A NEW
GENERATION
OF LOW COST
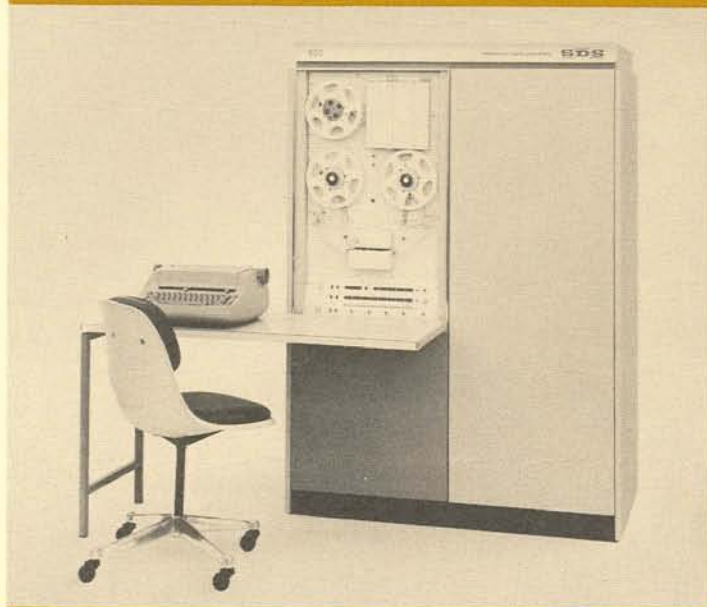GENERAL PURPOSE
DIGITAL
COMPUTERS

920

SCIENTIFIC DATA SYSTEMS SDS
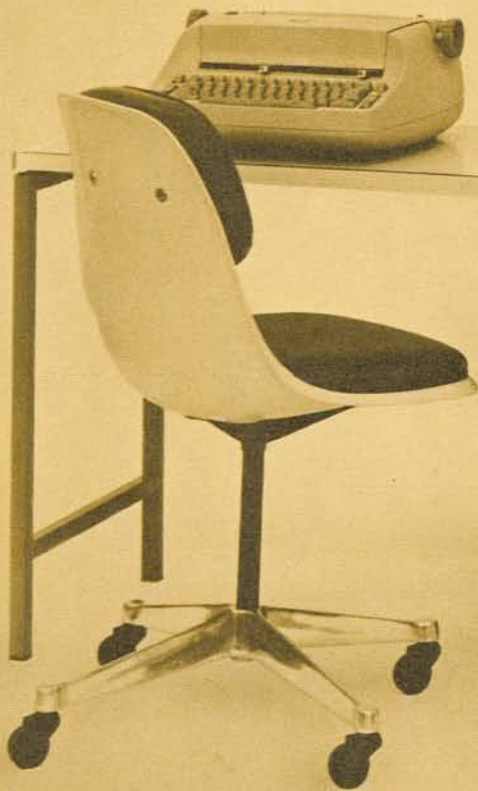
SDS
900 SERIES

SCIENTIFIC DATA SYSTEMS, INC.

MODEL 920 .... $98,000

The SDS 920 is a low cost, general purpose computer designed for scientific engineering computation and for systems integration. It has all the speed and operating features found only in much more expensive equipment, including instructions that facilitate floating-point and multi-precision operations. An evaluation of the 920's unequalled performance-per-dollar capabilities can be made by comparing the following characteristics with any presently available digital computer:

TYPE: Single address with indexing and indirect addressing • Binary • Core Memory • Solid State • Instructions for facilitating floating-point and multi-precision operations • Parity checking on Input/Output and Memory Operations • Programmed Operator

MEMORY: Coincident magnetic core • 4096 words expandable to 16,-384 words – all directly addressable • 24-bit word and parity • Non-volatile if power fails

EXECUTION TIMES: *All times include both memory access & indexing*

Add .... 16 microseconds
Mutiply .... 32 microseconds

Floating-Point Operations:

   (24-bit Mantissa plus 9-bit Exponent)

