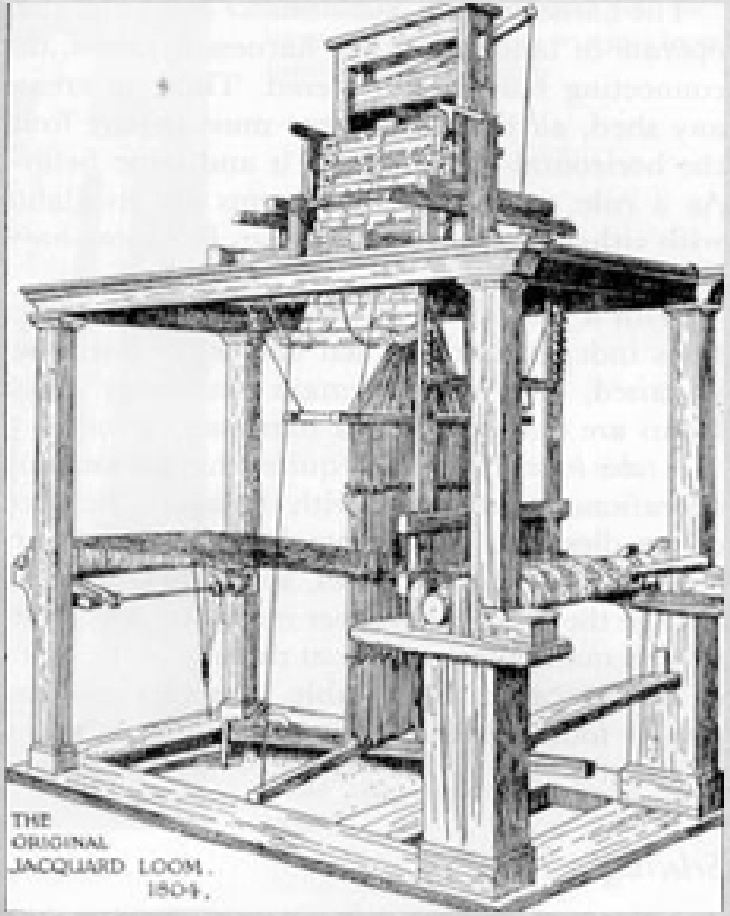
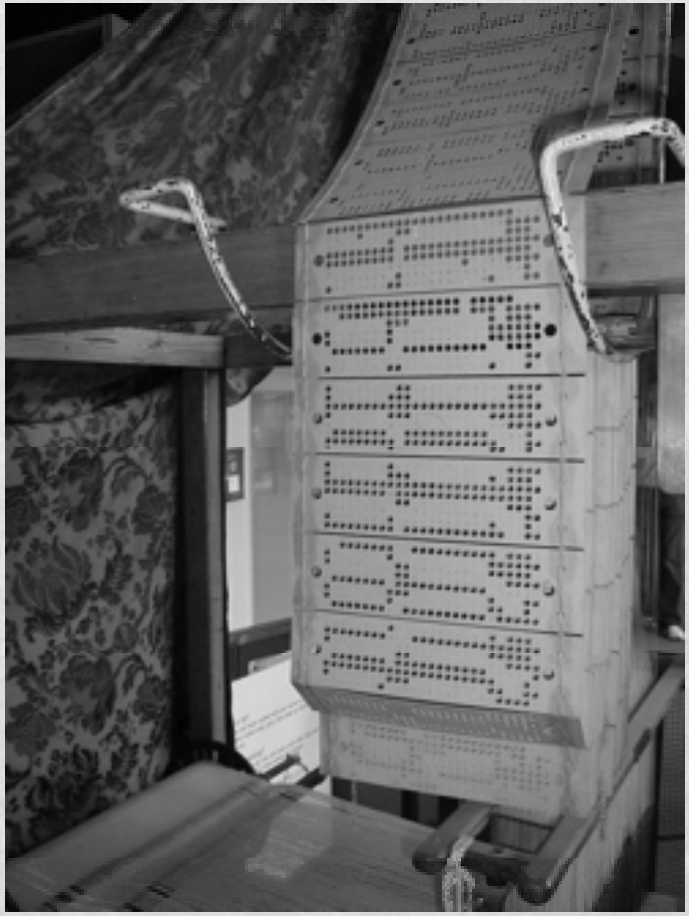
The Evolution of Information Technology: Origins

Ian King, Sr. Vintage Systems Engineer
Living Computer Museum
Vulcan, Inc.

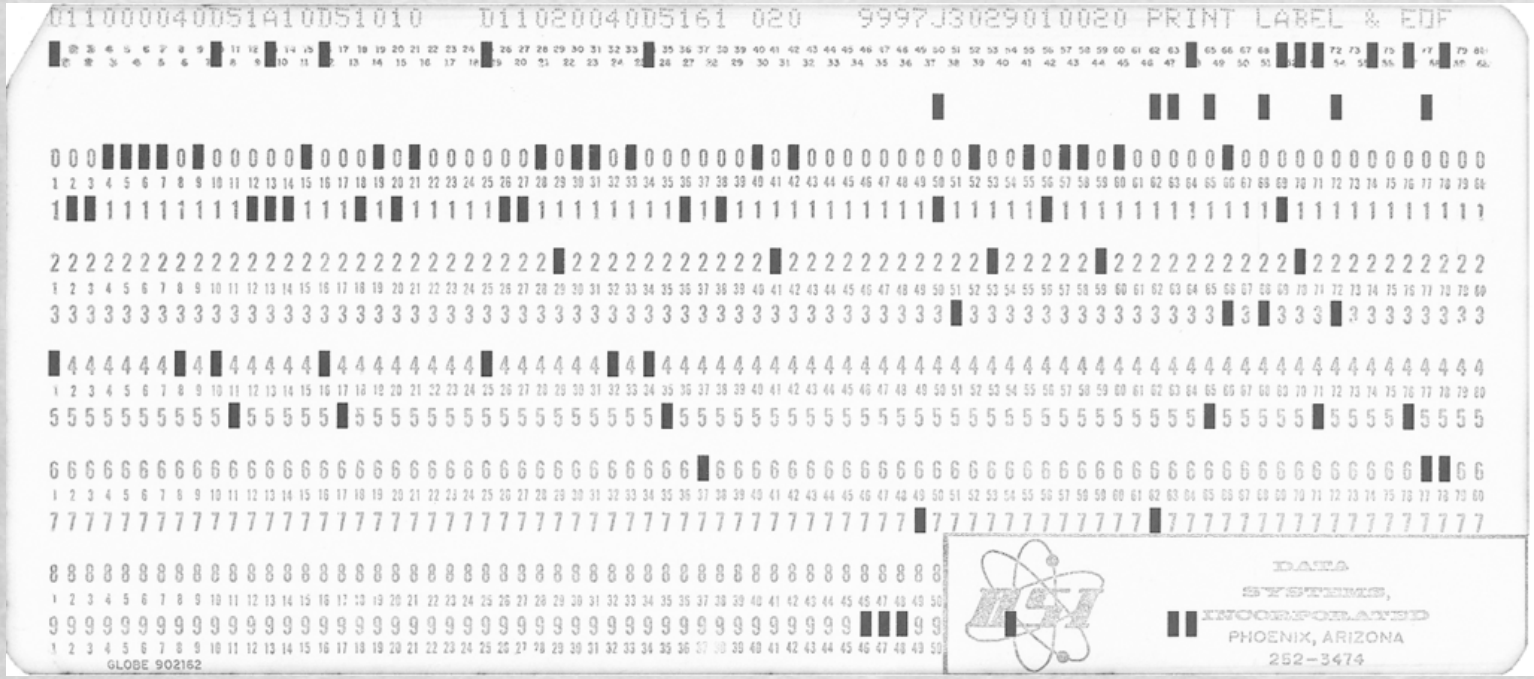
Before the beginning: process automation



