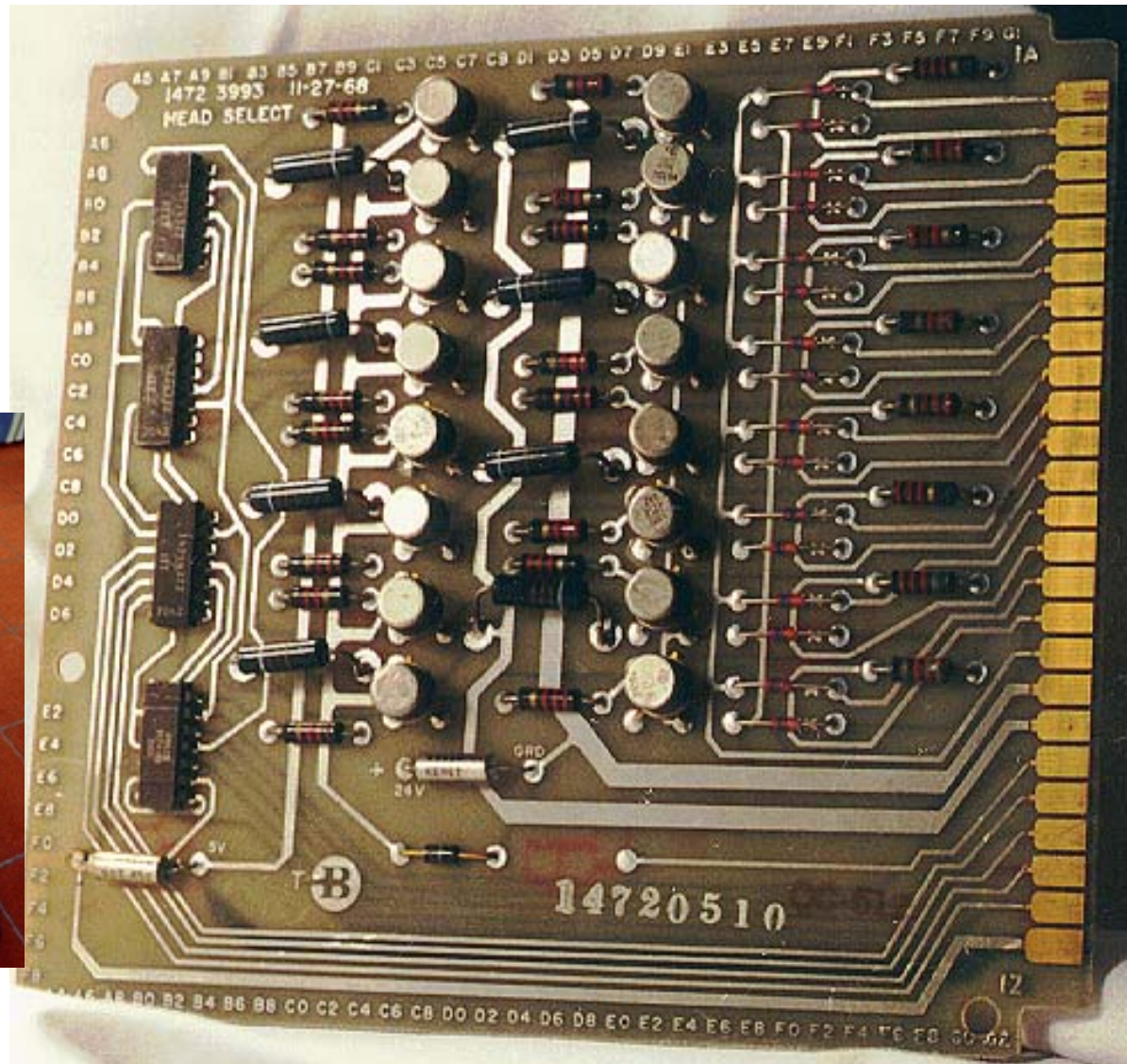
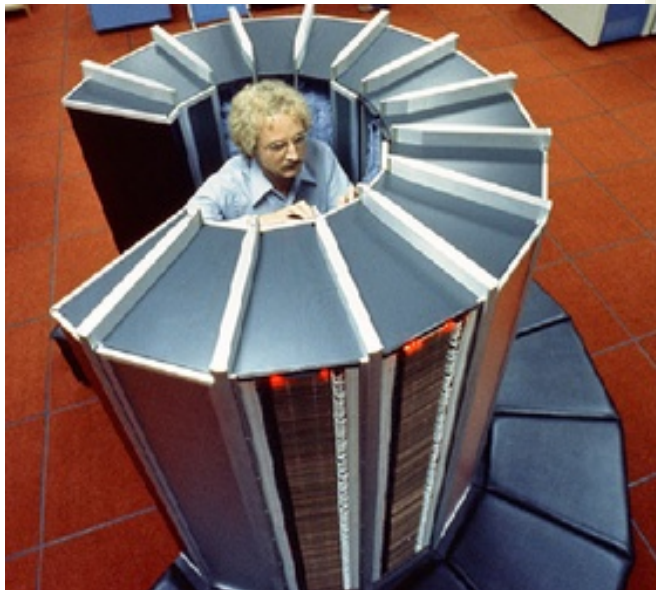


