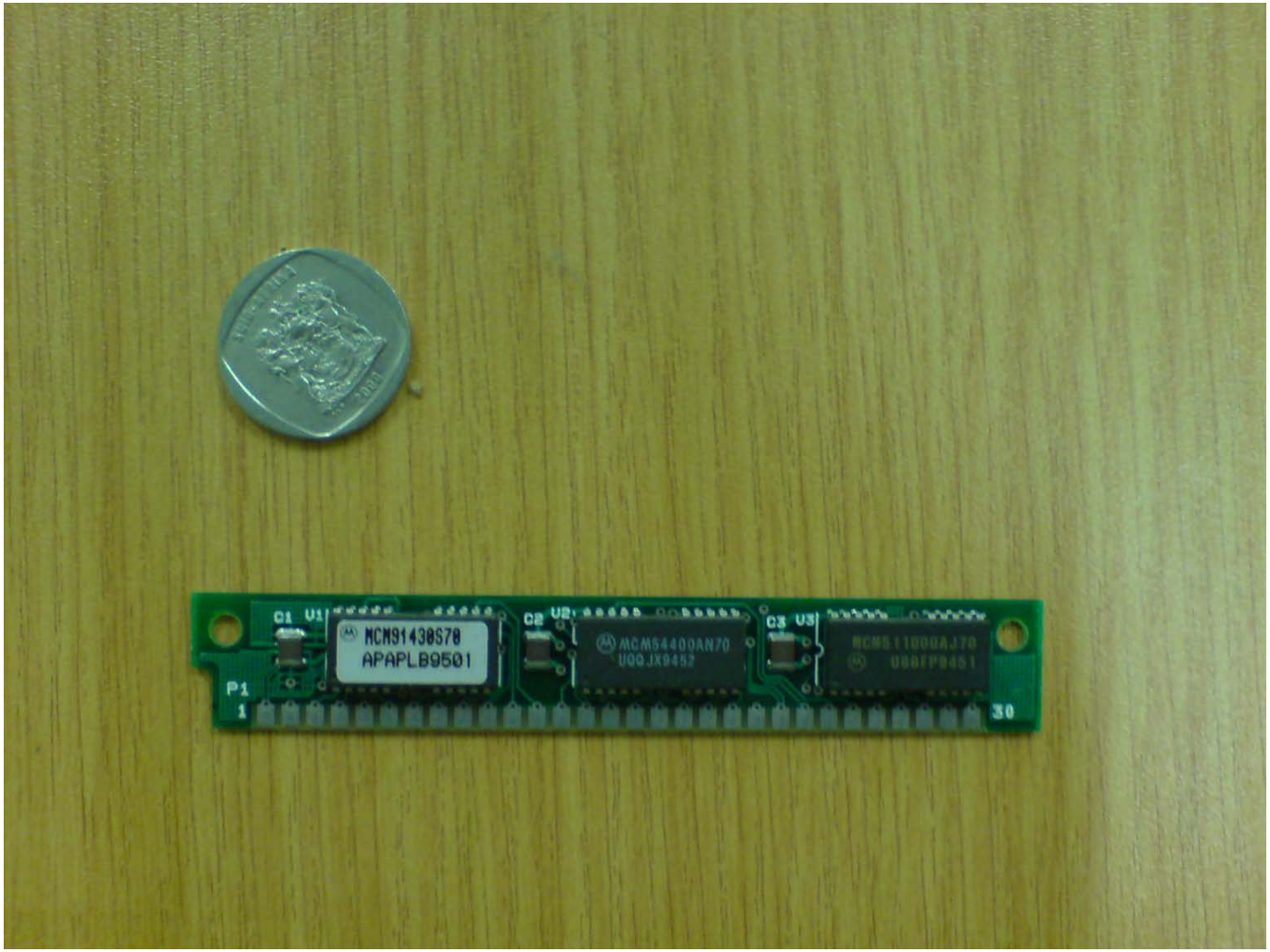
Drive Controller Card