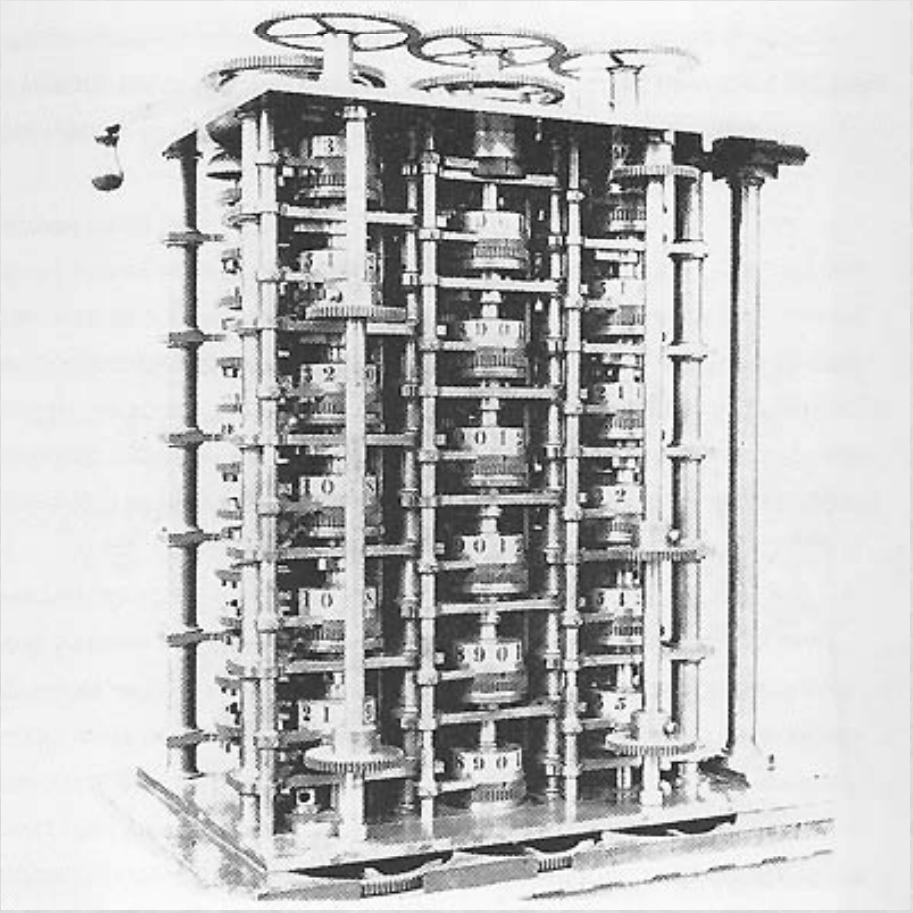


Before the beginning: tabulation

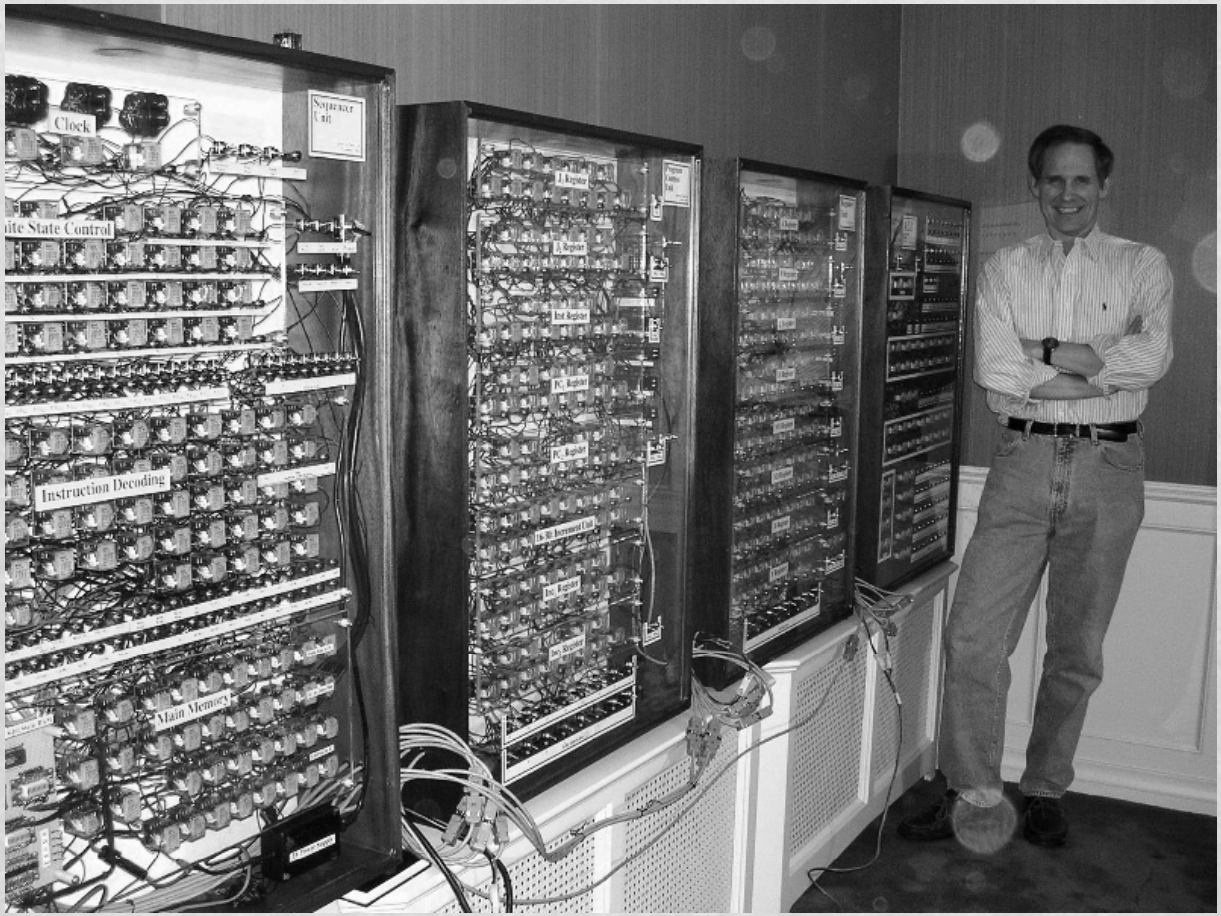
Before the beginning: tabulation



Before the beginning: automated calculation

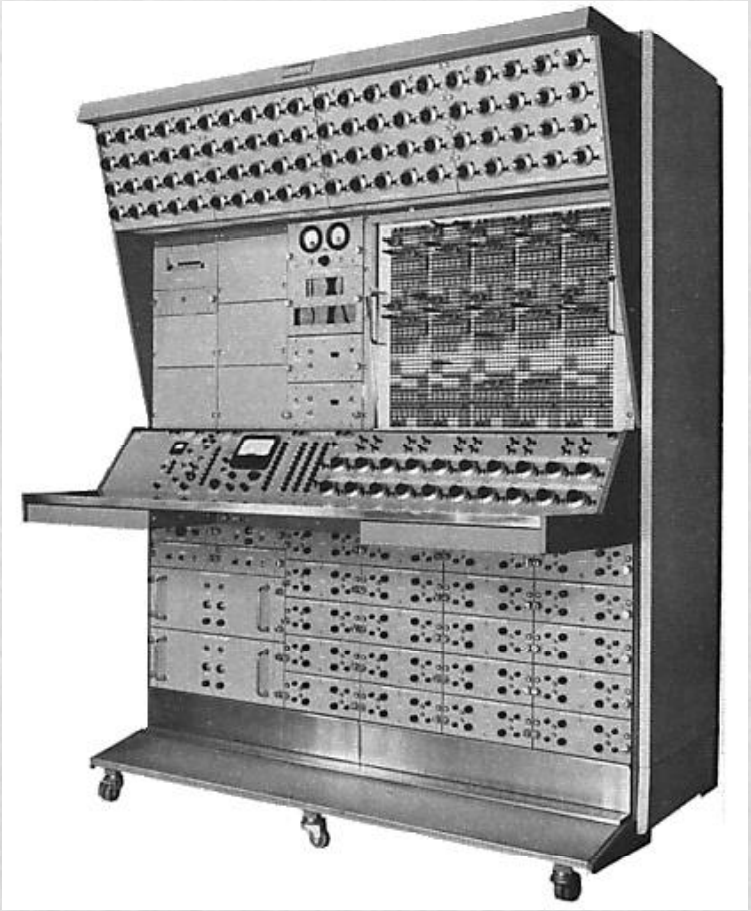


~~Electronic~~ digital computer

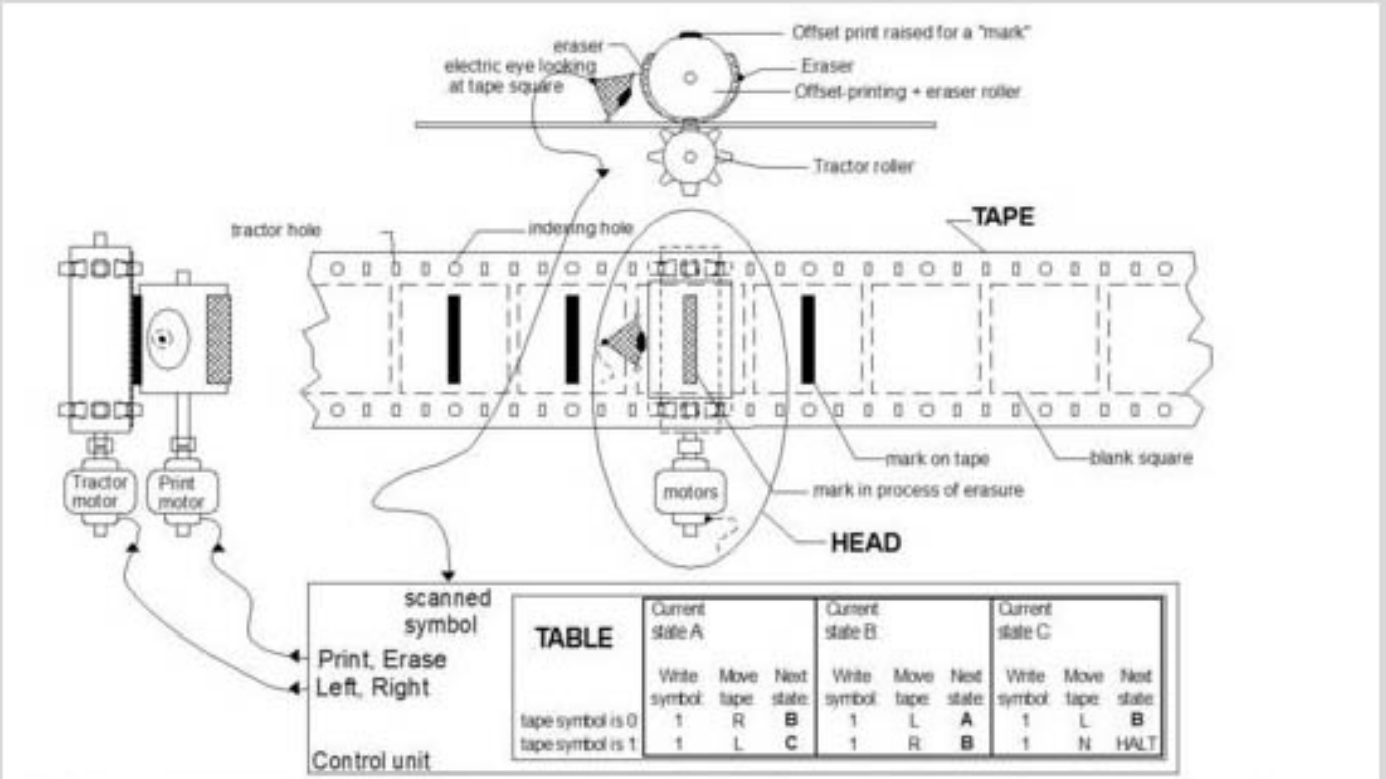


Electronic digital computer

Electronic ~~digital~~ computer



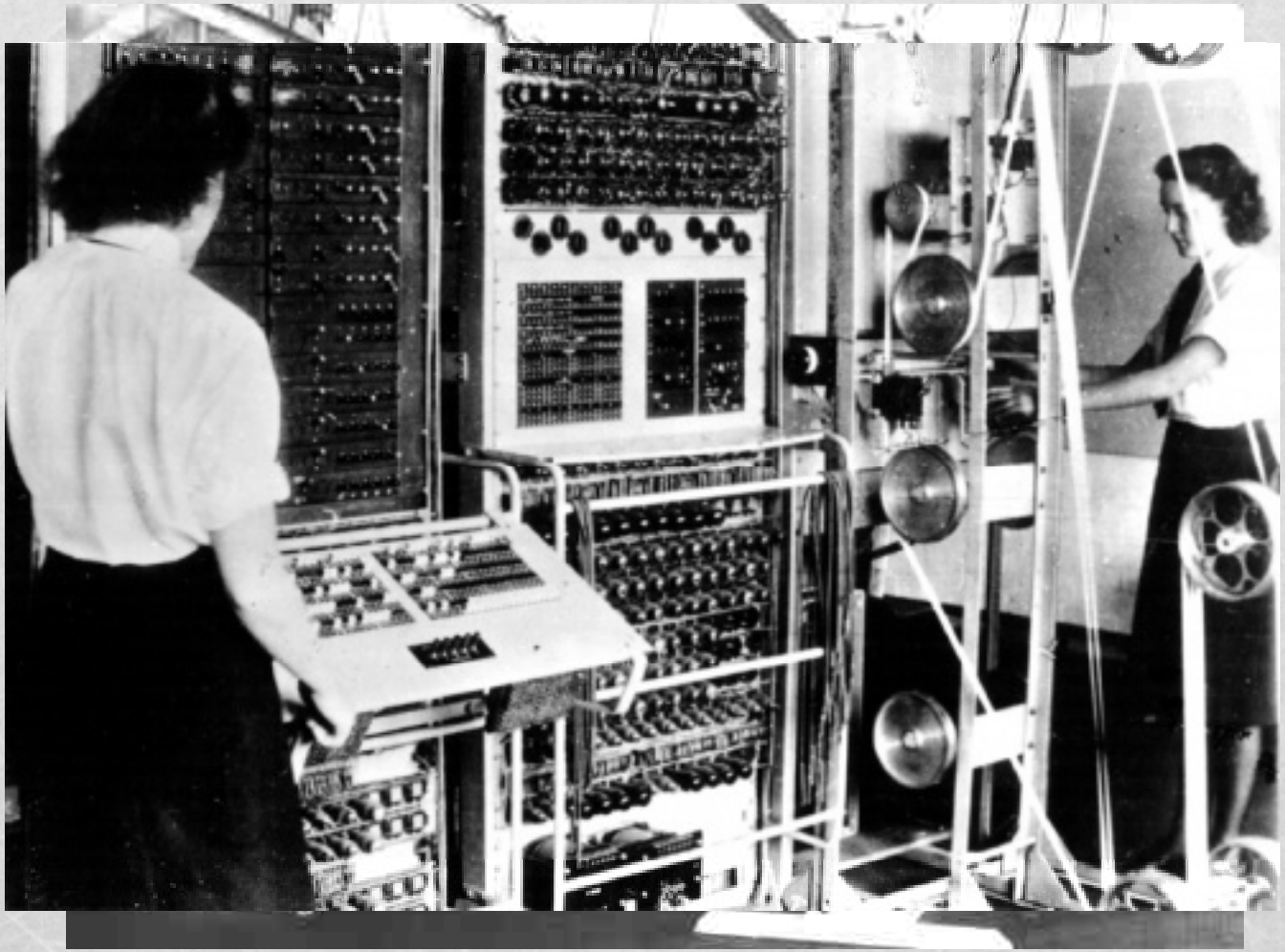
Electronic digital computer



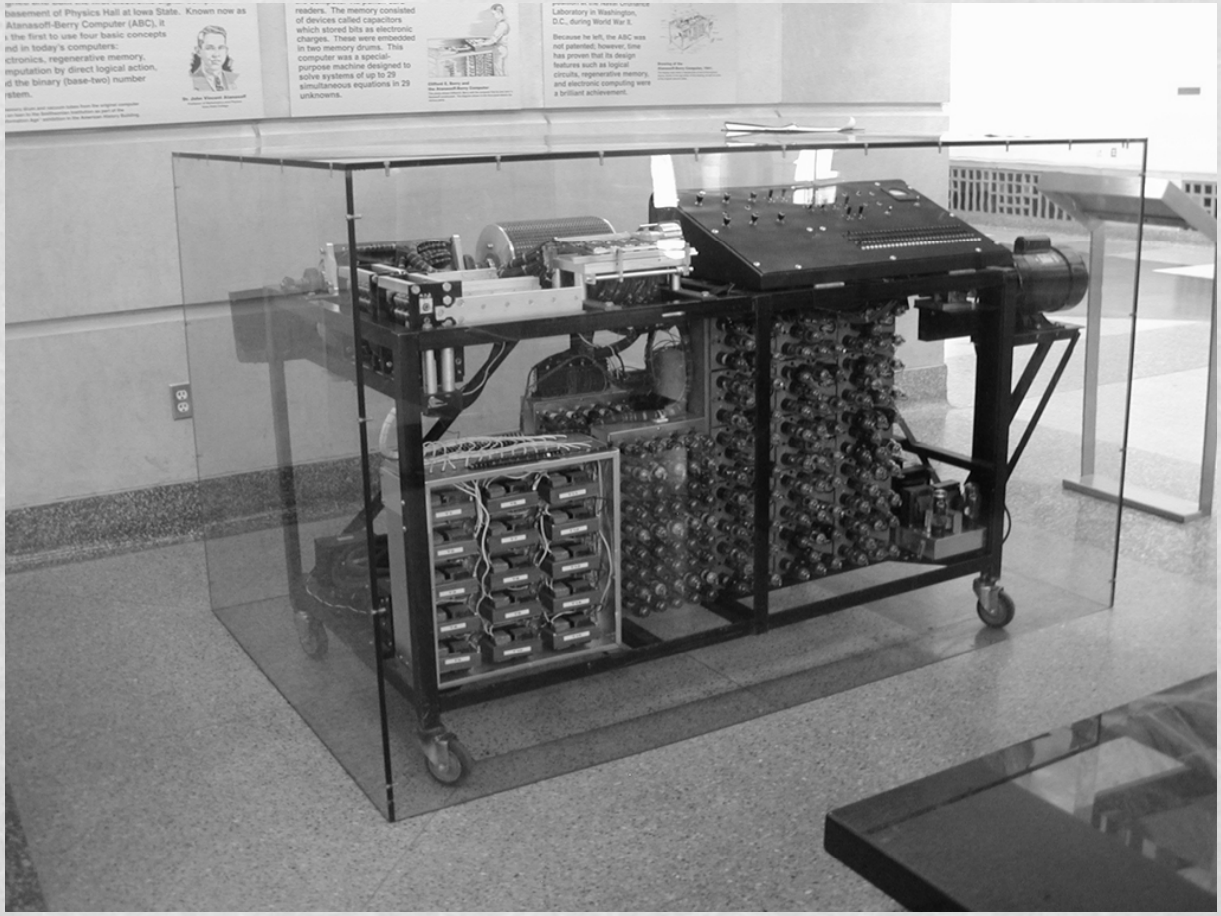