•   Add ....292 microseconds
   Multiply ....248 microseconds

   (39-bit Mantissa plus 9-bit Exponent)

   Add ....368 microseconds
   Multiply ....600 microseconds

INPUT/OUTPUT:

Standard Equipment — Five input/output operation modes • Buffer with input/output rates in excess of 50,000 characters/second simultaneous with computation • Dual channel priority interrupt • Display console and manual control of internal registers • 300 character/second photoelectric paper tape reader • 60 character/second paper tape punch • Automatic input/output typewriter

Optional Equipment — 15 kc and 41.7 kc magnetic tape units (IBM compatible) • 300 line/minute printer • 200 cpm and 250 cpm card readers • Graph plotter • 896 channels of priority interrupt • Second input/output buffer • Direct communication with IBM 7090 • Analog-to-digital converters • Paper tape spooler (shown above)

PROGRAMMING: FORTRAN II with magnetic tape statements • Symbolic Assembler • Complete package of subroutines and utility programs • Program interchangeability with SDS 910 Computer

PHYSICAL: All silicon solid state components • Dimensions — 66"x 48" x 27" • Power — 110V, 60cps, 20 amps • Operating temperature range — 0°C. to +50°C.

SERIES

GENERAL PURPOSE COMPUTERS

Unparalleled economic justification based on performance-per-dollar.

SDS 900 Series digital computers are much less expensive than comparable machines in both original price and operating costs. This results from careful attention to *all* cost parameters during development of both the over-all conception and the detailed design. While each SDS 900 Series computer compares favorably on all single cost criteria, its true value lies in a unique combination of economies: Programming is greatly simplified. Peripheral equipment cost is minimized. Internal computing speed is high. Original equipment cost is low. A complete software package is provided. And reliability is excellent. *SDS 900 Series computers offer more answers-per-dollar, more reliably, than any other currently available equipment.*

A reduction of lapsed time between program entry and final answers.

900 Series computers are extremely fast throughout the complete problem solving cycle, from program entry to the presentation of answers. Characteristic of this high internal speed is an Add time, *including memory access and indexing,* of 16 microseconds. SDS matched input/output devices, with speeds balanced to that of the computers — utilizing the efficient built-in buffer — prevent the information flow bottlenecks which have restricted computer operation in the past. A capability for simultaneous computing and input/output handling (combinations of nine register operations performed concurrently, with a single instruction) speeds problem solution. Built-in index register operation, indirect addressing, and automatic subroutine handling, efficiently utilize the memory and allow fast, flexible programming.

Five separate systems with rates up to 200,000 characters-per-second.

Five distinct input/output systems are standard equipment on 900 Series computers. Information can be processed by bits, characters, or words, for greatest flexibility and speed. A built-in priority interrupt system allows efficient handling of a virtually unlimited number of peripheral input/output devices. An external Memory Interlace system automatically provides fast, direct input/output connection to the core memory, without program intervention, at rates up to 200,000 characters per second. With SDS 900 Series computers, over 16,000 signals are available for device operation and testing under program control. Three input/output operations can be carried on simultaneously. An integrated group of optional input/output devices — including both low and high density IBM compatible magnetic tape units — are available at lowest cost from SDS.

Comprehensive software package, including FORTRAN II compiler.

SDS 900 Series computers have been designed to reduce the cost, time and effort required for programming. Single address instructions, with indirect addressing and indexing, permit maximum programming flexibility. A comprehensive software package, including FORTRAN II with magnetic tape statements, a symbolic assembler with macro-handling facilities, and a complete array of arithmetic sub-routines and utility programs, assures powerful, flexible programming with a minimum of "learning time." An SDS innovation, the *Programmed Operator,* allows programs from any one SDS 900 Series computer to be run on any other SDS 900 Series machine. The SHARE library is available to all 900 Series users.

Use of silicon solid state components ensures better performance.

The SDS 900 Series is the first commercially available family of computers to use silicon solid-state components to widen operating temperature range and thereby increase reliability by an order of magnitude. All memory operations and input/output are parity checked. Low noise coupling for peripheral equipment insulates the computer system against outside electrical disturbances which cause errors. The memory is protected against information loss in the event of power failure. Closed loop synchronization of all input/output operations assures no inadvertent loss of information.

