

CONTROL DATA 160-A COMPUTER

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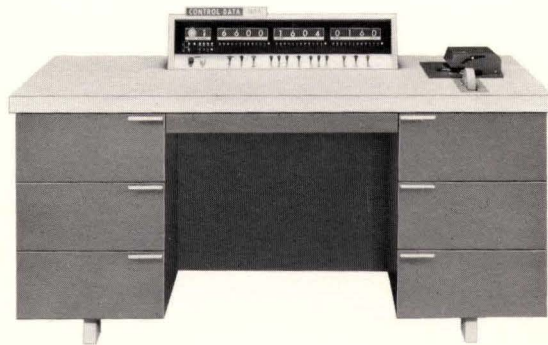
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160-A COMPUTER, SOFTWARE



The Control Data 160-A is a desk-size computer with the speed, capability, and flexibility of many large-scale computers. These features plus the 160-A software and available optional peripheral equipment put the 160-A Computer in a class by itself.

SUMMARY OF 160-A FEATURES

- Stored program, general purpose digital computer
- Parallel mode of operation
- Single address logic:
 - function code (F) 6 bits
 - execution code (E) 6 bits
- Low cost
- 8192 words of magnetic core storage (expandable to 16,384; 24,576; or 32,768 words):
 - 6.4 microseconds memory cycle time
 - 12.8 microseconds basic add time
 - 15.0 microseconds average execution time
- Buffered input-output
- Internal and external interrupt
- External multiply and divide unit (optional)
- Binary arithmetic (one's complement)
- Flexible repertoire of 130 instructions
- Completely solid state
- Low power consumption
- High reliability

160-A APPLICATIONS

A general purpose digital computer, the 160-A can be used in numerous applications . . . including:

Real-Time Applications

Scientific Calculations using FORTRAN

Civil Engineering Problems

Biomedical Experimentation and Analysis

Commercial Data Processing

Data Acquisition and Reduction

PROGRAMMING SYSTEMS

The computing power, flexibility, and speed of the 160-A Computer are enhanced by the many programming systems developed by Control Data for the 160-A Computer. These programming systems include symbolic assemblers, compilers, and interpretive systems with languages suited for general-purpose calculational tasks. A growing library of SWAP (the 160-A Users Group) programs is also available to all 160-A users.

OSAS-A

A symbolic assembler, the OSAS-A provides fully symbolic coding, automatic address correspondence, code-error checking, and listing of source and object program. The object code may be in fixed or relocatable format. Full machine language of the 160-A is available in symbolic operation codes. Pseudo operations control the assembler and its translation of the source program.

160-A FORTRAN

The 160-A FORTRAN includes a compiler, a subroutine library, and an interpreter. Programs are written in an algebraic-like notation using symbolic identifiers. The language of the 160-A FORTRAN SYSTEM is the FORTRAN-II language. The system provides all input-output routines for 160-A peripheral equipment, including the optional multi-divide unit (168-2).

SICOM

SICOM for the Control Data 160-A Computer is a general purpose interpretive system utilizing floating point arithmetic. With SICOM the 160-A becomes a decimal, floating point machine with a 10-decimal digit, plus exponent, word length. The SICOM library includes many arithmetic and trigonometric subroutines.

INTERFOR

INTERFOR is an interpretive programming system for the 160-A Computer. It contains a symbolic assembler (FLAP), a binary program loader (FLOADER), a library of subroutines, and an interpreter. The system provides six index registers and 33-bit floating point arithmetic. Programs may be written for this system which will also run on the 1604-A Computer.

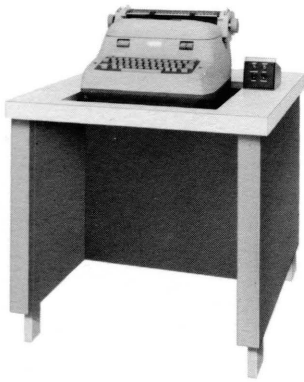
CEPS

CEPS is a programming system for solving civil engineering problems on the Control Data 160-A Computer. It enables the engineer to express the solution of a problem in a language at approximately the same level which he could use in describing his solution to another engineer. CEPS is problem oriented, modular, and the instruction repertoire is expandable.

