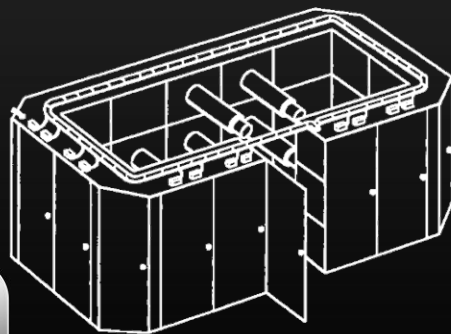


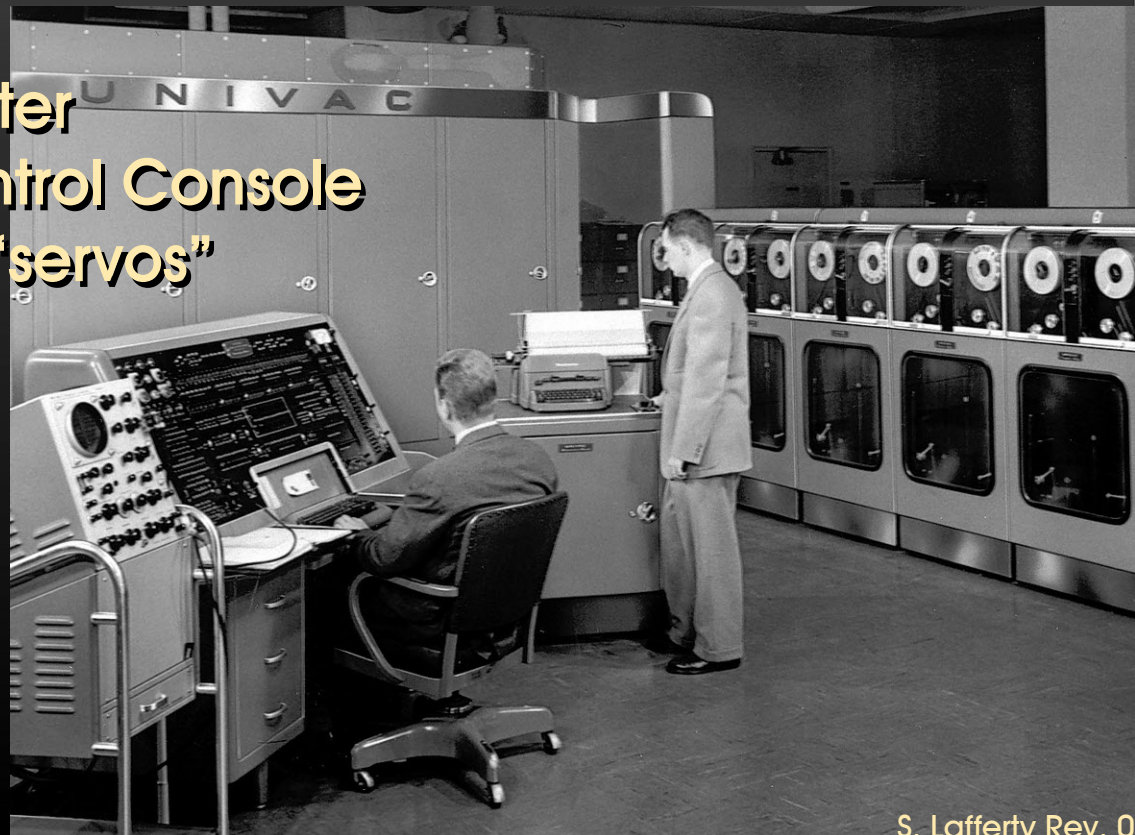
THE UNIVAC SIMULATOR

About the UNIVAC

- Made by Eckert-Mauchly, division of Remington Rand
- The first Commercial Computer in the US – March 1951
- A success at about \$1,000,000 each. 46-units made.
- Main elements:
 - Central Computer
 - Supervisory Control Console
 - 10-tape drives “servos”
 - Printer



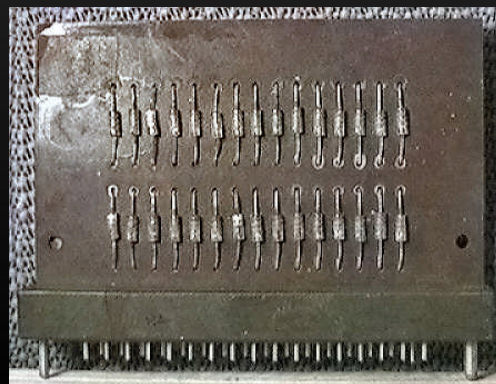
Central Computer
13-racks plus corner units



