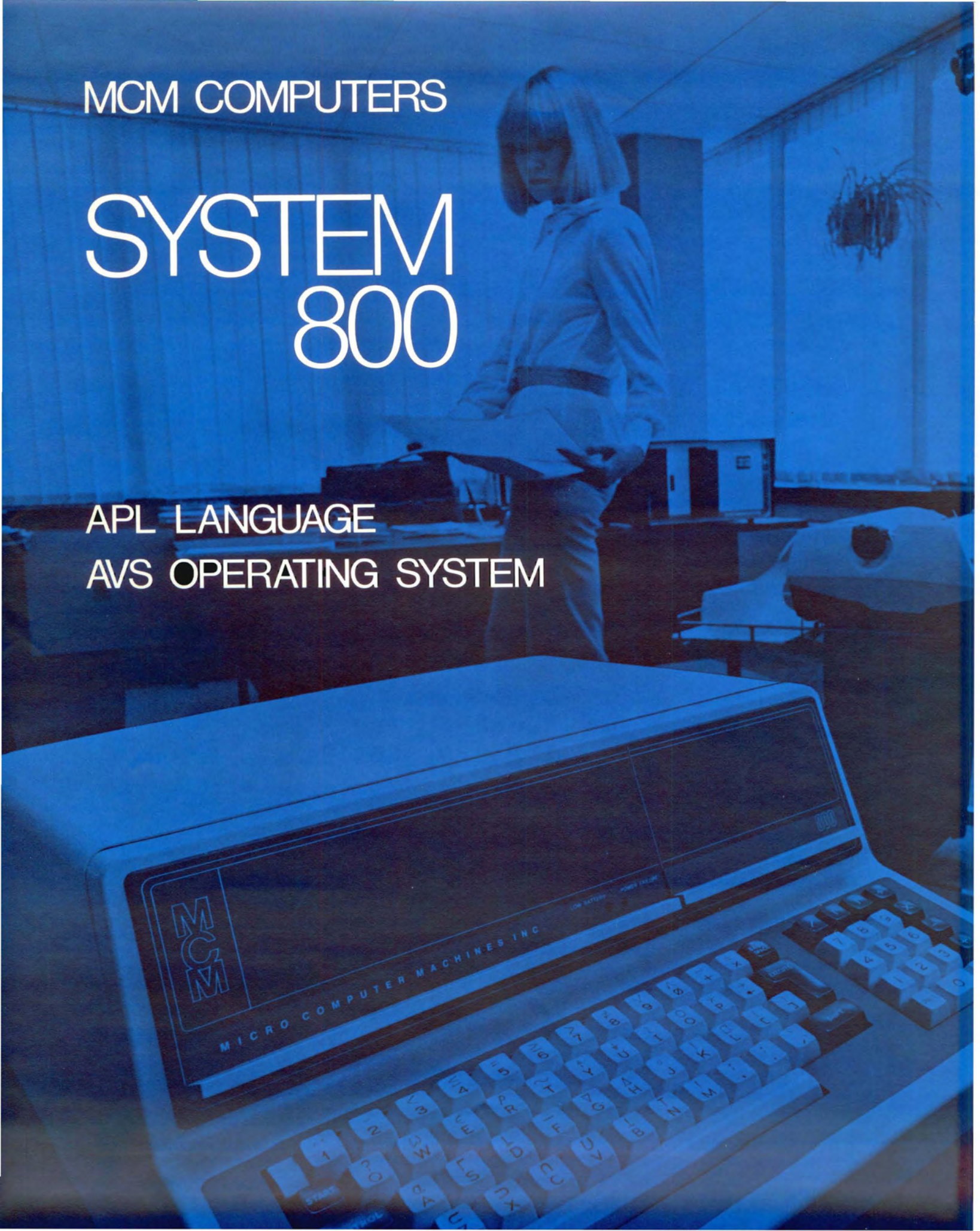
MCM COMPUTERS

SYSTEM 800

APL LANGUAGE

AVS OPERATING SYSTEM



BRIDGING THE GAP...

between the sophisticated calculators that offer simplicity of operation but fail to provide the information processing capability of the computer . . . and the large, complex and expensive computers that require such high degrees of training and experience as to place them beyond the operational capabilities of most people who want to use them.

MCM/800. Sufficiently simple to allow its use by anyone able to operate an electronic calculator and an ordinary typewriter . . . yet sufficiently sophisticated to perform practically any task performed by a large-scale computer.

MCM/800. Designed to serve general information processing needs — and also the specialized needs of the high-level computer professional.

The System 800 by Micro Computer Machines, Inc. is a complete, stand-alone computer system providing all the capabilities of a large shared computer system with none of the inconveniences and at a fraction of the expense. At the heart of the System 800 is MCM's second generation of the world's smallest APL computer. With the MCM/800 at the heart of this system, the modular concept of field-upgradeable expansion permits the System 800 to grow as your needs expand.

With your MCM/800-based system you can operate in a stand-alone or distributed processor mode . . . access time-shared computers or data bases, drive printers and plotters, handle input from marked card readers . . . and interface with practically any standard peripheral device you wish.

Here are the main features of the MCM/800:

- Complete stand-alone computer system
- Full capability to communicate with other computers and terminals
- Powerful, easy-to-use APL language built in
- 256K byte AVS Virtual Memory operating system
- Modular design for easy field expansion
- True portability . . . less than 25 pounds

The first complete stand-alone micro-computer to provide full scale information processing capability — with the power of a large-scale computer and the ease of a programmable calculator. Right at your own desk . . . or anywhere else it may be needed. At a price you can afford.

