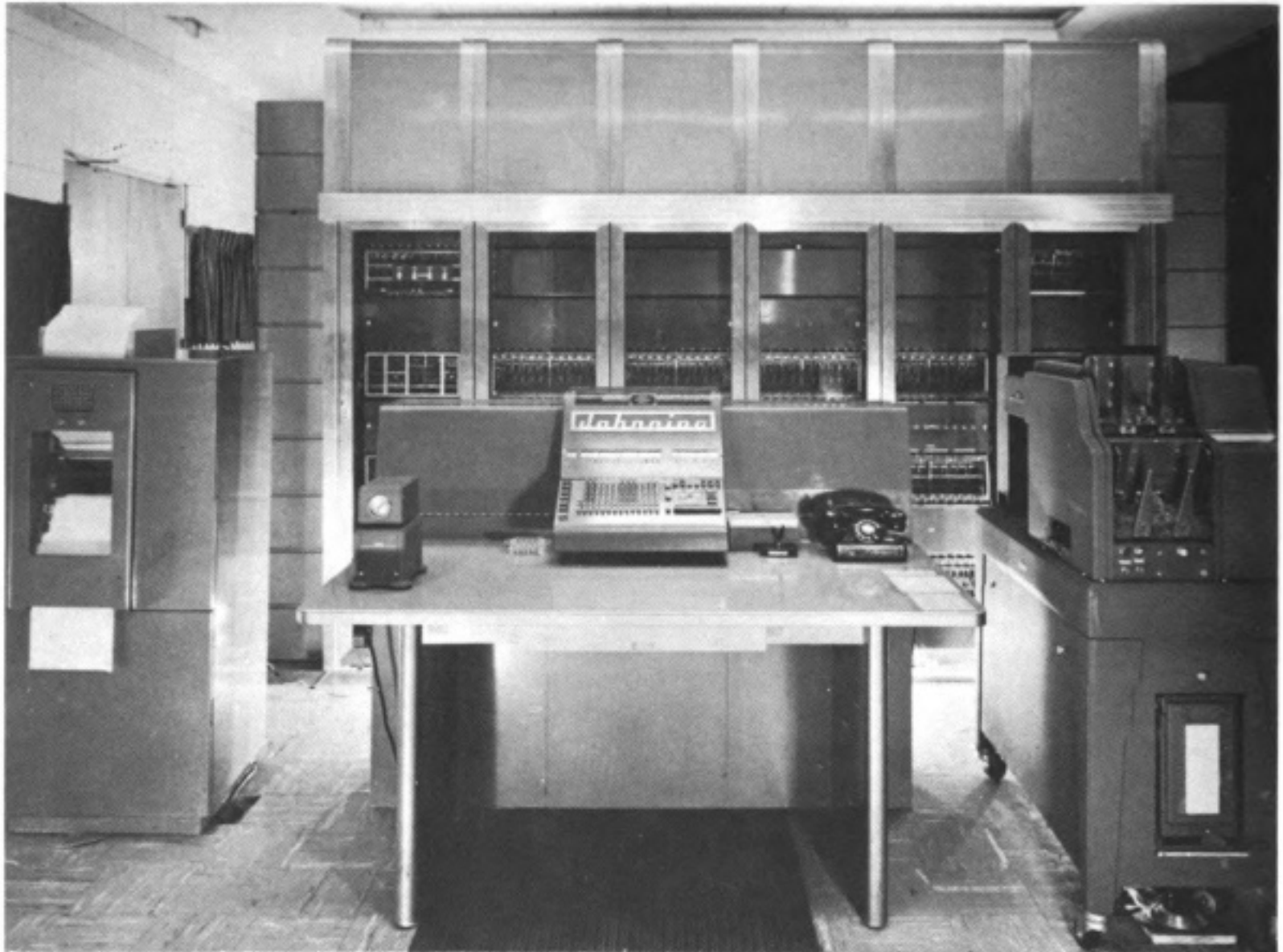


JOHNNIAC

John (Von Neumann)
Integrator and Automatic Computer

MANUFACTURER

The Rand Corporation



Picture by Rand Corporation

APPLICATIONS

Scientific and engineering data processing.