A fanciful mechanical Turing machine's TAPE and HEAD. The TABLE instructions might be on another "read only" tape, or perhaps on punch-cards. Usually a "finite state machine" is the model for the TABLE.

First (?) electronic digital computer

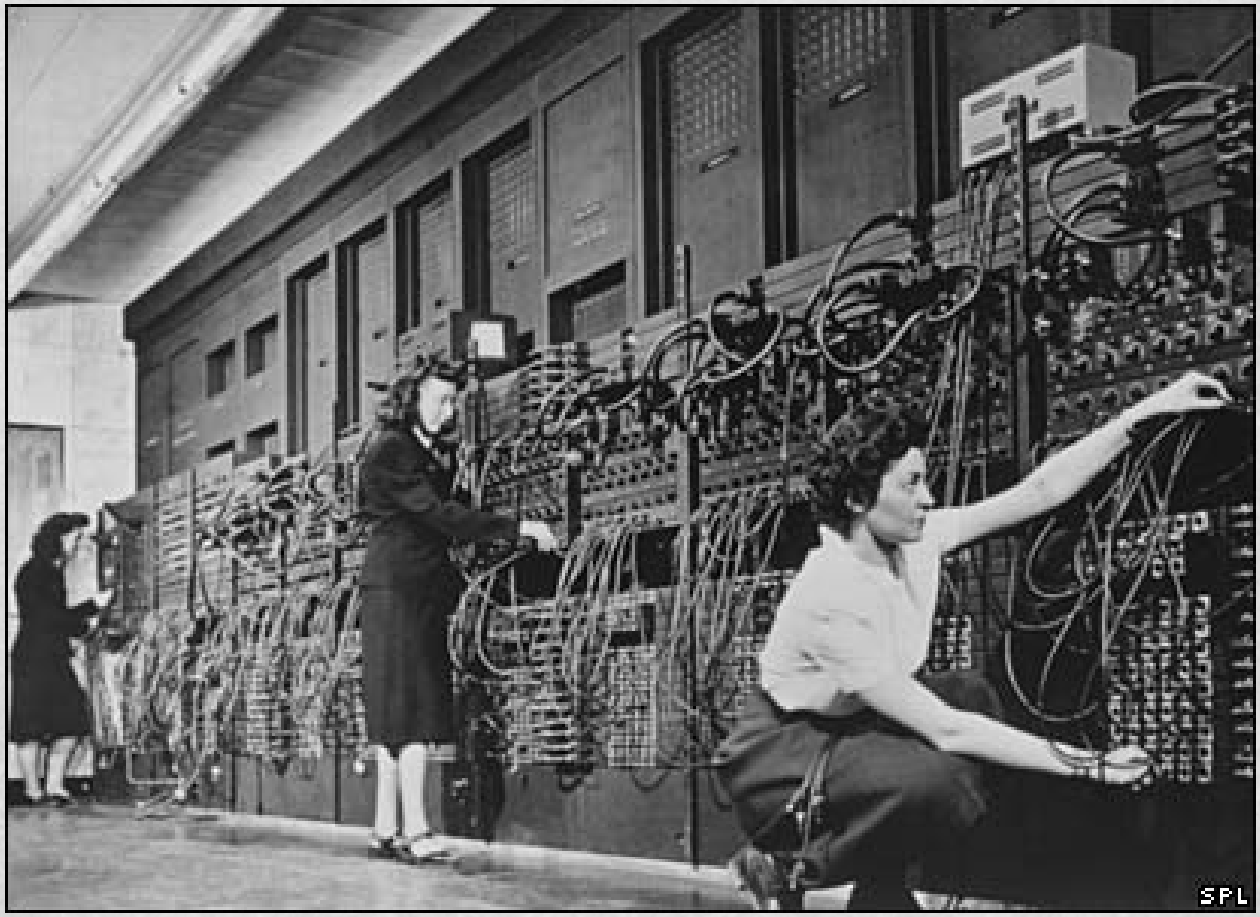
First (?) electronic digital computer



First (!) electronic digital computer



Programming the ENIAC



Program? Data?

The von Neumann approach

0010 0101 0001

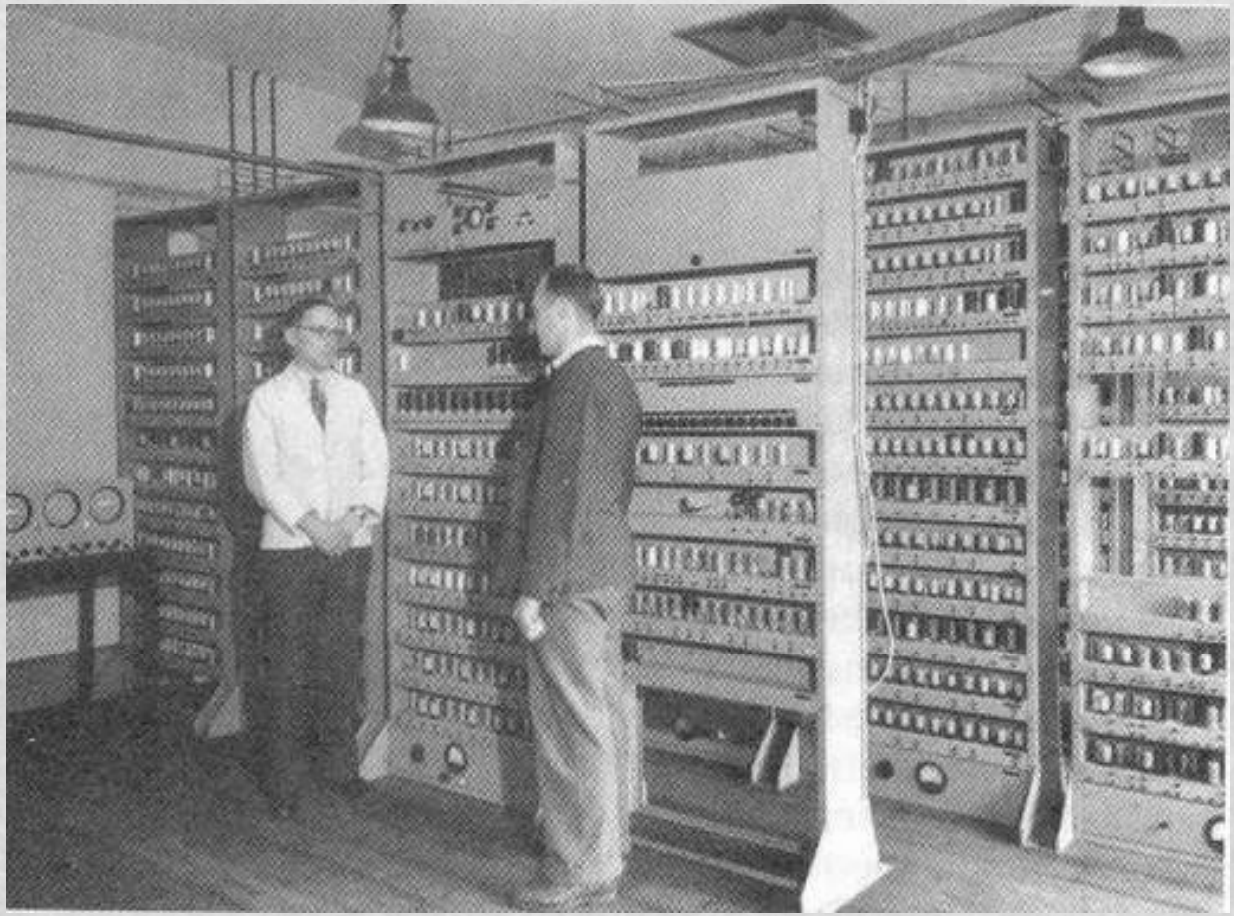
593_{10}

'IQ'