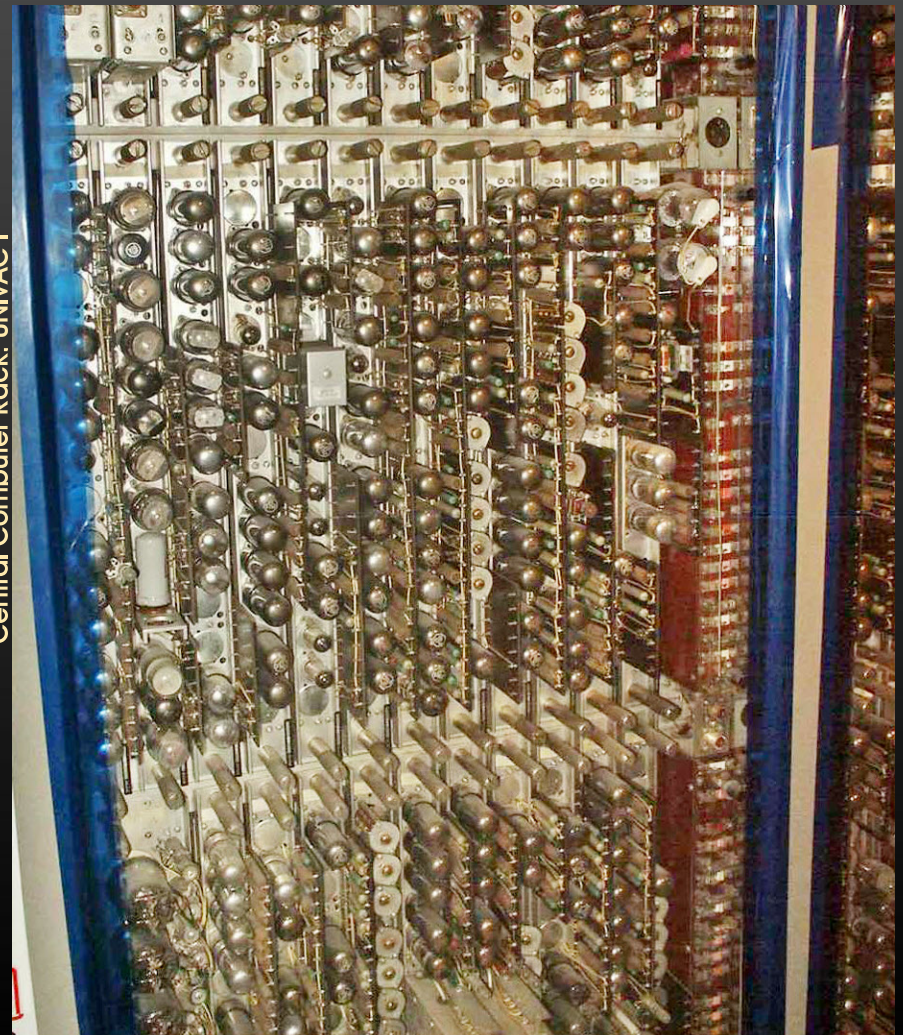
About the UNIVAC (continued)

- 5400 vacuum tubes. Most logic was done with 18,000 “crystal” diodes.
- 36-bit instructions, 1000-words of $220\mu\text{s}$ main memory, 72-bits each. 9KB total.
- Math operations ranged from 500 to $4000\mu\text{s}$. ($\sim 1\text{K op/s}$)

Diode board, UNIVAC file computer



Central Computer Rack, UNIVAC I



Dr. Ingerman's UNIVAC Simulator

- Peter Ingerman programmed UNIVAC I, 1957-1963.
- Supports UNIVAC I, II, tape drives, SCC functions, assembler, memory dumps, tracing, memory viewer.
- Free download but online help and examples \$35.
- Quick factorial Demo

UNIVAC I simulator

rCC: [000000000000] rSR: [000000000000]

rCR: [000000000000] rF: [000000000000] rL: [000000000000] rA: [000000000000] rX: [000000000000]

rl cleared rY cleared rV cleared

Running

Overflow Breakpoint stop 50 stop Q/T stop Invalid operand Invalid address Invalid opcode Bad SR parity

Q and T: Clear 0 1 2 3 4 5 6 7 8 9 All

Load Servo Servo Power

Servo: - 1 2 3 4 5 6 7 8 9

Read Names: Go to [] No go [] UNIVAC I with I instruction UNIVAC I with Overdrive

Breakpoint: Off On 50 break: Skip Normal Stop Special functions

Auxiliary Functions: Console printer Fill Off-line functions

Location: 000 Contents: 500053500054

Store SCICR i r c t s b n

Continuous One Step One Instruction Stop Clear SR Clear CC Clear Registers Clear Memory Power off

Console Keyboard I...