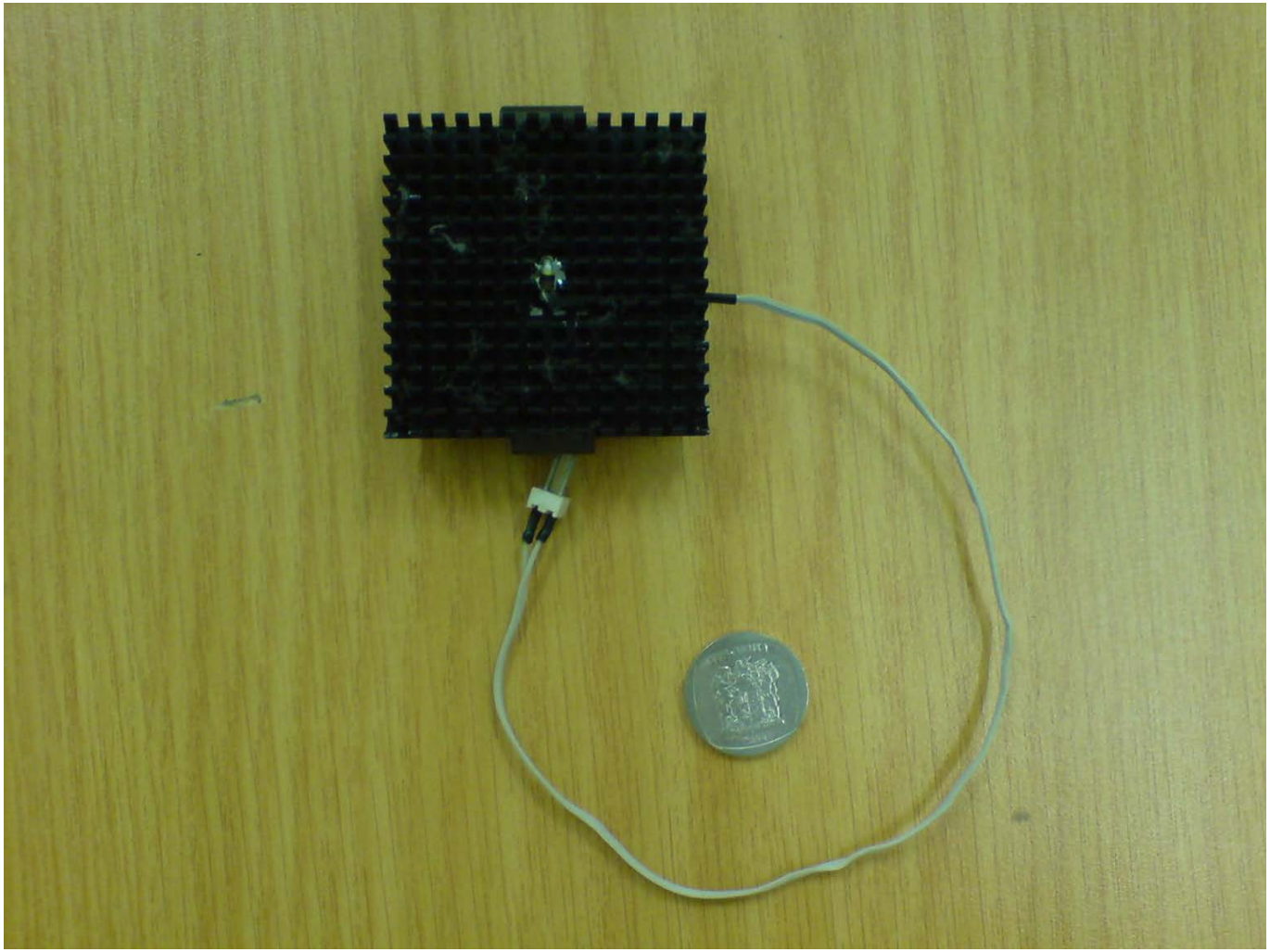
Motherboard



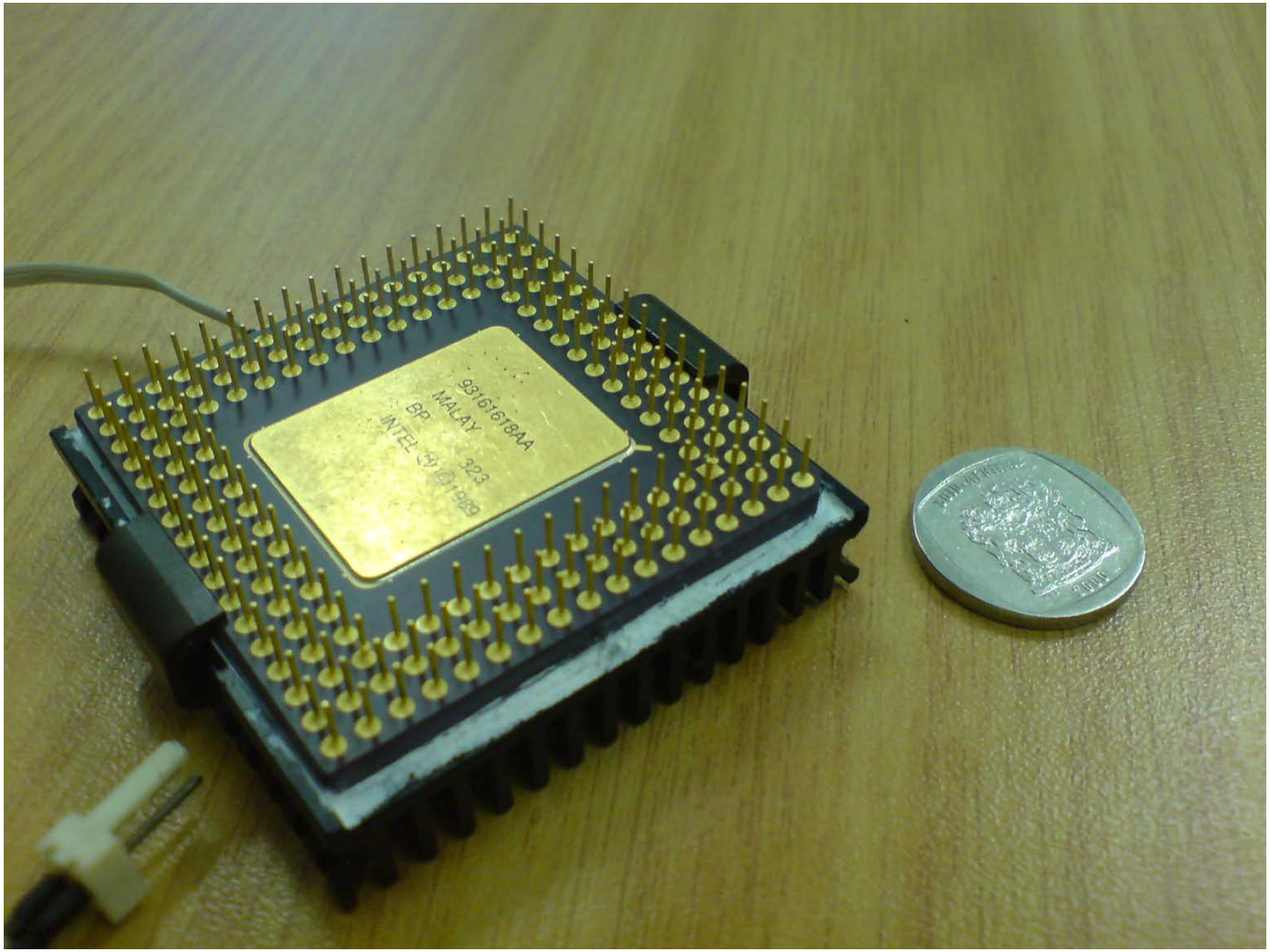