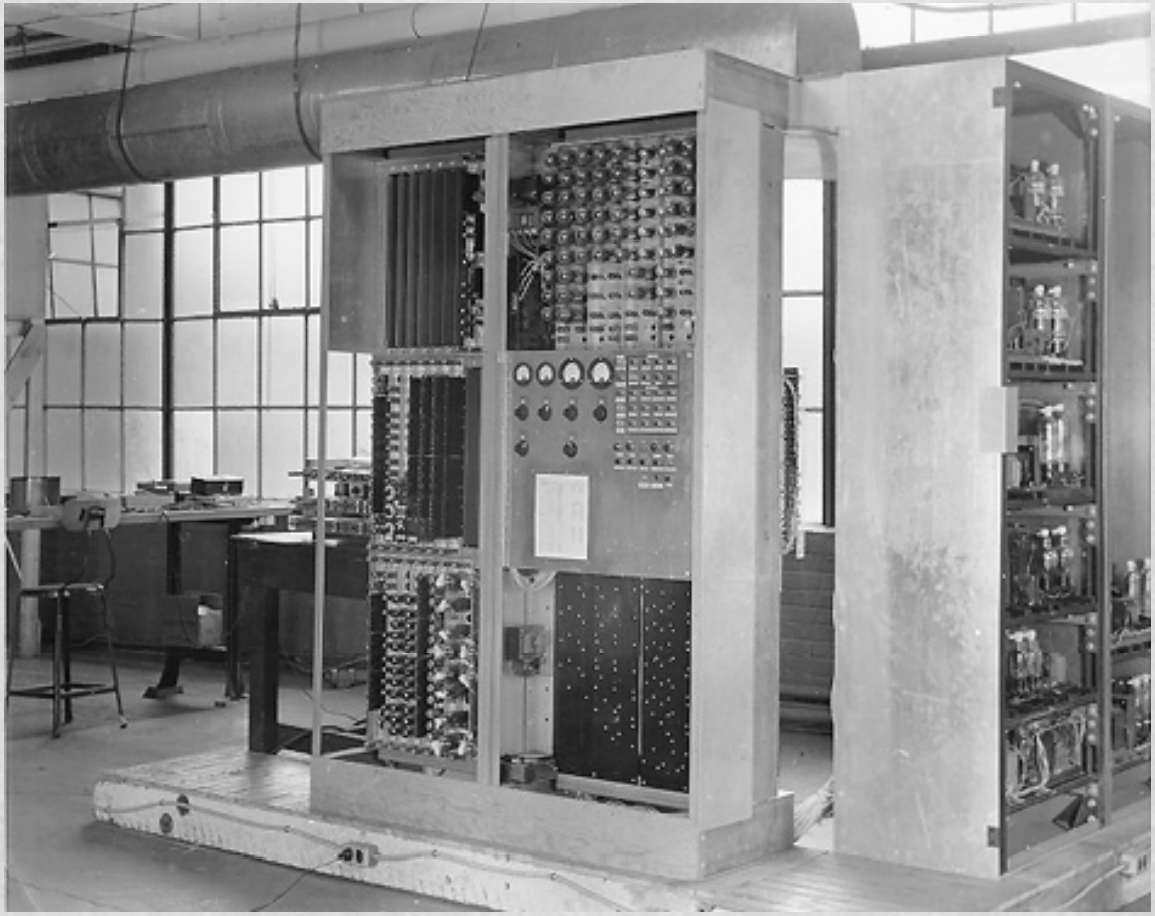
TAD 0001

- two's complement add, AC <- (location 0001) + AC

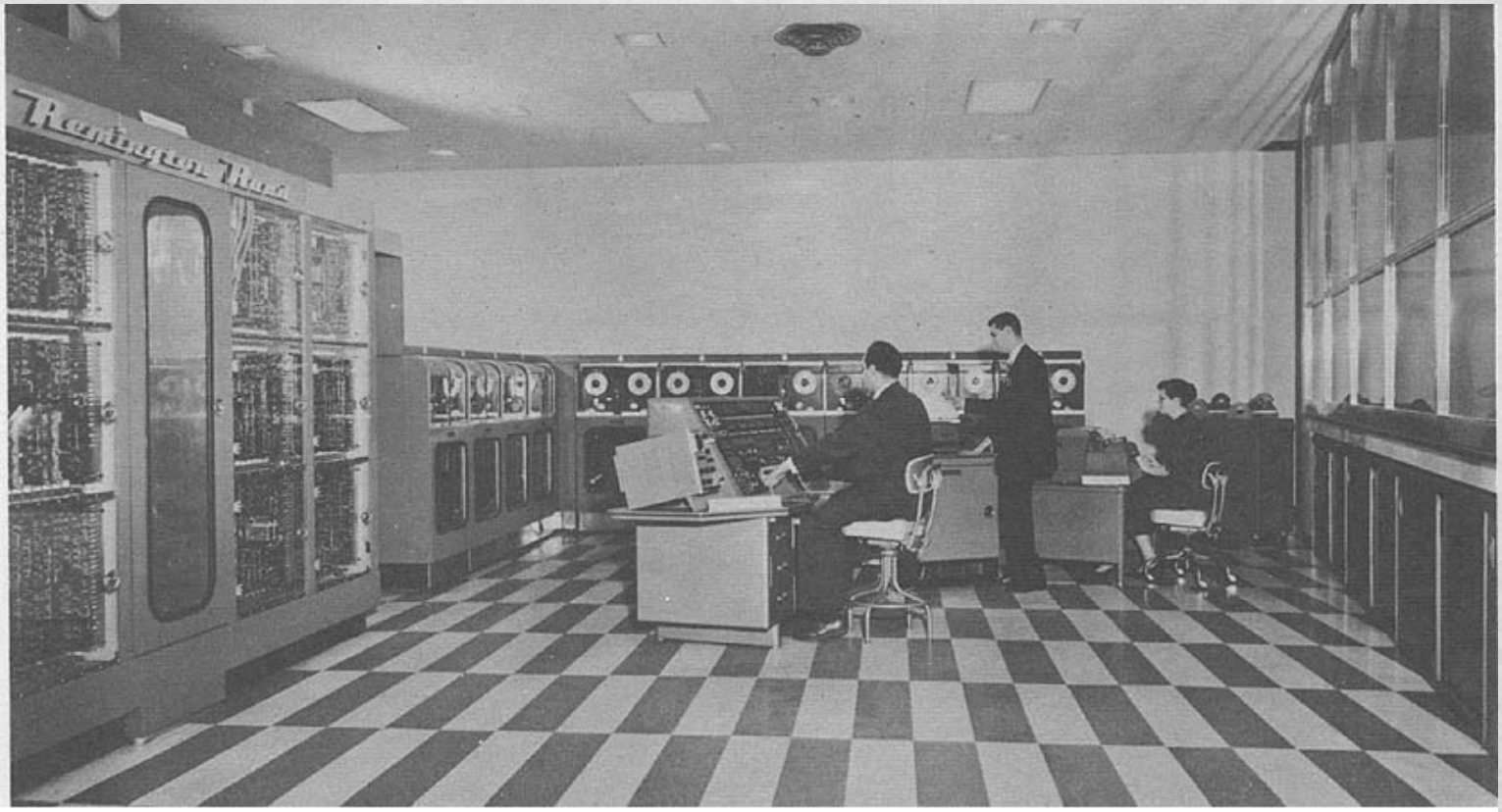
Stored Program Electronic Digital Computer



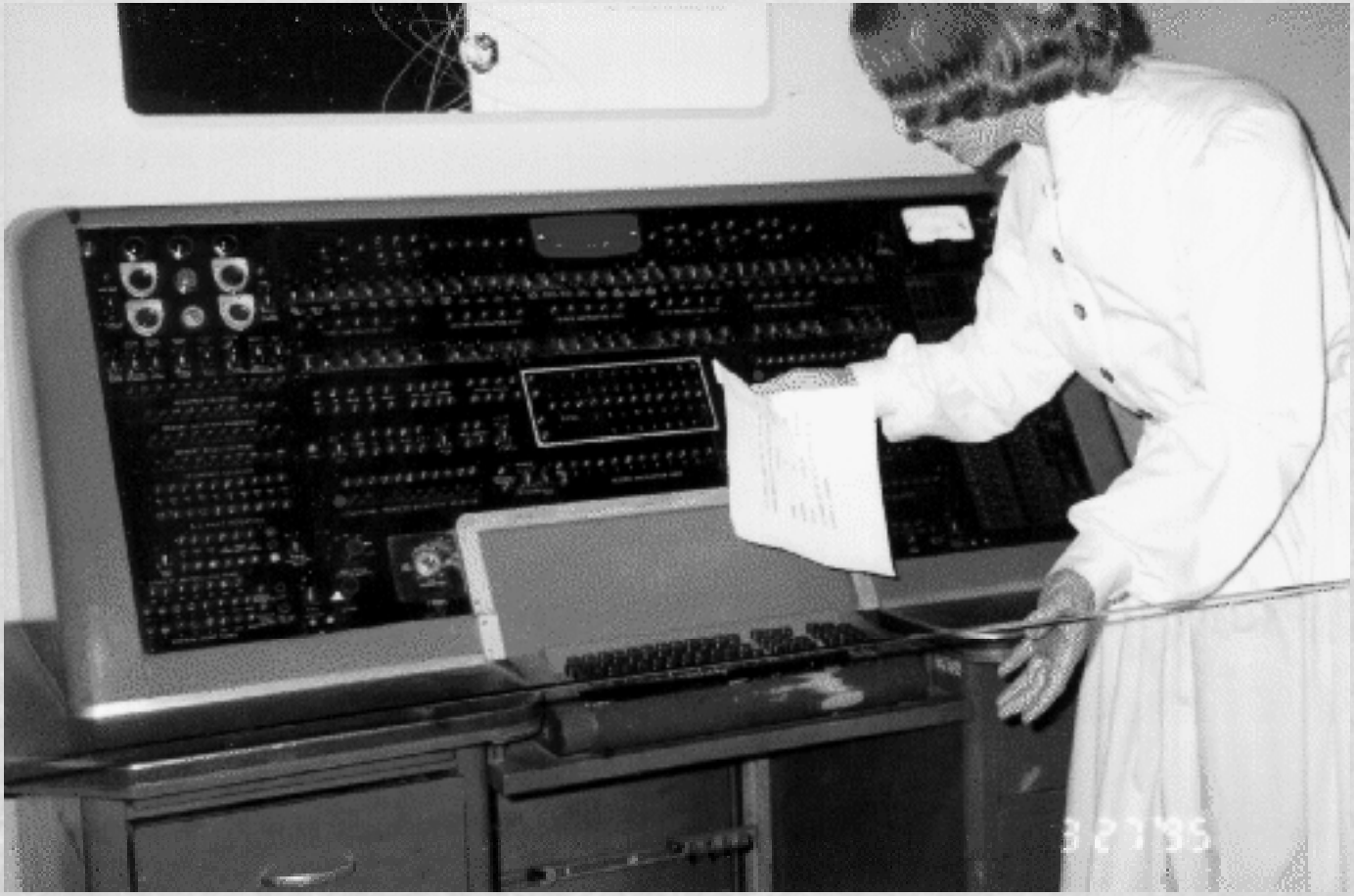
Stored Program Electronic Digital Computer



UNIVAC I



UNIVAC I



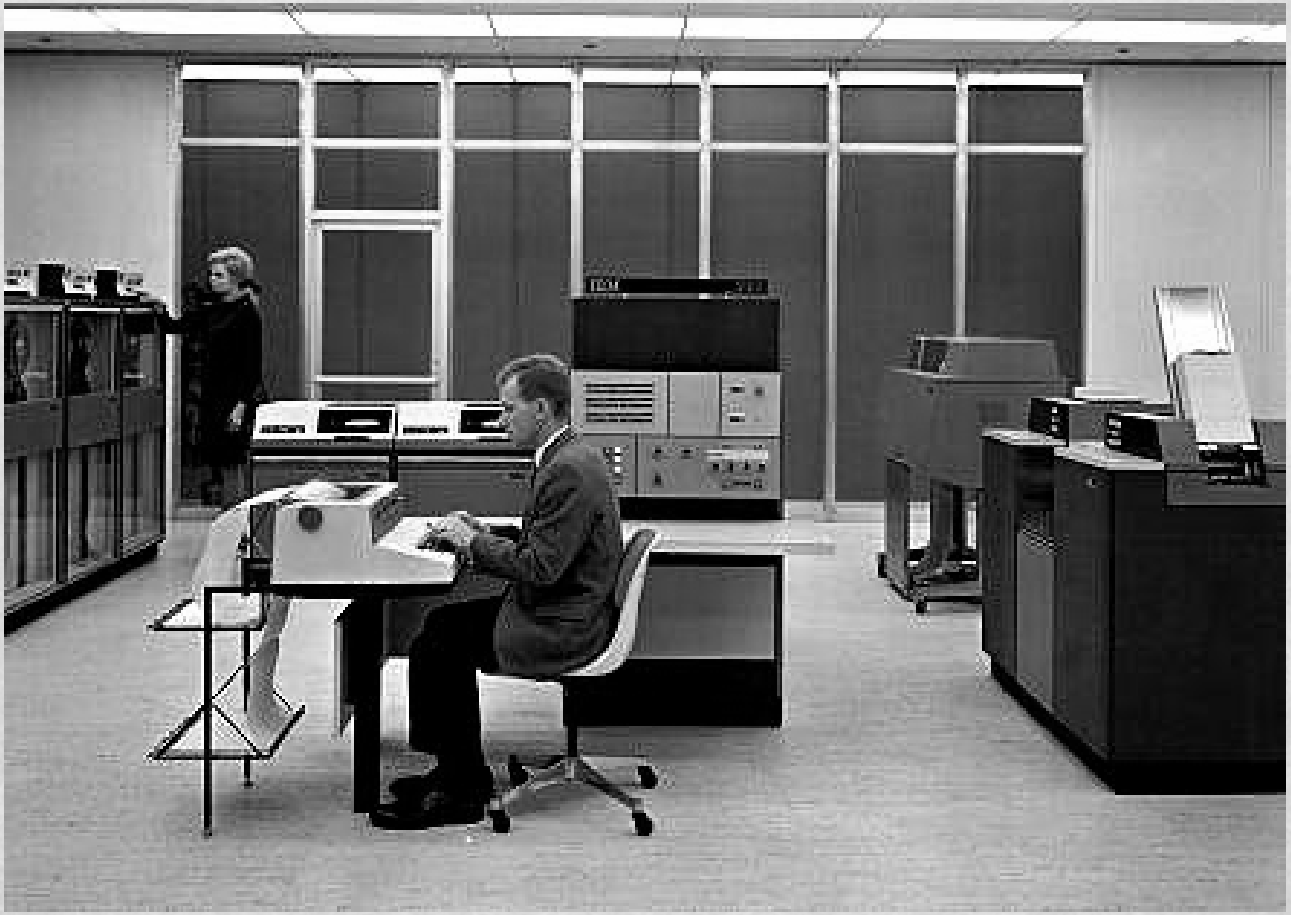
UNIVAC I


ELECTION RESULTS
TIME
THE WEEKLY NEWSMAGAZINE
"Governments are instituted among Men,
deriving their just powers from the consent of the governed."