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TYPE: Single address with indexing and indirect addressing ● Binary ● Core Memory ● Solid State ● Instructions for facilitating floating-point and multi-precision operations ● Parity checking on Input/Output and Memory Operations ● Programmed Operator

MEMORY: Coincident magnetic core ● 4096 words expandable to 16,384 words—all directly addressable ● 24-bit word and parity ● Non-volatile if power fails

EXECUTION TIMES: *All times include both memory access & indexing*
Add .... 16 microseconds
Mutiply .... 32 microseconds
Floating-Point Operations:
   (24-bit Mantissa plus 9-bit Exponent)
●   Add ....292 microseconds
    Multiply ....248 microseconds
   (39-bit Mantissa plus 9-bit Exponent)
    Add ....368 microseconds
    Multiply ....600 microseconds

INPUT/OUTPUT:
Standard Equipment — Five input/output operation modes ● Buffer with input/output rates in excess of 50,000 characters/second simultaneous with computation ● Dual channel priority interrupt ● Display console and manual control of internal registers ● 300 character/second photoelectric paper tape reader ● 60 character/second paper tape punch ● Automatic input/output typewriter

Optional Equipment — 15 kc and 41.7 kc magnetic tape units (IBM compatible) ● 300 line/minute printer ● 200 cpm and 250 cpm card readers ● Graph plotter ● 896 channels of priority interrupt ● Second input/output buffer ● Direct communication with IBM 7090 ● Analog-to-digital converters ● Paper tape spooler (shown above)

PROGRAMMING: FORTRAN II with magnetic tape statements ● Symbolic Assembler ● Complete package of subroutines and utility programs ● Program interchangeability with SDS 910 Computer

PHYSICAL: All silicon solid state components ● Dimensions — 66"x 48" x 27" ● Power — 110V, 60cps, 20 amps ● Operating temperature range — 0°C. to +50°C.

INPUT/OUTPUT

SDS 900 Series input/output equipment has been selected to achieve unparalleled efficiency in the handling of information flow to and from the computer. The speed and flexibility of the five input/output systems allow the best possible utilization of computer time and ensure efficient use of all types of peripheral equipment.
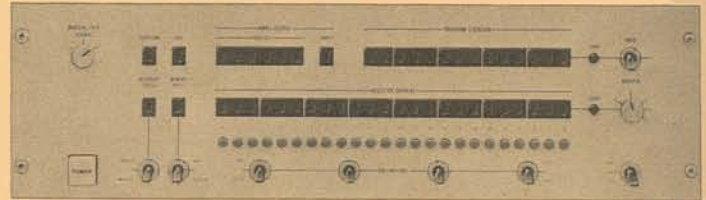
Control Panel SDS 900 Series computers are equipped with a conveniently located control panel which displays all register, program and input/output status to facilitate program checkout. Breakpoint switches provide manually selectable program options.
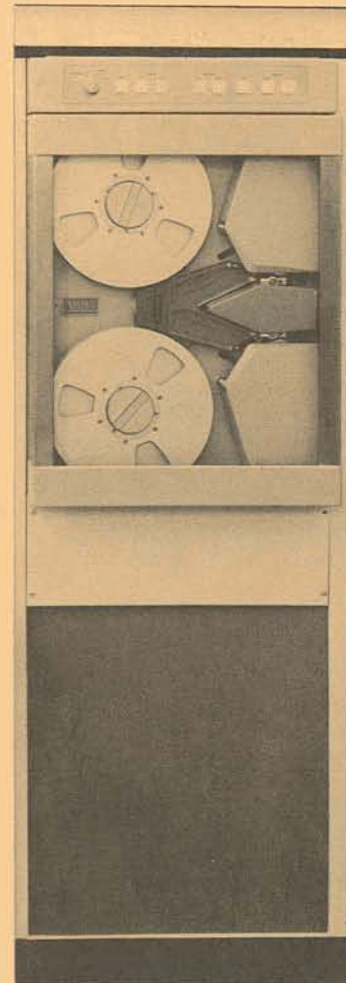
Magnetic Tape Units Two types of magnetic tape systems are available for SDS 900 Series computers. One type utilizes 15 kc transports and the other utilizes 41.7 kc transports. Both systems are compatible with standard IBM formats and provide read-after-write redundant heads to ensure instantaneous error recovery. Longitudinal parity and standard interblock gaps are automatically generated during writing operations. Practically any number of tape transports may be connected to SDS 900 Series computers. By utilizing a second input/output buffer, two magnetic tape units operate simultaneously with computation.
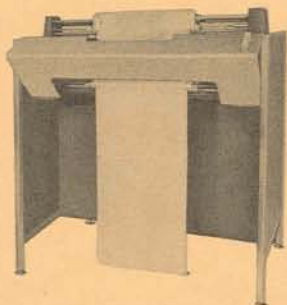
EQUIPMENT