Type value from keyboard, then click or press Enter

000000000000

i r c t s b n

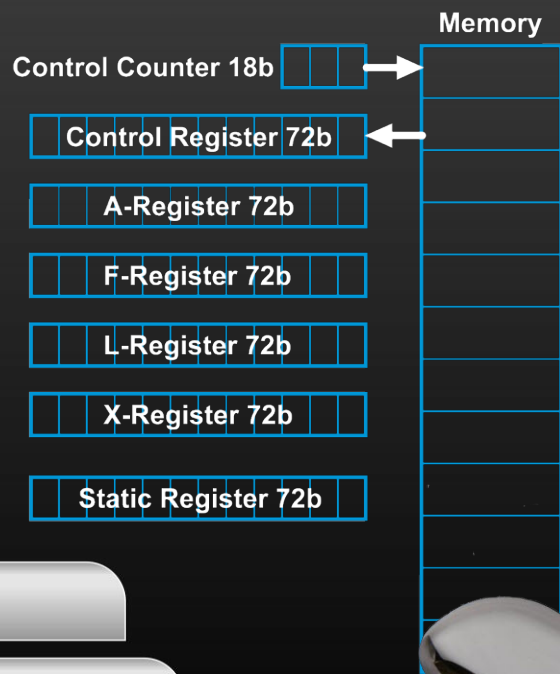
Continue in single-step

of numbers between 0 and 13
Written by
Peter Zilahy Ingerman
as a demonstration on 2001 May 1
Please enter number:

Breakpoint stop Stop code Illegal character Power CD Start Clear Hide

UNIVAC Memory and CPU

- Mercury delay line memory. Acoustic waves at 10MHz.
- Decimal arithmetic and number storage.
- Used a 6-bit binary code (XS-3) for chars and digits.
- Numbers stored in 72-bit (12x6-bits) words. 11-digits. plus sign. 12-characters of alpha storage per word.



UNIVAC had seven of these memory tanks. Each had 18 mercury-filled rods, serving as acoustic delay lines. Data was recirculated.

Instruction Set

- ADD instruction is "Am":
 $(\text{mem}) + rA \Rightarrow rA$

- Assembler language:

A [label] e.g. A

- Encoded as:

A [0] [0] 1 2 3

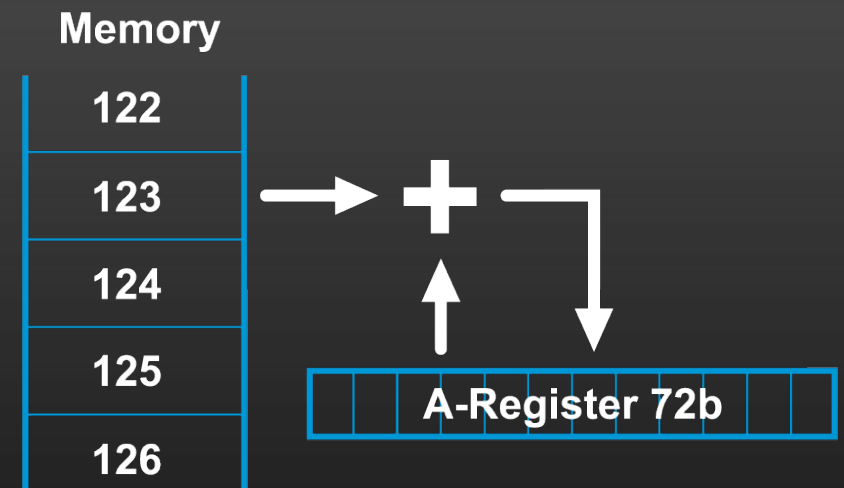
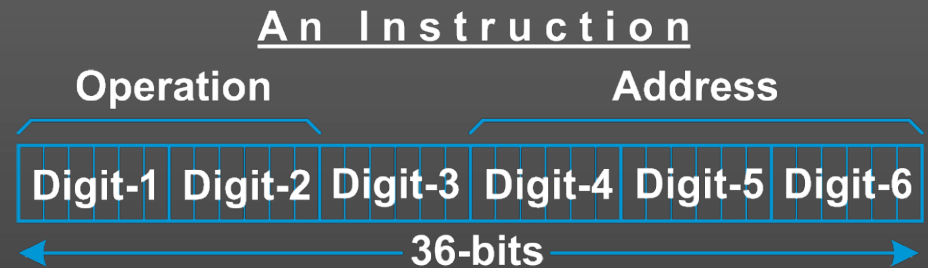
- Other instructions:

- Tm – "Jump if greater"

If $rA > rL$ jump to m

- 1n – "Read 60wd tape block from servo n to buffer."