And what of IBM?

IBM's greatest hits

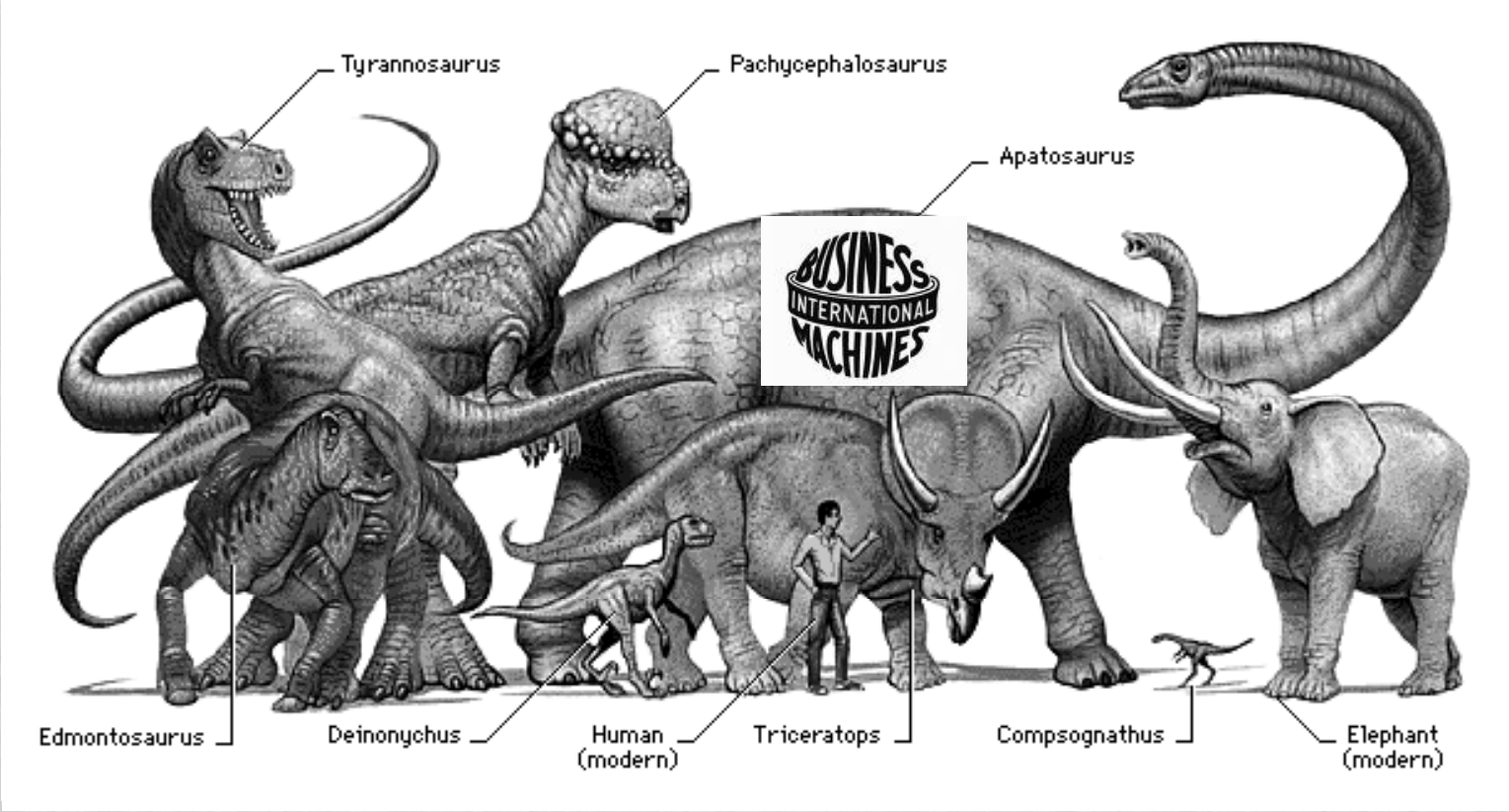
IBM System/360



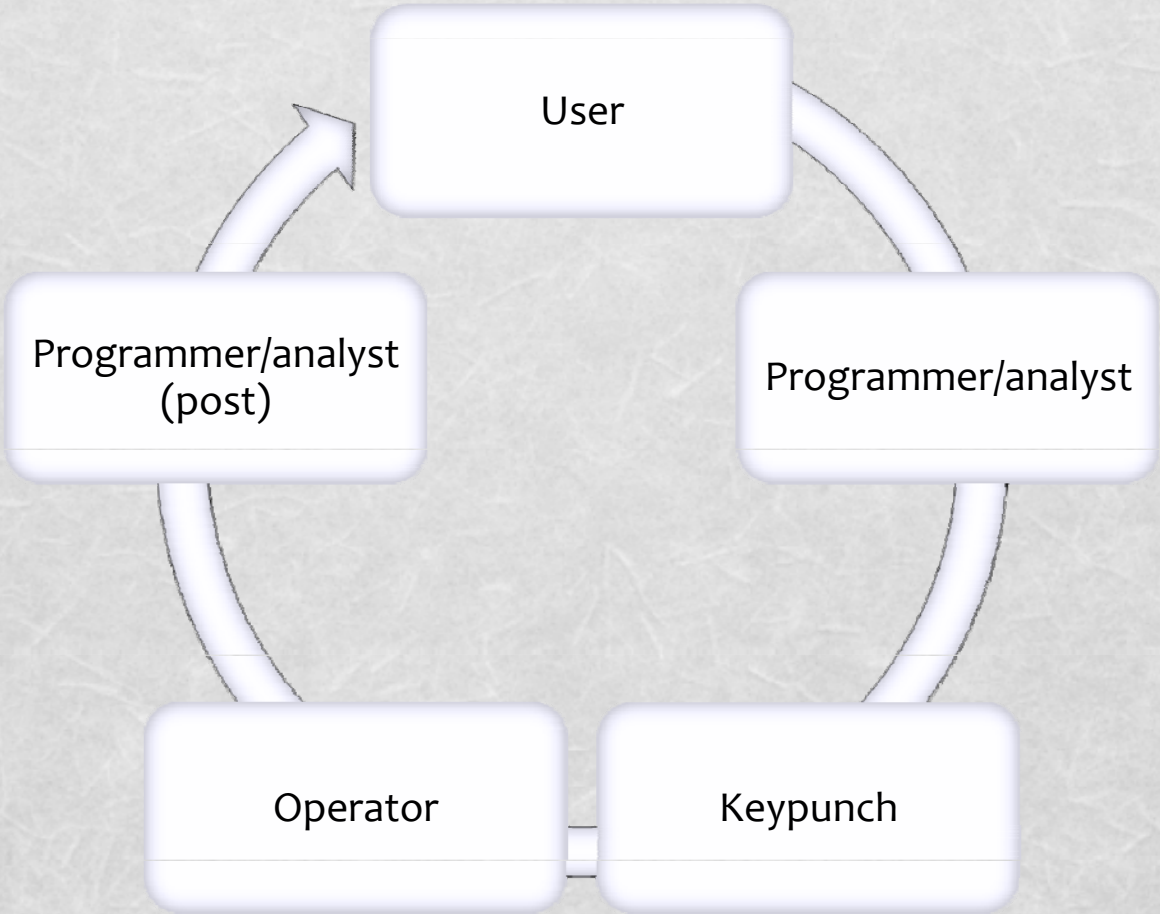
IBM System/360

IBM System/360

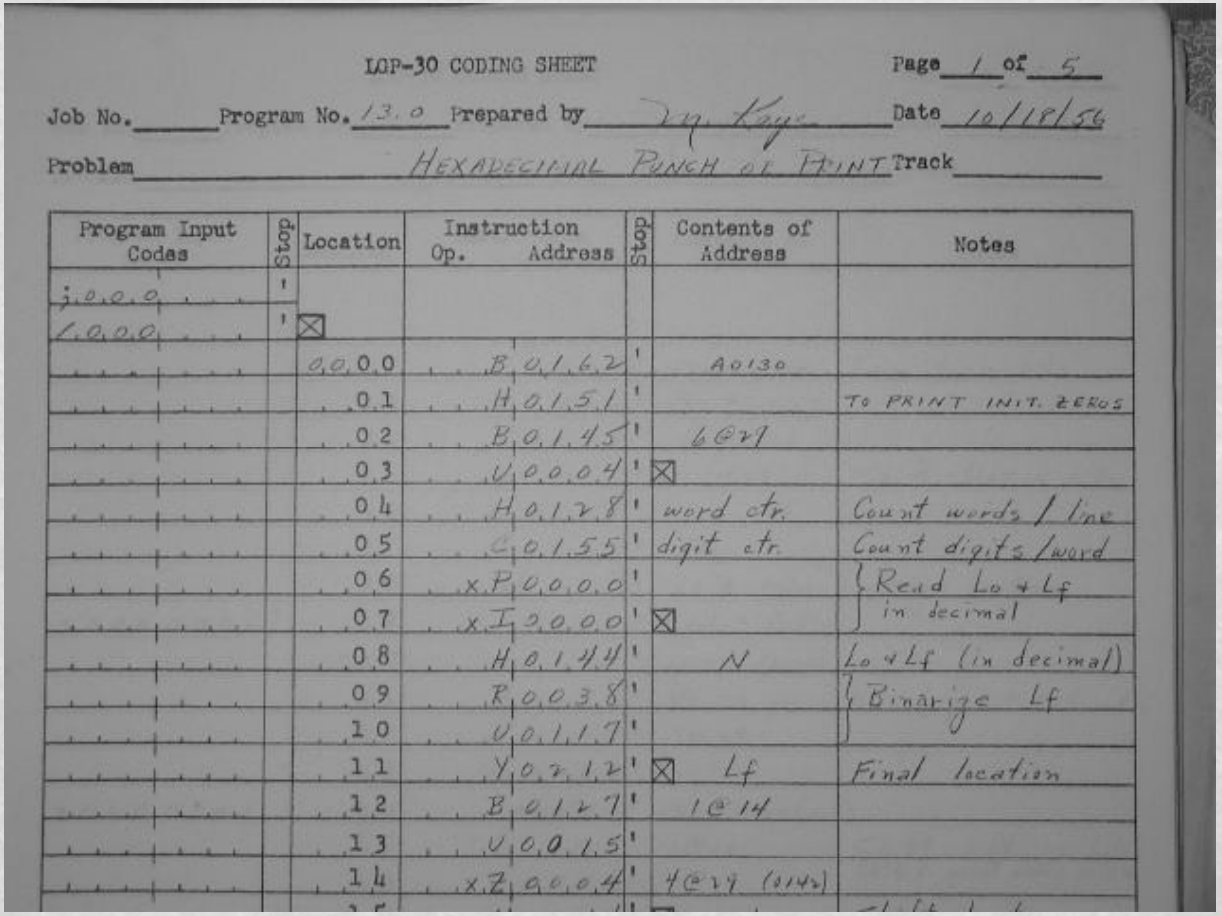
When dinosaurs ruled the earth



When dinosaurs ruled the Earth



Programming paradigms



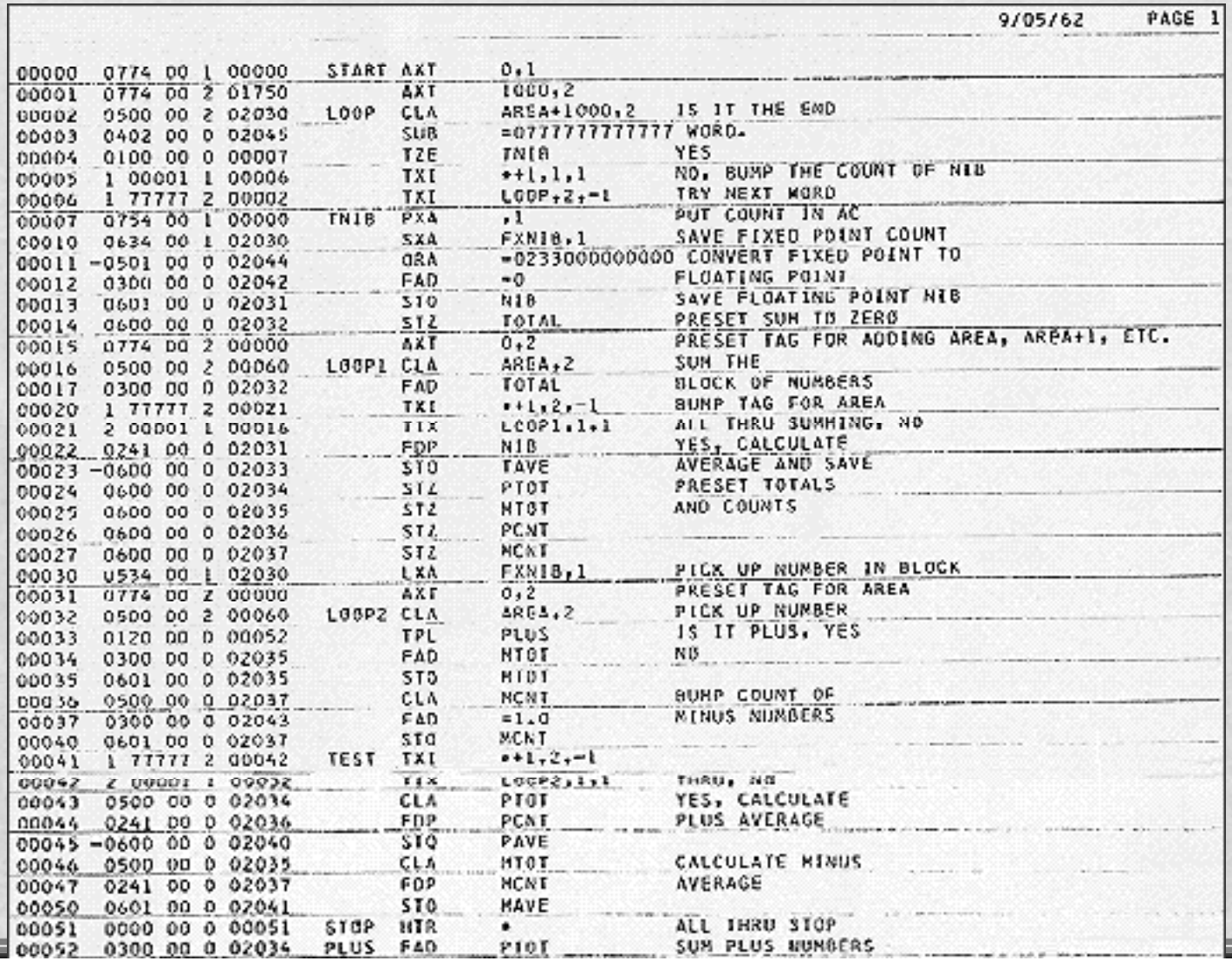
LGP-30 CODING SHEET Page 1 of 5

Job No. _____ Program No. 13.0 Prepared by Dy. Kaye Date 10/18/56

Problem HEXADECIMAL PUNCH OF PRINT Track _____

Program Input Codes	Stop	Location	Instruction Op.	Address	Stop	Contents of Address	Notes
j.0.0.0	'						
/.0.0.0	'	☒					
		0.0.0.0	B	0.1.6.2	'	A0130	
		0.1	H	0.1.5.1	'		TO PRINT INIT. ZEROS