Input/Output Typewriter The SDS 900 Series typewriter which is used for both input and output in conjunction with the input/output buffer, operates at 15 characters-per-second on output, and has a completely flexible formating capability.
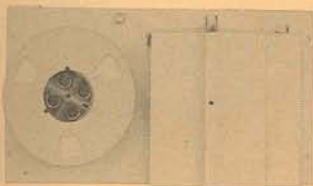
Card Readers SDS card readers are available in both 200 cpm and 250 cpm speeds.

Photoelectric Reader The SDS reader reads seven channel paper tape into the computers at 300 characters-per-second. Six channels are for information and the seventh for parity. Removable 8″ NAB tape reels are available for tape handling. The photoelectric reader is supplied as standard equipment on all SDS 900 Series machines.

High-Speed Line Printer The SDS high-speed printer provides output at 300 lines per minute. There are 132 print positions per line with a 64 character set.

Additional input/output buffer SDS 900 Series computers are pre-wired to accept a second input/output buffer to augment the buffer provided in the basic machines. The additional buffer will increase the efficiency of handling a large number of input/output devices. Two additional channels of priority interrupt are supplied with the buffer to facilitate simultaneous operations.

Paper Tape Punch The SDS paper tape punch operates at 60 characters-per-second. Seven tape channels are punched per character — six data channels, plus a parity channel generated in the input/output buffer. The punch is standard equipment with the SDS 920 Computer.

Additional Priority Interrupt Channels In addition to the two channels supplied in basic 900 Series computers (four, if the second buffer is used), there are 896 priority interrupt channels available to facilitate handling of many input/output devices. Each channel is assigned a separate priority status — no two channels have the same priority. Priority interrupt is added in groups of 16 channels.

Systems Components SDS provides analog-to-digital and digital-to-analog converters, multiplexing units, and amplifiers as standard components for integration with SDS 900 Series computers.