AUTOCOMM

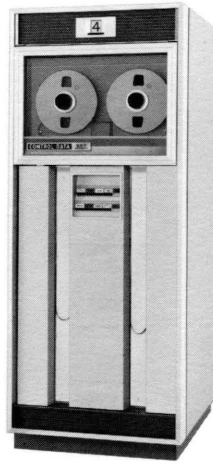
Designed for commercial data processing applications, AUTOCOMM provides a method of quickly and easily translating business problems into 160-A Computer solutions. It includes all input-output, move, compare, and edit routines. In addition, AUTOCOMM is decimally oriented and utilizes powerful instructions to minimize programming time.

AND PERIPHERAL EQUIPMENT



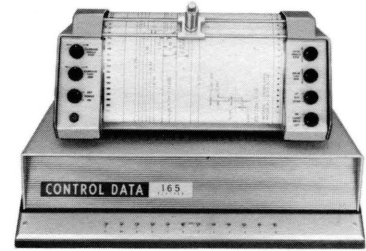
Control Data 161 Typewriter

The 161 accepts input information at normal typing speeds and prints output data from the computer at a rate of 10 to 12 characters per second. The 161 has a standard keyboard and a control panel.



Control Data 603 Magnetic Tape Transport

The Control Data 603 Magnetic Tape Transport has a maximum transfer rate of 41,700 characters per second; a tape speed of 75 inches per second; and a recording density of either 556 or 200 bits per inch. Seven-track recording on one-half inch tape conforms to industry standards and compatibility exists with IBM 727 and 729-I, II, III, and IV tape units. The 603's combination read-write heads permit immediate verification of writing and tape cleaners insure reliable tape operation. With the 603, programming is unrestricted; tape load and unload procedures are simplified by leaderless tape and straight line threading; and pneumatic drives assure long tape life.



Control Data 165 Plotter

The Control Data 165 incremental plotter permits direct on-line communication from the 160-A. A high-speed two-axis recorder for plotting one variable against another, the 165 operates at the following speeds: drum axis — 300 steps per second maximum; carriage axis — 300 steps per second maximum; pen — 16 operations, 8 up and 8 down, per second maximum.



Control Data 166 Buffered Line Printer

The Control Data 166 has a 120-character-wide print drum with a 64-character circumference around the drum. It can be used off-line without the computer for tape or card listing operations, as well as on-line with the 160-A. Speed — 150-600 lines per minute with three standard print drums. The Control Data 1612 Line Printer (not shown) is a high-speed printer available as a peripheral device with the 160-A.



Control Data 167 Card Reader

The Control Data 167 is an on-line peripheral device used with the 160-A. Standard, 80 column punched cards are read photo-electrically at a rate of 250 cards per minute. The 167, with an optional feature added, can input either column-binary data or decoded Hollerith-to-BCD data to the 160-A for on-line operations; or to the 166 for off-line card-to-printer or card-to-tape conversion.

Control Data 168 Arithmetic Unit

There are two arithmetic units available with the 160-A — the 168-1 and 168-2. The 168-1 provides fixed point double precision addition and subtraction, plus single or double precision multiply and divide. Arithmetic speeds for the 168-1 are as follows: single precision multiply — 120 μ sec; single precision divide — 145-180 μ sec; double precision multiply — 250 μ sec; and double precision divide — 295-365 μ sec. Times include obtaining operands from memory and storing the results in memory.

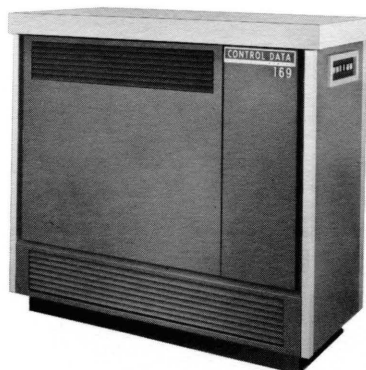
The 168-2 Arithmetic Unit is designed for FORTRAN. When used with the new 160-A FORTRAN, floating point multiply and divide times are reduced to 1.5 milliseconds, including fetch times. In summary, the 168-2 improves overall FORTRAN speeds, and it allows significant expansion of scientific calculation capacity without program changes and for low cost.

Control Data 169 Auxiliary Memory Unit

The Control Data 169 provides expansibility in modules of 8192 12-bit words up to a maximum of 24,576 words of additional external memory. In addition, the 169 provides the option of operating two 160-A Computers together, sharing a common memory and a buffer channel. The additional buffer channels allow I/O operations at a rate of 125,000 words per second.

Control Data 1610 Card Read and Punch System

The Control Data 1610 provides card input/output at a reading rate of 650 cards per minute and a punch rate of 100 cards per minute. A slower card read and punch system is also available.



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