		0.2	B	0.1.4.5	'	6@21	
		0.3	U	0.0.0.4	' ☒		
		0.4	H	0.1.2.8	'	word ctr.	Count words / line
		0.5	C	0.1.5.5	'	digit ctr.	Count digits / word
		0.6	x.P	0.0.0.0	'		{ Read Lo + Lf
		0.7	x.I	2.0.0.0	' ☒		{ in decimal
		0.8	H	0.1.4.4	'	N	Lo + Lf (in decimal)
		0.9	R	0.0.3.8	'		{ Binarize Lf
		1.0	U	0.1.1.7	'		{
		1.1	Y	0.2.1.2	' ☒	Lf	Final location
		1.2	B	0.1.2.7	'	1@14	
		1.3	U	0.0.1.5	'		
		1.4	x.Z	0.0.0.4	'	4@21 (0142)	

Programming paradigms



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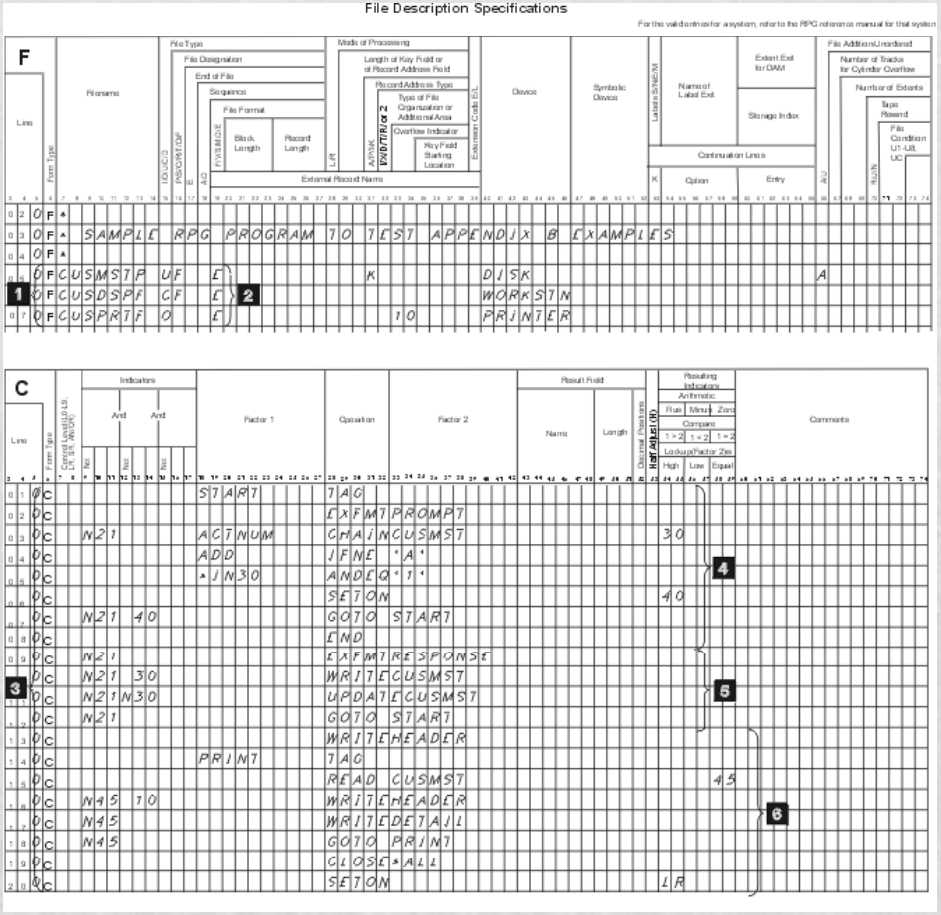
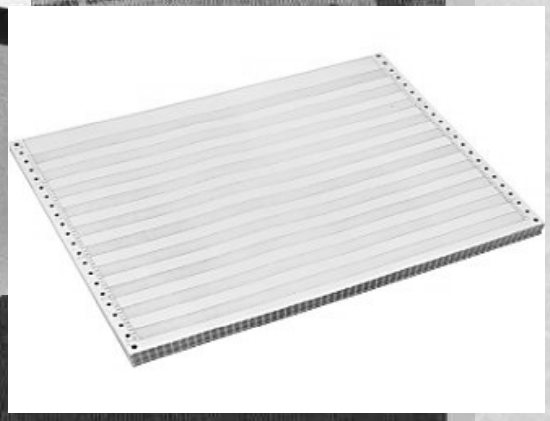
                                                                    9/05/62     PAGE 1