SDS SYSTEMS

TYPICAL 900 SERIES APPLICATION AREAS

AIRCRAFT AND MISSILE DESIGN AND ANALYSIS

DATA REDUCTION SYSTEMS

CIVIL ENGINEERING

SIMULATION STUDIES

OPTICAL DESIGN

AUTOMATIC CHECKOUT SYSTEMS

ELECTRICAL DISTRIBUTION ANALYSIS

ON-LINE PROCESS CONTROL

RANGE SAFETY

STATISTICAL ANALYSIS

RADAR CONTROL SYSTEMS

THERMODYNAMIC DESIGN

SEARCHING THEORY AND ANALYSIS

CRYSTALOGRAPHIC STUDIES

REACTOR DESIGN AND SIMULATION

TRAJECTORY COMPUTATIONS

DATA ACQUISITION SYSTEMS

QUALITY CONTROL ANALYSIS

MEDICAL RESEARCH

MANUFACTURING CONTROL SYSTEMS

STRUCTURAL ANALYSIS

INFORMATION PROCESSING

NAVIGATION

CRITICAL PATH SCHEDULING

HYDRAULIC AND GAS NETWORK ANALYSIS

SATELLITE COMPUTER OPERATION

COMMUNICATION SWITCHING SYSTEMS

TELEMETRY DATA REDUCTION

APPLICATIONS

SDS 900 SERIES COMPUTERS ARE UNIQUELY EFFICIENT AND ECONOMIC FOR SYSTEMS APPLICATIONS

MINIMUM PROGRAMMING COSTS

    POWERFUL INPUT/OUTPUT INSTRUCTIONS

    PRIORITY INTERRUPT

    EASY SYNCHRONIZATION

MINIMUM ENGINEERING REQUIREMENTS

    INTERNAL BUFFERING

    FIVE INPUT/OUTPUT SYSTEMS

    PLUG-IN MODULAR SUB-SYSTEMS

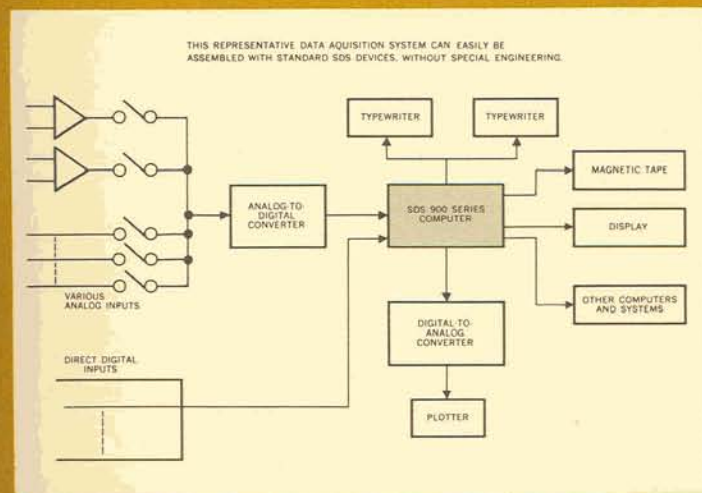MAXIMUM RELIABILITY

    SILICON SOLID-STATE COMPONENTS

    0°C. to +50°C. OPERATING TEMPERATURE RANGE
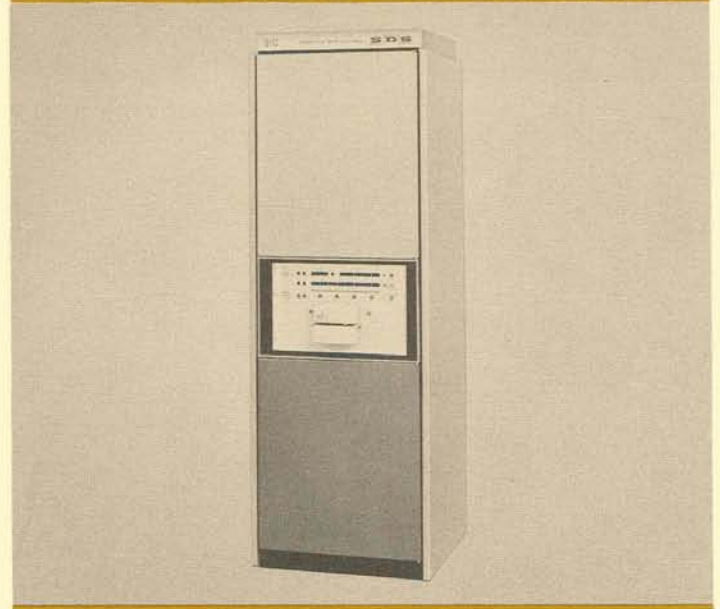
    POWER FAILURE PROTECTION

HIGH SPEED

    SIMULTANEOUS INPUT/OUTPUT AND COMPUTATION

    FAST ARITHMETIC

    HIGH DATA TRANSFER RATES

ON-LINE SOONER

    COMPLETE LINE OF STANDARD SYSTEM DEVICES,

    SUCH AS ANALOG-TO-DIGITAL CONVERTERS,

    THAT PLUG DIRECTLY INTO THE COMPUTERS

    STANDARD SYSTEM PROGRAMS

THIS REPRESENTATIVE DATA AQUISITION SYSTEM CAN EASILY BE ASSEMBLED WITH STANDARD SDS DEVICES, WITHOUT SPECIAL ENGINEERING.