Memory


C1 U1
MCM91430S70
APAPLB9501
C2 U2
MCM54400AN70
C3 U3
P1
1
30

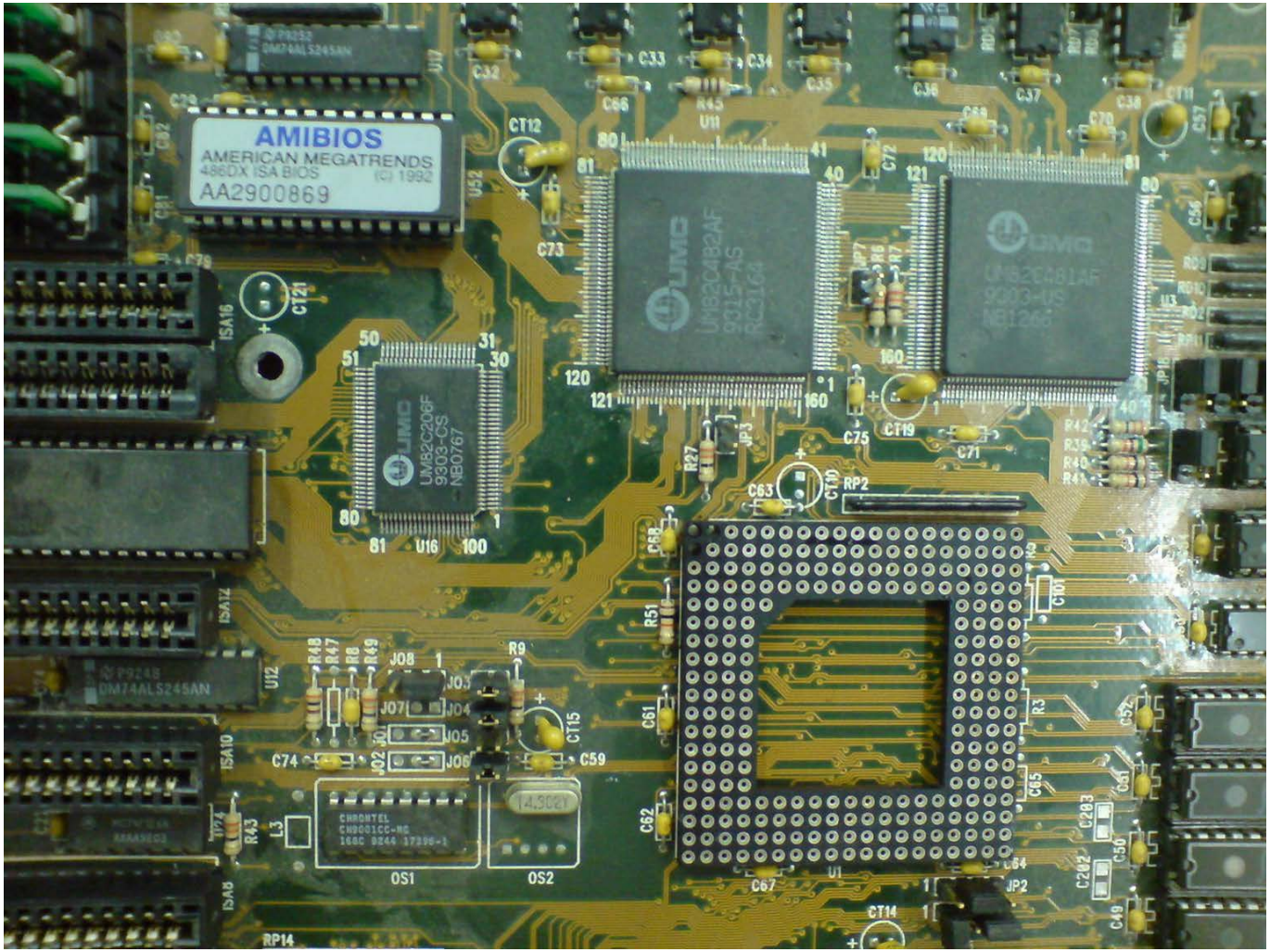
CPU – top view



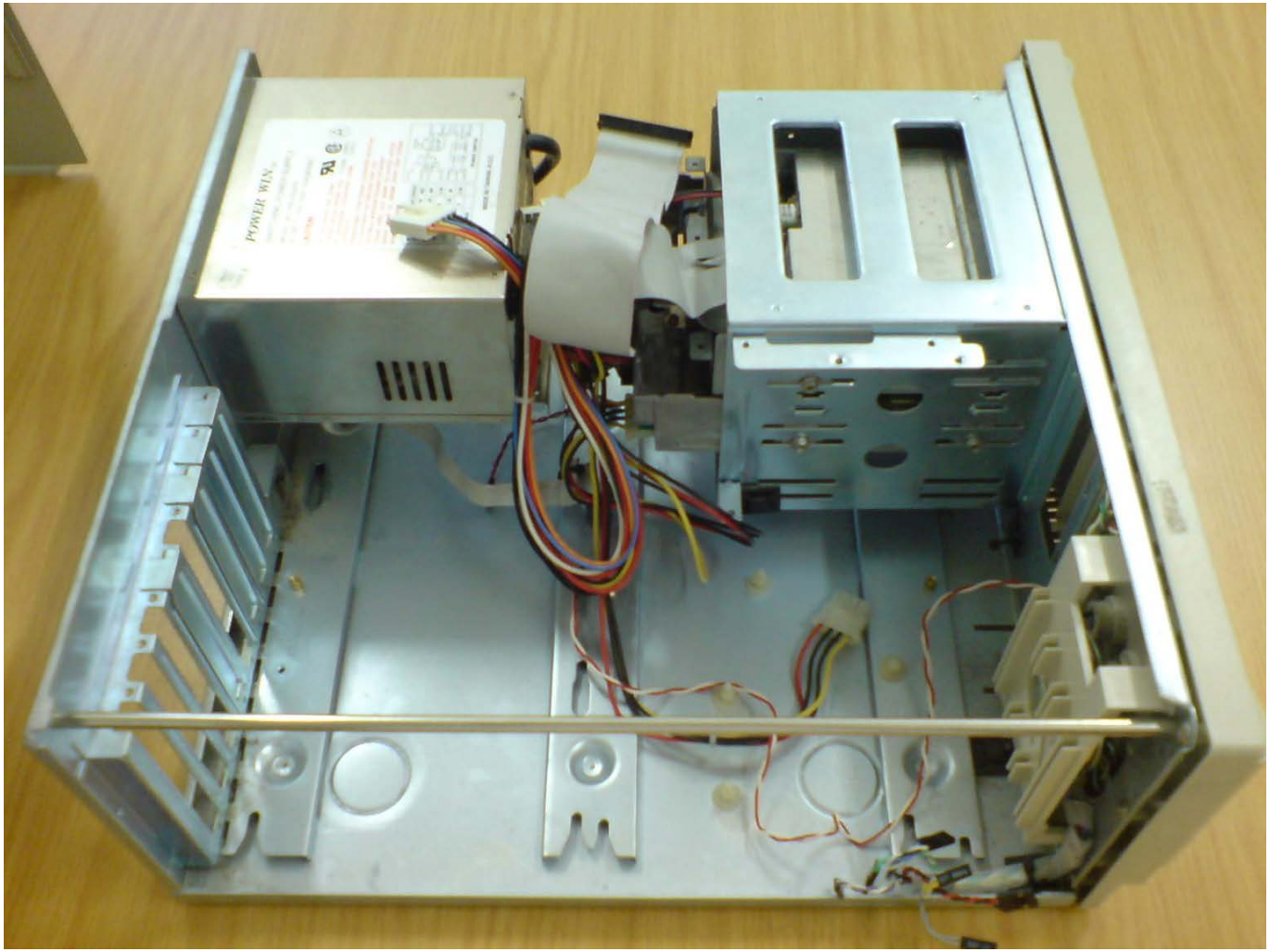