00000  0774 00 1 00000  START  AXT    0,1
00001  0774 00 2 01750         AXT    1000,2
00002  0500 00 2 02030  LOOP   CLA    AREA+1000,2    IS IT THE END
00003  0402 00 0 02045         SUB    =0777777777777 WORD.
00004  0100 00 0 00007         TZE    TNIB           YES
00005  1 00001 1 00006         TXI    *+1,1,1        NO, BUMP THE COUNT OF NIB
00006  1 77777 2 00002         TXI    LOOP,2,-1      TRY NEXT WORD
00007  0754 00 1 00000  TNIB   PXA    ,1             PUT COUNT IN AC
00010  0634 00 1 02030         SXA    FXNIB,1        SAVE FIXED POINT COUNT
00011 -0501 00 0 02044         ORA    =0233000000000 CONVERT FIXED POINT TO
00012  0300 00 0 02042         FAD    =0             FLOATING POINT
00013  0601 00 0 02031         STO    NIB            SAVE FLOATING POINT NIB
00014  0600 00 0 02032         STZ    TOTAL          PRESET SUM TO ZERO
00015  0774 00 2 00000         AXT    0,2            PRESET TAG FOR ADDING AREA, AREA+1, ETC.
00016  0500 00 2 00060  LOOP1  CLA    AREA,2         SUM THE
00017  0300 00 0 02032         FAD    TOTAL          BLOCK OF NUMBERS
00020  1 77777 2 00021         TXI    *+1,2,-1       BUMP TAG FOR AREA
00021  2 00001 1 00016         TIX    LOOP1,1,1      ALL THRU SUMMING, NO
00022  0241 00 0 02031         FDP    NIB            YES, CALCULATE
00023 -0600 00 0 02033         STO    TAVE           AVERAGE AND SAVE
00024  0600 00 0 02034         STZ    PTOT           PRESET TOTALS
00025  0600 00 0 02035         STZ    MTOT           AND COUNTS
00026  0600 00 0 02036         STZ    PCNT
00027  0600 00 0 02037         STZ    MCNT
00030  0534 00 1 02030         LXA    FXNIB,1        PICK UP NUMBER IN BLOCK
00031  0774 00 2 00000         AXT    0,2            PRESET TAG FOR AREA
00032  0500 00 2 00060  LOOP2  CLA    AREA,2         PICK UP NUMBER
00033  0120 00 0 00052         TPL    PLUS           IS IT PLUS, YES
00034  0300 00 0 02035         FAD    MTOT           NO
