UNIVAC® SOLID-STATE 90

Specification Features

Remington Rand Univac
DIVISION OF SPERRY RAND CORPORATION

THE UNIVAC SOLID-STATE 90

GENERAL DESCRIPTION

The UNIVAC Solid-State 90 is a medium-scale, solid-state, 90-column punched card computer designed for both business and scientific applications. The rental price of $6,950 per month or purchase price of $347,500 includes a Central Processor, High-Speed Reader, Read-Punch Unit and High-Speed Printer.

CENTRAL COMPUTER

The Central Processor is a single unit which contains a high-speed magnetic drum, arithmetic and transfer controls and all the circuitry that governs the operation of the entire system. There are only 20 vacuum tubes in the Central Processor.

A. PRIMARY STORAGE

1. Type of Storage. The primary storage is a high-speed magnetic drum rotating at 17,667 revolutions per minute. The drum is hermetically sealed in helium to eliminate air friction heating between the drum and stator. There are 25 bands on the drum for program and data storage, each holding 200 ten-digit words with sign. The drum is five inches in diameter and eight inches long.

   a.) Fast Access. Twenty storage bands are called "fast access" bands and are provided with one read/write head per band.

   b.) High-Speed Access. The remaining five bands are "high-speed access" bands equipped with four read/write heads per band, located 50 words apart. They have an information "access-time" four time as fast as the fast access bands and are used for both data and program storage.

2. Word Length. A word consists of a sign and 10 decimal digits. The sign is to the right of the least significant digit.

3. Word Capacity. The word capacity is 50,000 digits or 5,000 words.

4. Number System. A coded decimal number system consisting of four binary bits (5, 4, 2, 1) plus a check bit is used to represent the decimal integers.

5. Word Time. Word time is .017 milliseconds. (The transfer rate is 707,000 characters per second.)

6. Transfer Check. A parity check is made on all data transfers.

B. ARITHMETIC

1. Registers and Circuits. The Central Processor contains the arithmetic registers as well as the adder and comparator circuits. There are four one-word registers. Register C holds the instruction being executed and Register A, Register L and Register X hold instructions or data upon which the logical or arithmetic operations are being performed.

2. Recording Mode. The mode of operation is serial (i.e., one character at a time is handled).

3. Operating Speed. To standardize system comparison, the typical operating speed formula used by a U.S. Government Agency is used:

$$[(A + B)\ \ C]\ \div D \longrightarrow \text{memory}.$$

The average time to accomplish the above is approximately 1.19 milliseconds.

4. Validity Check. The validity check used in this system is a bit-by-bit check (buffer band to Register A and buffer band to Register X. Register A and Register X are compared for equality).

C. PROGRAM CONTROL

1. Address System. The UNIVAC Sold-State 90 uses a 1½ address system.

2. Instruction Format. The instruction format consists of 10 decimal digits and a sign. The sign is not used in instruction words. The breakdown consists of an Operation Code, Operand Address, and Instruction Address as shown below:

Operation Code	Operand Address	Instruction Address
50	3456	4356

There are three phases to the Instruction Cycle.

3. Operation Codes. There are 39 operation codes.

D. OTHER STORAGE

Data and instructions are stored in 90-column punched-cards as well as on the high-speed drum.

E. SPECIAL FEATURES

1. Checking Features:

Timing Check. A timing check is built into the basic computer to signal any lack of drum synchronization.

Program Check. The program data is checked upon transfer of data to Register C(which contains the instruction word).

2. Buffer Storage. There are two input/output buffers on the drum: the Print Buffer is used solely for the High-Speed Printer, while the Card Buffer is utilized by both the High-Speed Reader and the Read-Punch Unit.

CONSOLE

The Processor Control Panel is part of the Central Processor; there is no separate supervisory control console.

TAPE AND TAPE HANDLERS

At present, the UNIVAC Solid-State 90 employs 90-column punched-cards only.

INPUT/OUTPUT UNITS

There are three major input/output units.

A. THE HIGH-SPEED READER

1. Card Speed. Data is read into the system from 90-column punched-cards at a speed of up to 450 cards per minute through a High-Speed Reader.

2. Card Code. In addition to the Remington Rand card code, any other type of card code can be used.

3. Card Cycle. Initiation of a card cycle requires three word times.

4. Hopper-Stacker Capacity. The card feed system consists of an input hopper holding 1000 cards, two reading stations, and three output stackers each of which can contain 800 cards.

5. Simultaneous Operation. The Central Processor controls the operation of the Reader on a time-sharing basis so that reading of data occurs in parallel to the processing of previously read data.

6. Stacker Select Time. Stacker select requires one word time.

7. Parity Check. An odd-bit parity check is performed automatically on all external data transfers. Parity checking makes possible the handling of codes of any type.

8. Buffers. The High-Speed Reader is completely buffered. All Input/Output Units have individual intermediate buffers which communicate directly with the drum buffers.

9. Operator Panels. Operator visual display indicators advise of operating conditions at any moment.

10. Vacuum Feed. Vacuum feed insures positive card feeding.

11. Misfeed Detection. The misfeed detection system, during a card jam or some other abnormal condition in the High-Speed Reader, will bring the Processor to a stop, preventing the propagation of any input errors.

B. THE READ-PUNCH UNIT

1. Card Speed. The Read-Punch Unit, which functions in the dual capacity of an input and output device, can read, punch and check 90-column cards at a speed of up to 150 cards per minute.