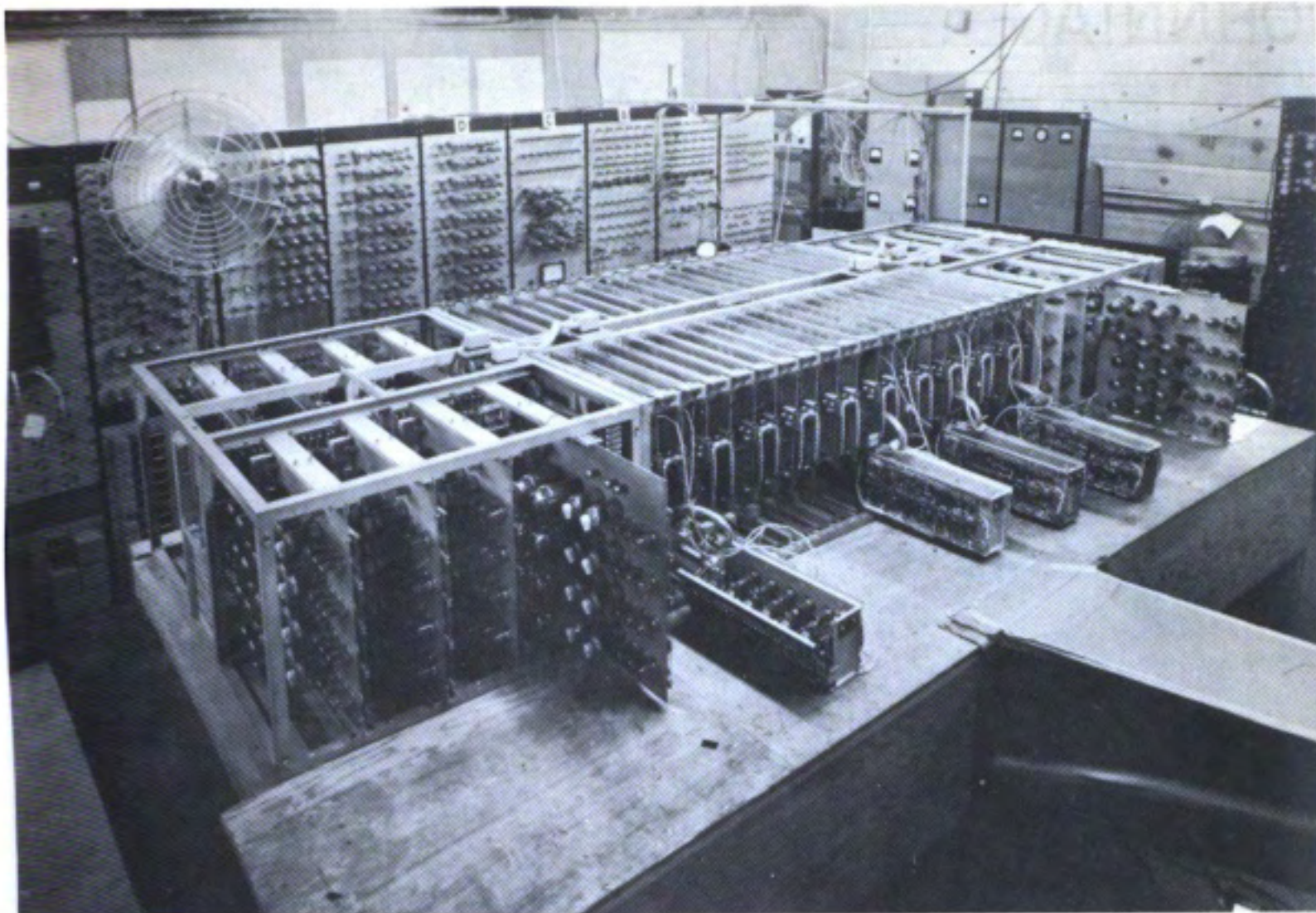
NUMERICAL SYSTEM

Internal number system	Binary
Binary digits per word	40
Binary digits per instruction	20
Instructions per word	2
Instructions decoded	128
Instructions used	Approx. 85
Arithmetic system	Fixed point
Instruction type	One address
Number range	Numerically less than unity.
Negative numbers are represented as complements.	

ARITHMETIC UNIT

	Includ. Stor. Access Microsec	Exclud. Stor Access Microsec
Add time	25	10
Mult time	400	385
Div time	400	385
Construction	Vacuum tubes and transistors	
Rapid access word registers		4
Arithmetic mode	Parallel	
Timing	Asynchronous	
Operation	Sequential	

Addition is concurrent with store cycle. Multiply and divide times are maximum. The transistorized logical adder has a full carry time of 1.5 micro-seconds.



Picture by Rand Corporation and Telemeter Magnetics, Incorporated

STORAGE

Media	Words	Digits	Microsec Access
Magnetic Core	4,096	40/word	15
Magnetic Drum	12,288	40/word	17,000

Drum access time is average access to first word. Sixty microseconds are required for each succeeding address in same channel.

INPUT

Media	Speed
Card Reader	240 cards/min

An IBM collator is used on both primary and secondary feeds are used.

OUTPUT

Media	Speed
Card Punch	100 cards/min
Printer (AN elec.)	1,200 lines/min

An IBM 523 is used. The printer prints 136 columns, 56 char/column (alphanumeric)

CIRCUIT ELEMENTS ENTIRE SYSTEM

Tubes	5,000
Tube types	11
Crystal diodes	500
Magnetic storage cores	163,840
Magnetic switch cores	5,120
Transistors	1,400

CHECKING FEATURES

Manual marginal testing is performed.

POWER, SPACE AND WEIGHT

Power, computer	55 KW, 63 KVA, 0.88 PF
Power, air cond.	28 KW
Space, computer	290 cu. ft., 36 sq. ft.
Space, air cond.	180 cu. ft., 50 sq. ft.
Weight, computer	5,000 lbs.
Weight, air cond.	5,000 lbs.
Capacity, air cond.	25 Tons

Dimensions of computer are 12 x 3 x 8 feet.

PRODUCTION RECORD

Produced 1
Operating 1

This system was designed and is owned and operated by the Rand Corporation.

PERSONNEL REQUIREMENTS

Daily Operation	Engineers	Tech and Operators
2-8 Hour shifts	1	2

One technician per shift and one engineer on call is required.

RELIABILITY AND OPERATING EXPERIENCE

Average error-free running period 10 hours
Good time 1380 hours
Attempted to run time 1500 hours
Operating ratio (Good/Attempted to run) 0.92
Figures based on period July 1956 to November 1956
Acceptance test March 1954

INSTALLATIONS

The Rand Corporation, 1700 Main Street, Santa Monica, California

ADDITIONAL FEATURES AND REMARKS

System includes console facilities which report the static state of all registers in an octal display, allow manual entry of information via a keyboard, punch contents of all registers and key board conditioning switches on a single card, display static state of all toggles and allow manual control over toggle states.

A wired in core store test routine is included which tests all addresses and bits under a variety of information patterns without aid of a stored program.