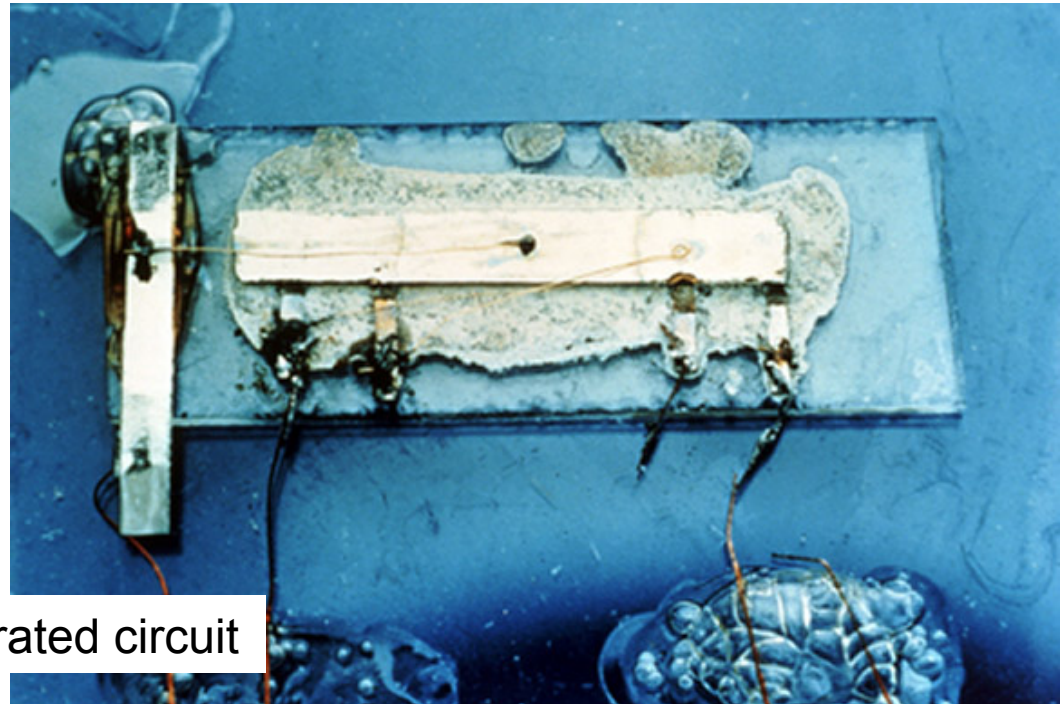
Not Perfect ... Hand Assembly

- Expensive
- Error-prone
- Unreliable
- Size-limited



Big Idea: Solid State Electronics

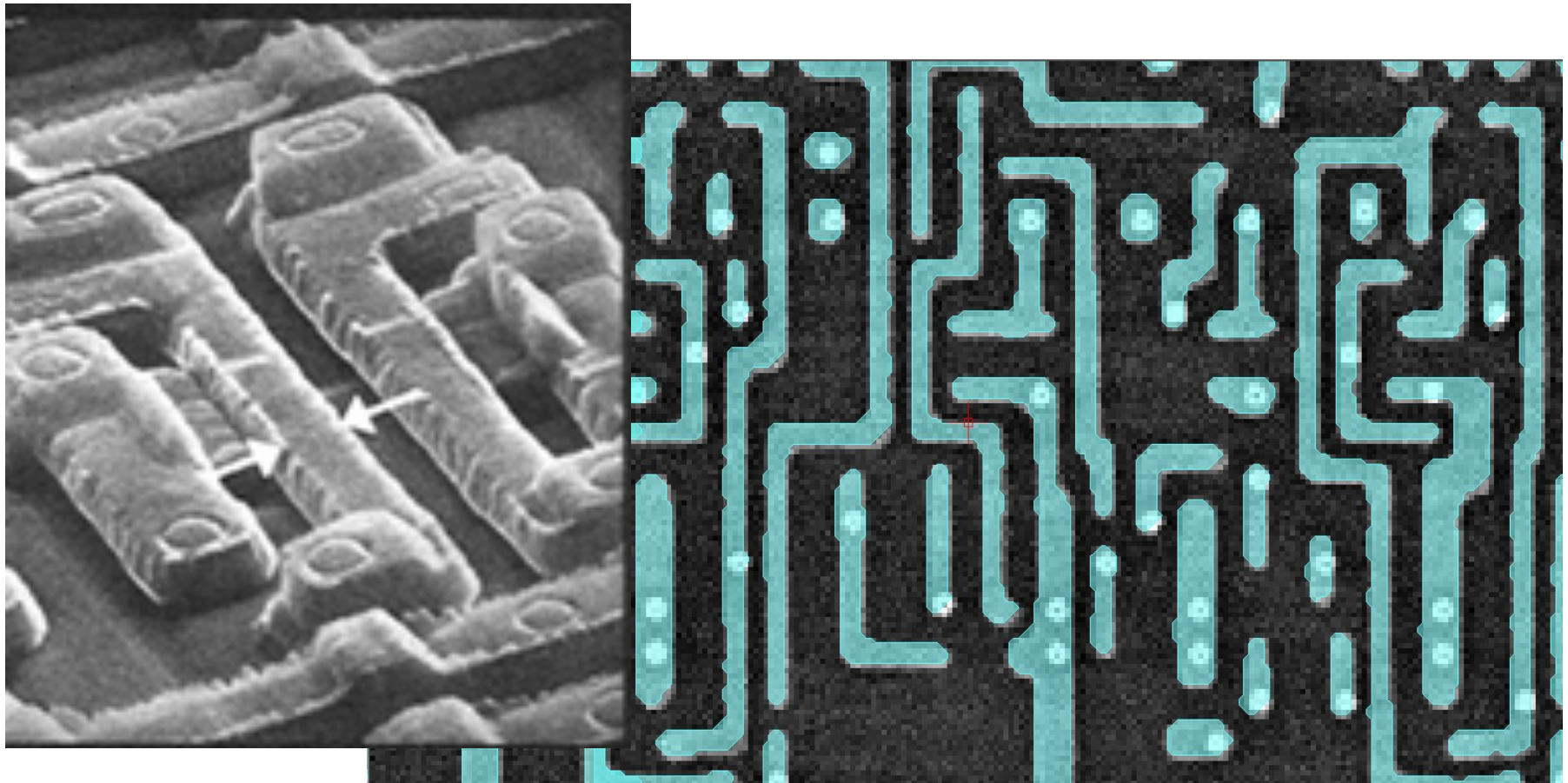
- **Integrated circuits** – transistors + resistors + capacitors – are created together out of similar materials in one long recipe
- Key fabrication process is *photolithography* – the transistors are “printed” on the silicon!



Jack Kilby's First integrated circuit

All Parts Built/Connected At Once

- Parts etched onto silicon in layers; use boron, phosphorus, aluminum, glass, etc.



Field Effect Transistor

- This nMOS transistor implements the idea by exploiting an electro-magnetic field