MODEL 910 .... $48,000

The SDS 910 is designed for low cost, high performance, general purpose computing. Although its primary purpose is on-line control and real time systems work, the 910 is useful as a general purpose scientific computer. The 910 is the first and only random access machine with buffered input/output to be priced below $90,000. It operates directly with all types of input/output devices, including magnetic tape units, automatic typewriters, and analog-to-digital converters.

TYPE: Single address with indexing and indirect addressing ● Binary ● Core Memory ● Solid State ● Parity checking on Input/Output and Memory Operations ● Programmed Operator

MEMORY: Coincident magnetic core ● 2048 words expandable to 16,384 words — all directly addressable ● 24-bit word and parity ● Non-volatile if power fails

EXECUTION TIMES: *All times include both memory access & indexing*

Add .... 16 microseconds

Multiply .... 248 microseconds

Floating Point Operations:

    (24-bit Mantissa plus 9-bit Exponent)

      Add .... 440 microseconds

      Multiply .... 504 microseconds

    (39-bit Mantissa plus 9-bit Exponent)

      Add .... 832 microseconds

   Multiply .... 1696 microseconds

INPUT/OUTPUT:

Standard Equipment — Five input/output operation modes ● Buffer with input/output rates in excess of 50,000 characters/second simultaneous with computation ● Dual channel priority interrupt ● Display console and manual control of internal registers ● 300 character/second photoelectric paper tape reader

Optional Equipment — 60 character/second paper tape punch ● Automatic input/output typewriter ● 15 kc and 41.7 kc magnetic tape units (IBM compatible) ● 300 line/minute printer ● 200 cpm and 250 cpm card readers ● Graph plotter ● 896 channels of priority interrupt ● Second input/output buffer ● Direct communication with IBM 7090 ● Analog-to-digital converters ● Paper tape spooler

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PHYSICAL: All silicon solid state components ● Dimensions — 75"x 24" x 27" ● Power - 110V, 60cps, 17 amps ● Operating temperature range — 0°C. to +50°C.
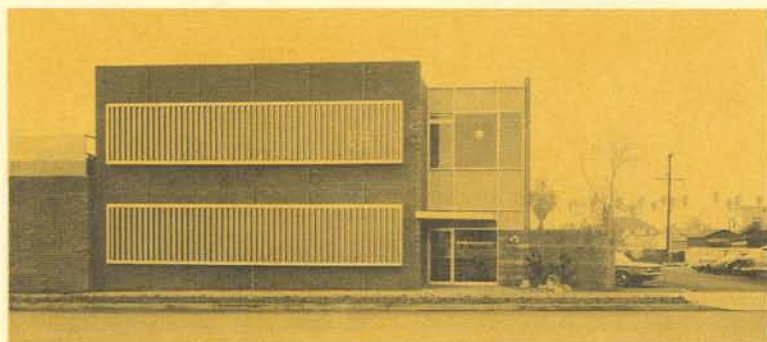
CAPABILITY THAT DIRECTLY MEETS USER REQUIREMENTS

The use of digital machines for scientific computation is over a decade old. Yet, only recently has there been enough technical history – enough operational experience – to allow a thorough evaluation of usage prior to designing a computer.

SDS was formed by a group of uniquely experienced computer specialists who, starting with a comprehensive knowledge of user problems, have designed a second generation of fast, low cost, solid state computers and associated equipment. These specialists are available to adapt SDS 900 Series computers to special customer requirements.

Other specialists at SDS are equally adept at systems design and installation and the company undertakes total responsibility for systems contracts. SDS is the only organization in the digital field offering this dual capability in high-speed computer design and total systems integration. The high degree of integration between these two specialized staffs makes possible a rapid and economic performance on systems contracts, to a degree never before available.

SDS
SCIENTIFIC DATA SYSTEMS

1649 Seventeenth Street ☐ Santa Monica, California