2. Simultaneous Operation. Read, Punch and Print operations may be time shared and computation may proceed independently. The High-Speed Reader and the Central Processor continue uninterrupted while the processing results are punched.

3. Punch Time. The punch operation takes 203 word times to perform.

4. Card Receivers. There are two receivers for cards on the Read-Punch Unit, and all cards are normally deposited in the second of the two. However, at the programmer's option, it is possible to segregate specific card types and accumulate them in the first receiver.

5. Read/Punch Same Card. The Read-Punch Unit can punch information into the same card it has read.

6. Maximum Number of Punches. The Read-Punch Unit punches a maximum of 270 holes in a card (three holes per column in each of the 90-columns).

7. Checking. Reading and punching are checked at two stations where a word-for-word check is performed prior to entry or exit from internal machine operation. Checking takes place internally within the Processor as with the High-Speed Reader. Provision for checking procedures in the input/output routines of both card units eliminates the necessity for a complicated checking procedure.

8. Jam Detection. Like the High-Speed Reader, the Read-Punch Unit has a card jam detection system which halts the Processor during a card jam until the fault is corrected.

9. Buffers. The Read-Punch Unit is completely buffered.

10. Operator Panels. The Read-Punch Unit has operator display panels that advise of operating conditions at any moment.

C. THE HIGH-SPEED PRINTER

1. Printing Speed. It prints at up to 600 lines per minute with a possible 130 print positions on a given line of printing.

2. Simultaneous Operation. The on-line High-Speed Printer is completely controlled by the Central Processor, although printing operations take place in parallel with Processor operations.

3. Print Time. It takes 100 milliseconds to complete a print order.

4. Number of Printable Characters. There are 51 printable characters: 26 alphabetics, 10 numerics and 15 special characters.

5. Programmed Printing Operations. All editing functions are performed internally within the Processor.

6. Orderly Printouts. The Printer will interlock if an attempt is made to print before the last paper advance or print cycle has been completed, or if an advance is attempted before the last print or advance is completed. One line can never be printed over another (no printing twice on the same line).

7. Plugboard Unnecessary. No plugboard is used in the High-Speed Printer because the stored program affords complete format flexibility.

8. Number of Tubes. There are only 145 tubes in the Printer, one for each print position, and 15 in the power supply.

9. Checking Features:

   Printing Check. A positive check is made at printing time by the code generator which compares the information in the print buffer with the print row character that is coming into position to print.

   Low Paper Supply Check. The printer will stop on detection of a low paper supply.

10. Spacing. Vertical spacing is six characters to the inch and horizontal spacing is 10 to the inch.

11. Paper Forms Used. The paper feed will handle any sprocket-fed paper up to and including card stock (either blank or preprinted), from four to 21 inches in overall width. At least five carbon copies and one original copy can be made by using between 11 and 13.5 pound paper.

12. Vertical Adjustment. Fine vertical adjustment of the position of the paper may be accomplished while the printer is in operation. Variable spacing control on the High-Speed Printer allows any number of lines to be skipped at a time, as desired.

13. Impression Control. An impression control permits variation in the strength or impact of the printing hammer stroke.

PHYSICAL SPECIFICATIONS

A. FLOOR AREA AND WEIGHTS

Component	Weight (Lbs.)	Height	Width	Length
Central Processor	3,532	69"	32"	108"
High-Speed Reader	758	49"	24"	49"
Read-Punch Unit	1,334	69"	32"	45"
High-Speed Printer	1,613	51"	32"	72"
	7,237			

The minumum floor area requirement for the UNIVAC Solid-State 90 is approximately 530 square feet.

B. OPERATING AND POWER REQUIREMENTS

Input Voltage Requirements: Single phase, 240 Volts AC (±10%), 3-wire, 60 cycle service; or two-phase from a three-phase wye system of 280 Volts AC (+10%, -5%), 4-wire, 60 cycle service. (The three-phase wye system may be used to supply two UNIVAC Solid-State 90 Systems.)

Power Requirements: 14.4 KVA

C. HEAT DISSIPATION

Heat dissipation is 35,000 BTU/HR.

SUMMARY OF FEATURES

A. Economy. The UNIVAC Solid-State 90 provide economies in two major areas:.

1. Site preparation. No special chilled water refrigeration is necessary. Space required by the system is approximately 530 square feet. Total power requirements of only 14.4 KVA eliminate the need for adding extensive power distribution facilities at the site.

2. Programming. Use of the English language programming system cuts training and conversion time to a few weeks. In addition, the extensive repertoire of computer instructions offers a high degree of flexibility for technical personnel wishing to do machine coding.

B. Reliability. There is a high degree of reliability and ease of maintenance of the equipment because of:

1. The solid-state components (transistors, magnetic amplifiers and diodes rather than electronic tubes) plus ...

2. Easily interchangeable printed circuits, as well as a number of self-checking features on each of the component parts. There are 1500 printed circuit cards of 49 different types, but only eight types make up 90% of the printed circuit cards.

C. Versatility. The ideal combination of the fast operating speeds of the input/output equipment and the large memory of the Central Processor provide:

1. The ability to combine a series of operations previously handled as separate systems, plus ...

2. The opportunity to perform many new applications previously uneconomical by available document processing techniques.

D. Balanced System Design. The UNIVAC Solid-State 90 is a uniquely balanced system:

1. Use of buffer test instructions assures simultaneous operation of all computer units.

2. Advantage is taken of the inherent balanced-design of the system so that interlock is avoided and "dead-time" on individual units is eliminated.

UNIVAC®—The FIRST Name in Electronic Computing Systems

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