- 3m – "Transfer buffer to m."



———— 63 total instructions ————

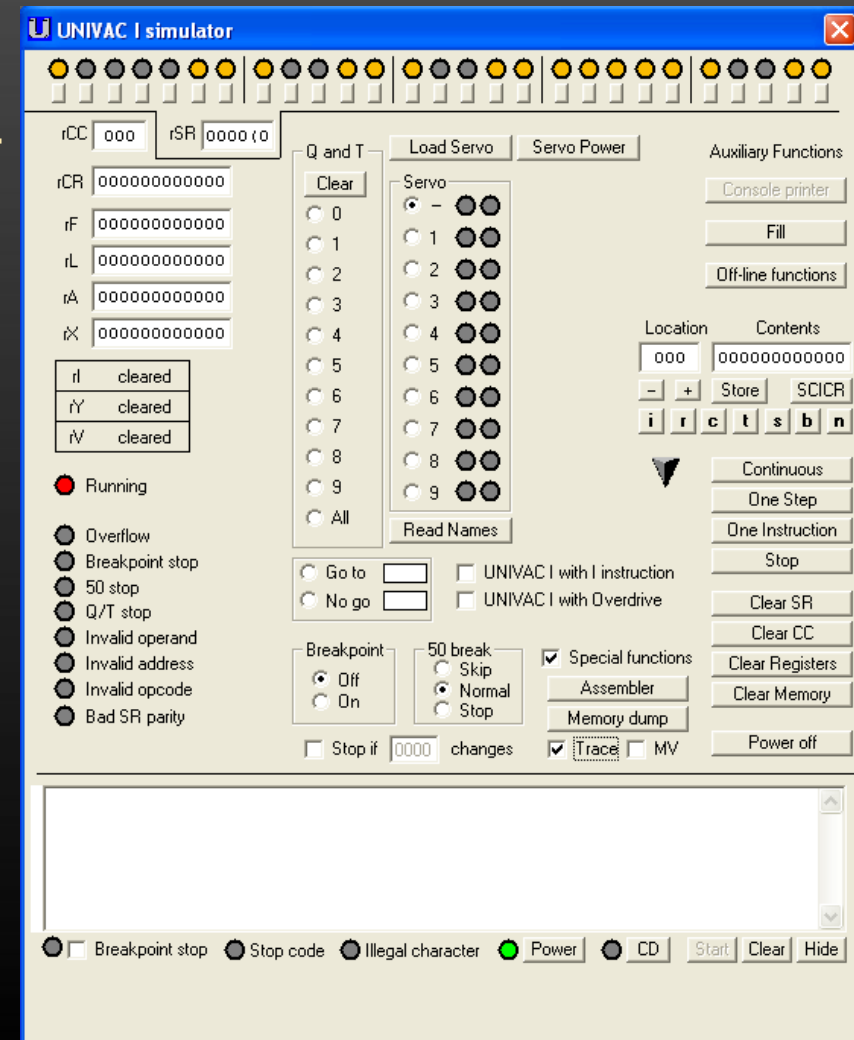
Simulator Features and Demo

Original:

- Jamb instruction – SCICR
- Servo power – clear servo
- Select default servo
- **Debug** – Single stepping, Q&T stop with override, Breakpoint stop “,” instruction/NOP, “50” - print with switchable skip/stop, Fill - print memory location CC

Simulator only:

- Load servo
- UNIVAC II and new instrs
- **Special Functions** – Assembler, Memory viewer (MV), Memory dump
- **Readouts!**



Simulator Issues

- You must click on Servo Power after mounting a tape. This is not a power switch but cycles the power to clear interlocks.
- I have not been able to run a second program without restarting the simulator from scratch.
- Clicking the [r] button on the console input window did not work. You need to press <Enter> on the PC keyboard.
- Apparently, if memory has not been loaded with data (has all zeros), a mem dump file will have zero bytes. But you can see it with MV – mem viewer in spcl fcns.
- Documentation Issues:
 - Text has “Uniprinter button” whereas the button is labeled Console Printer.
 - “Select servo “-“ by clicking the selection next to that.” Should be the “option button next to that.”
 - “to move this instruction rCR” should read “...to rCR”.
 - “or just click on “Run” apparently means “...on Continuous”.
 - “repeatedly click on the “Single Step button” may mean “... on the One Step button” or “...on the One Instruction button”.

Cover of Radio
and Television
news, Jan 1957