00035  0601 00 0 02035         STO    MIDT
00036  0500 00 0 02037         CLA    MCNT           BUMP COUNT OF
00037  0300 00 0 02043         FAD    =1.0           MINUS NUMBERS
00040  0601 00 0 02037         STO    MCNT
00041  1 77777 2 00042  TEST   TXI    *+1,2,-1
00042  2 00001 1 00034         TIX    LOOP2,1,1      THRU, NO
00043  0500 00 0 02034         CLA    PTOT           YES, CALCULATE
00044  0241 00 0 02036         FDP    PCNT           PLUS AVERAGE
00045 -0600 00 0 02040         STO    PAVE
00046  0500 00 0 02035         CLA    MTOT           CALCULATE MINUS
00047  0241 00 0 02037         FDP    MCNT           AVERAGE
00050  0601 00 0 02041         STO    MAVE
00051  0000 00 0 00051  STOP   HTR    *              ALL THRU STOP
00052  0300 00 0 02034  PLUS   FAD    PTOT           SUM PLUS NUMBERS
```

Programming paradigms



Computer/human interaction



Outliers: Whirlwind

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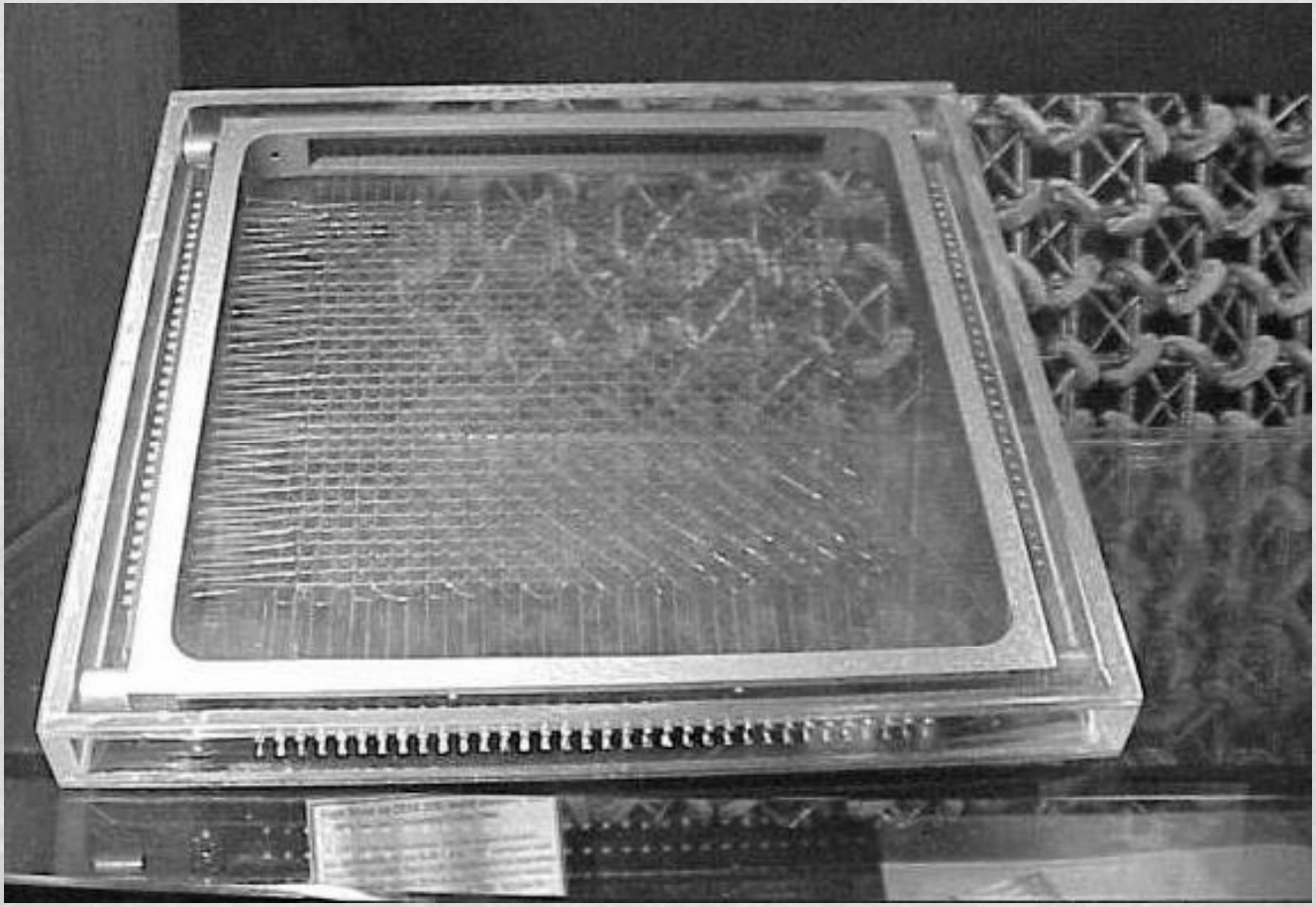
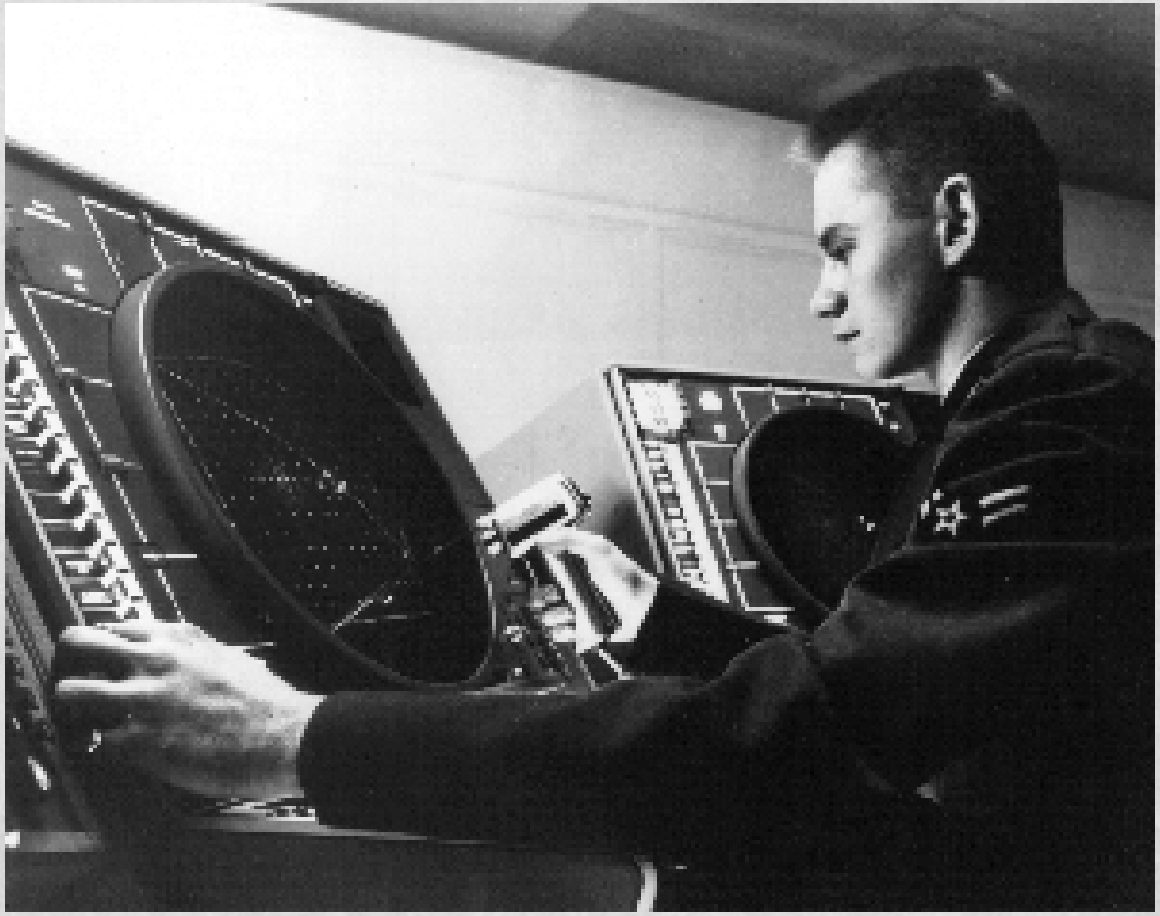


Outliers: SAGE

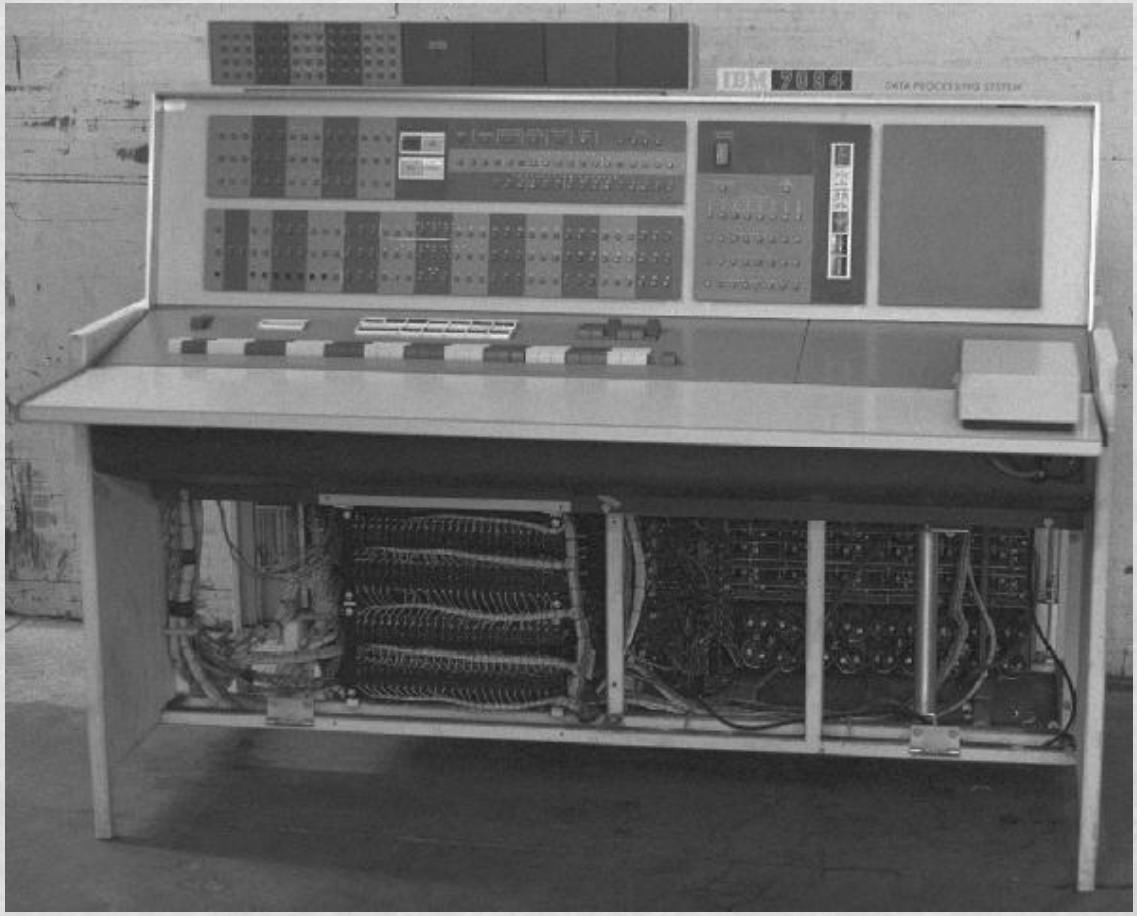
First powered: 1963
Retired: 1983

Weight: ~250 tons
Tube count: ~60,000

Outliers:
SAGE

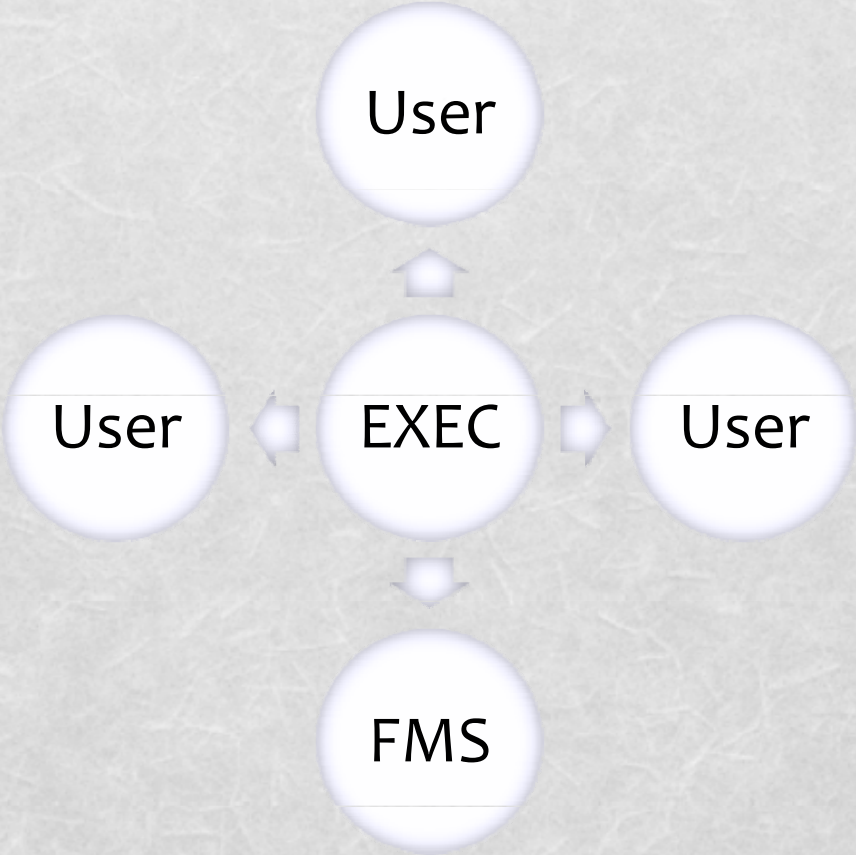


Outliers II



Outliers II:

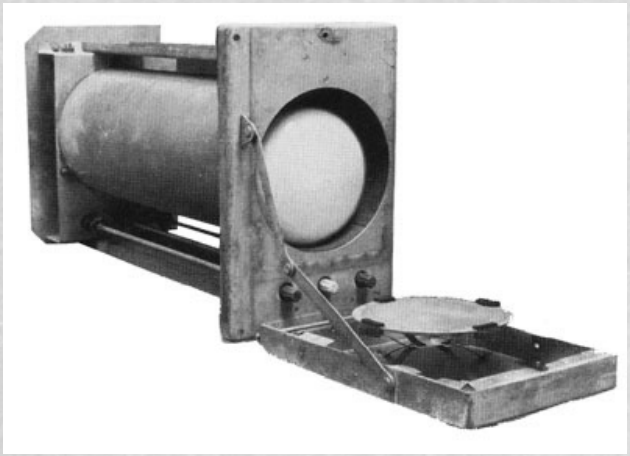
Compatible Time Sharing System

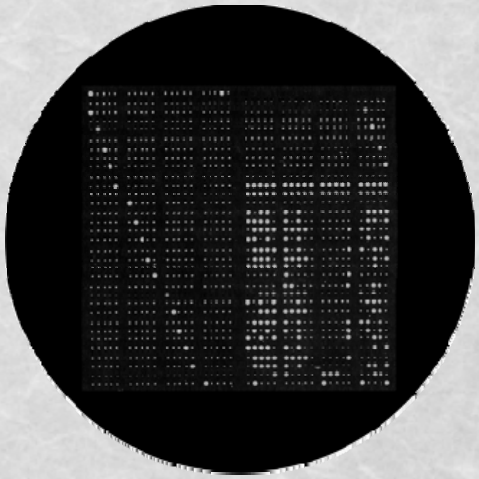


Under the hood: working store

- Acoustic delay lines

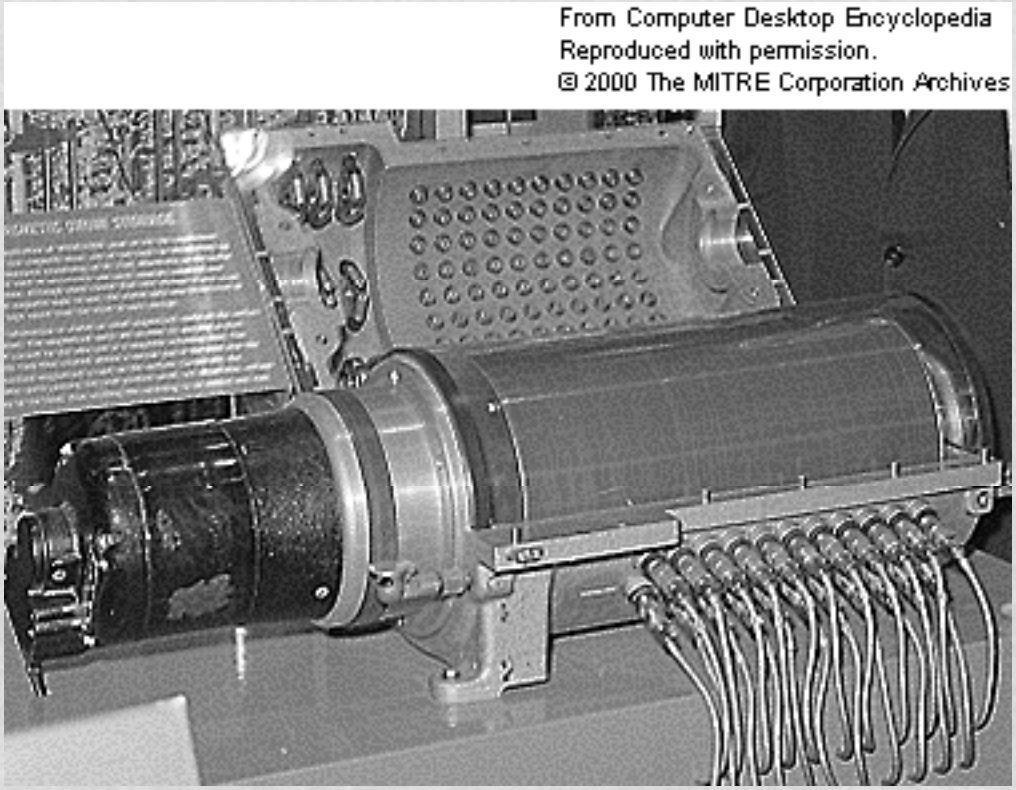
- Williams tubes





Building the machine: working store

- Magnetic drum



Building the machine: working store

- Magnetic core

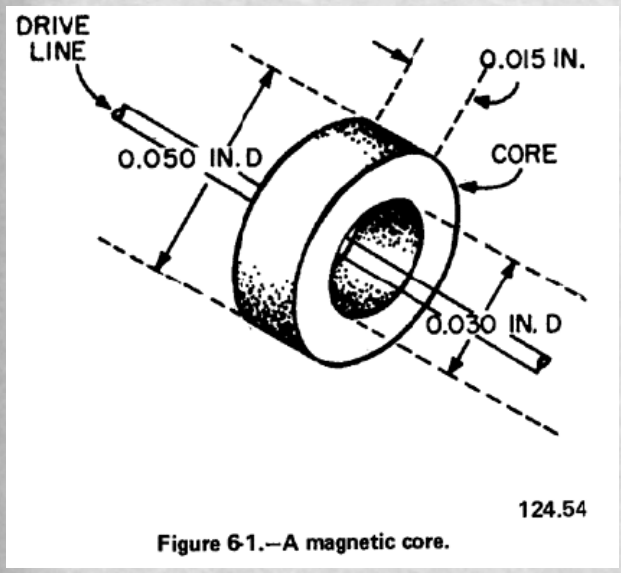


Figure 6-1.—A magnetic core.

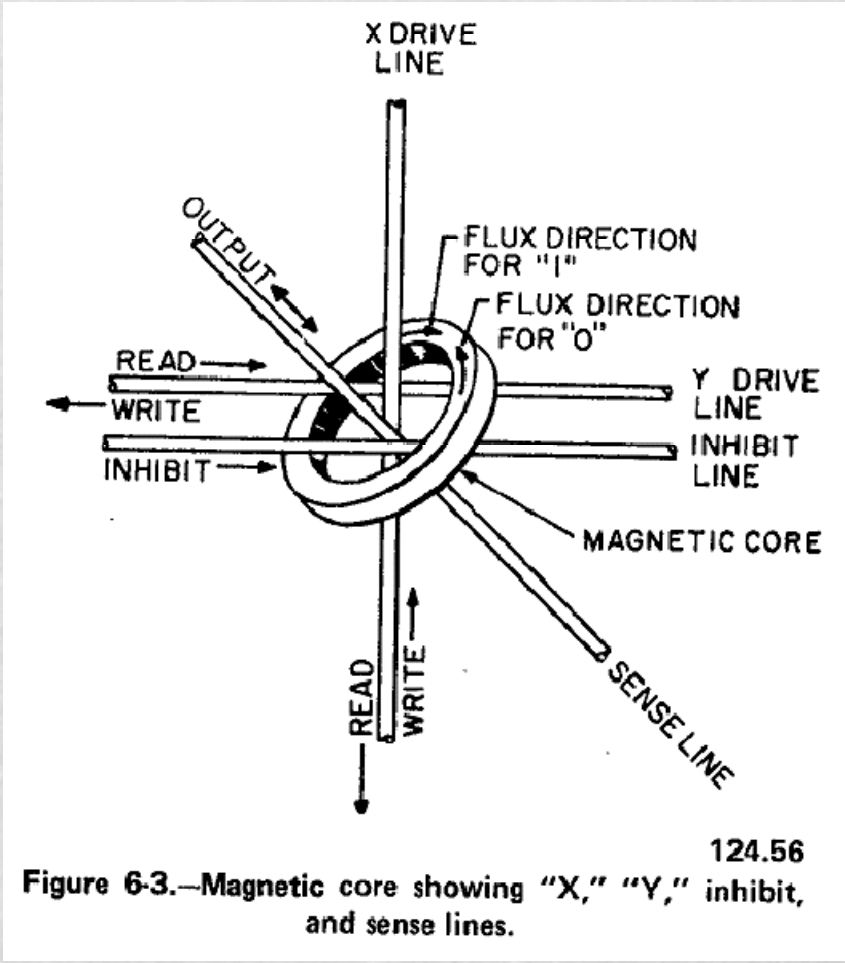
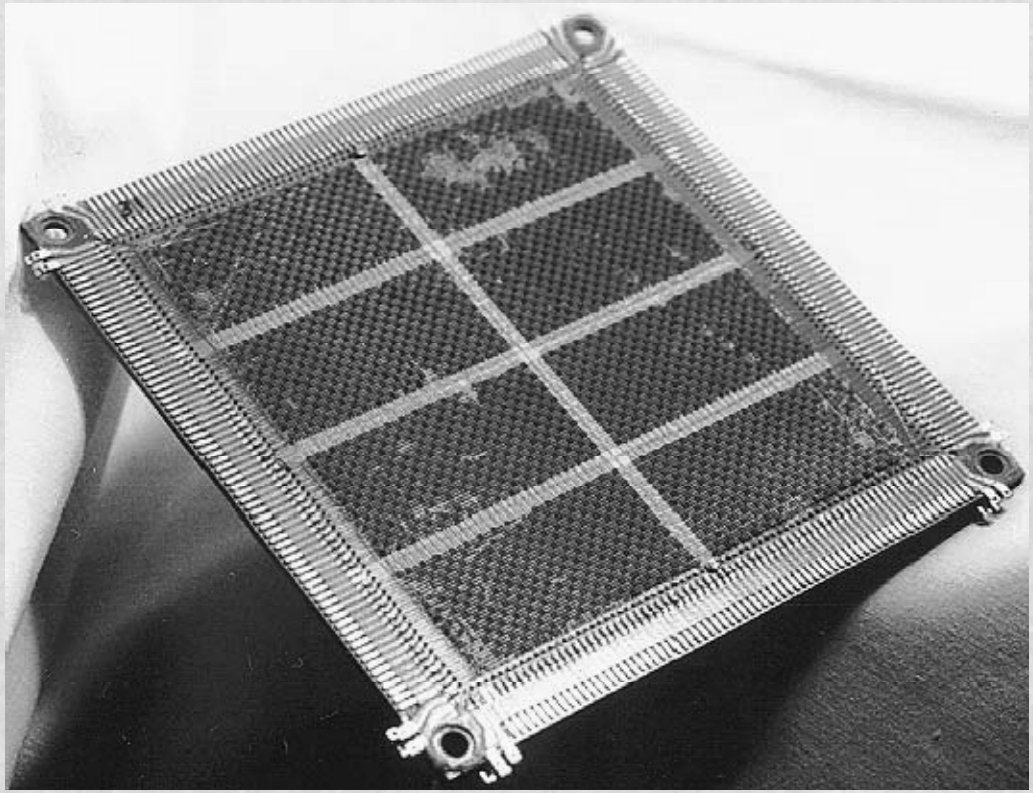


Figure 6-3.—Magnetic core showing "X," "Y," inhibit, and sense lines.

Building the machine: working store

- Magnetic core



Questions?