CPU – bottom view



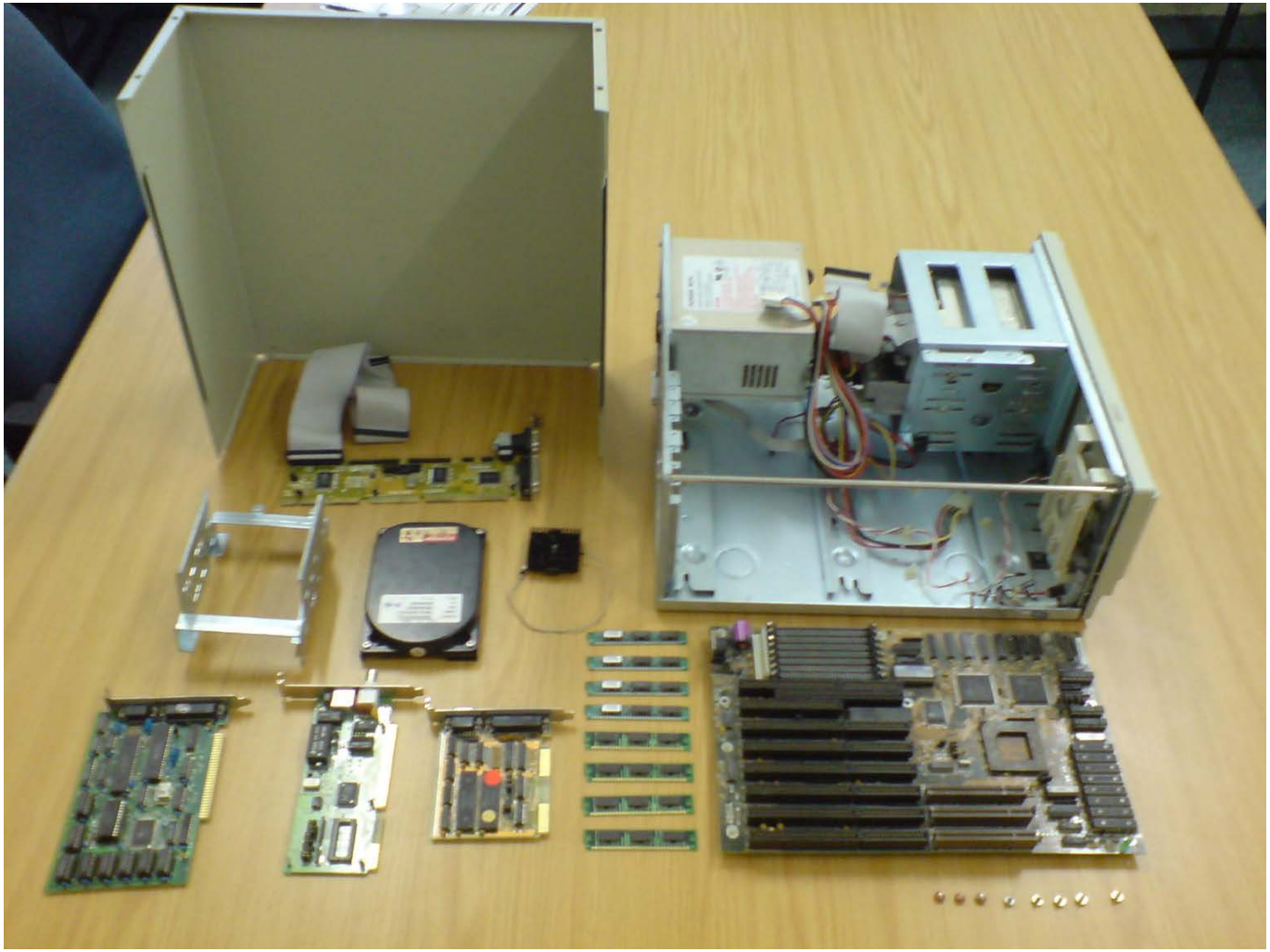
Motherboard - BIOS



Case/Power Supply/Floppy Drives



Disassembled Computer



Fully Assembled