SOLVE YOUR OWN PROBLEMS

MCM/800 uses the most powerful, versatile, yet simplest of the computer languages — APL. Within less than an hour of following simple step-by-step instructions, you can start problem solving with APL. You need no longer use your valuable time to describe to a programmer tasks that will quickly become routine. In many cases, you will find describing your problem in APL is quicker and more precise than explaining it to a programmer.

UTILIZE APPLICATION LIBRARIES TO MEET YOUR NEEDS

Using MCM-developed standard or customized applications packages, you can build up libraries on cassette or diskette to meet the specific needs of your business . . . general ledger, billing, inventory control, A/P or A/R. Also available are packages for plotting, actuarial analysis, financial analysis, and many, many more.

BECOME MORE COST-EFFECTIVE

MCM/800 allows you to be cost-effective in many ways. Your MCM/800 can be purchased outright for what you might pay for a month's lease on a large computer, or a few month's fees to a computer service bureau. A basic MCM/800 costs no more than many of the advanced programmable calculators now on the market. In effect, therefore, you can have total information processing power for less than any other method now available . . .

Additional savings are brought about because of the efficiency of the APL language. You will be able to develop programs in as little as one tenth the time required with other computer languages, thus providing continuing savings in operations costs.

Also, time saved on the big mainframe doing jobs that can be handled by an MCM/800 will provide paybacks of sometimes as short as one year.

ENSURE FULL SECURITY OF CONFIDENTIAL DATA

MCM/800 provides the second level of security for sensitive data. You can provide complete physical security of your cassette tapes and maintain your records in-house. No longer do you have to give confidential information to outside service bureaus or load your files into some distant public-access system.

ENJOY TRULY PORTABLE COMPUTING

Smaller and lighter than most typewriters, MCM/800 weighs less than 25 pounds and is innovatively compact. MCM/800 operates either from any standard electrical power source or from 14V battery power. You can work with MCM/800 in the office, the conference room, the lab, the field site, anywhere — even take it home — and have full data processing power wherever you need it.

MCM/800 TOTAL STAND-ALONE PERSONAL COMPUTING

APPLICATIONS OF THE MCM/800

The MCM/800 has applications in every area of human activity where information processing and calculation are essential.

In small organizations and large ... in laboratories, factories, classrooms . . . by businessmen, scientists, engineers, actuaries, educators and students . . . MCM/800 is ready to serve. Because it is the smallest, least expensive full service computer ever built it can go anywhere it's needed with ease and convenience

In the large computer-using organization, for example, MCM/800 provides an ideal, inexpensive method for data entry, problem solving and on-line processing, without tying up mainframe equipment and personnel.

In the location not equipped with computers, MCM/800 provides a highly cost-effective way to obtain full service information processing without the large expenditures needed to "computerize" operations now performed manually.

As a complete, stand-alone, full service unit, MCM/800 brings its capabilities to the desktop, the lab table, the school room and the field site with equal ease.

BUSINESS DATA PROCESSING

MCM/800 is applicable to business and industry at two levels.

For the organization with existing computer equipment, MCM/800 provides computer oriented personnel with a low cost means of developing new programs, debugging existing programs, performing remote or on-line data processing and handling calculations without tying up large mainframe equipment.

For the firm wishing to initiate in-house computer capability, MCM/800 provides a total, compact data handling system that is so simple to operate and so economical to purchase that costs for leasing large scale equipment or paying a service bureau cannot compete with the freedom of personal ownership of this new information processor.

Studies of a number of commercial facilities show that computers are often used at times when simple calculators would be more cost effective. Conversely, indications are that large computers are often not used when they could be, due to the batch orientation of the large system, and the reluctance of the DP staff to let users disrupt their system. Thanks to the simplicity of APL, the user can now solve problems, access information, and be "on-line" to his MCM System while being "off-line" to the large centralized system. The resultant savings in time and skilled personnel readily offset the costs of MCM/800 ownership.

In both cases, MCM/800 provides the ideal solution for bridging the gap where calculators leave off and large scale systems begin.

Now, total management and record control, inventory control, word processing, accounting functions, market planning, and all other activities where calculators and computers are traditionally used . . . can be served by the low-cost, stand-alone power of MCM/800.

PROBLEM SOLVING

In all areas of engineering, scientific, and mathematical work MCM/800 provides the ideal solution for truly personal, portable problem solving.

In addition to standard computational and mathematical operations, MCM/800 is capable of performing any task that large scale computers can.

Now, with on-the-spot convenience, MCM/800 can be put to work in the laboratory, the office, the production floor or the test station. It can be brought easily to the assembly line area, the conference room, the field site and even the home.

The simple, powerful language of APL makes MCM/800 the perfect tool for engineering and scientific requirements.

Through easily attached peripheral equipment, the small, low-cost unit can be applied everywhere . . . in data acquisition and control, actuarial analysis and simulations, physiological analysis, circuit design, network simulation, structural design and stress analysis, chemical process analysis and control, or anywhere else where computers and calculators are now used.

Using the mathematical shorthand notation of APL, all trigonometric functions, logs to any base, sorting, maximizing, minimizing, factorials, random number generation, as well as qualitative and logical comparisons are accomplished in single or two key depressions. All matrix operations are APL notations as are encoding and decoding from one numbering system to another. The ease of APL combined with the vast libraries of statistical, engineering and mathematical programs already available in APL, makes the MCM/800 a unique tool for problem solving.

EDUCATION

MCM/800 is ideally suited for use in the three key educational applications — the object of instruction; the vehicle for instruction; and the means for administrative management of instruction.

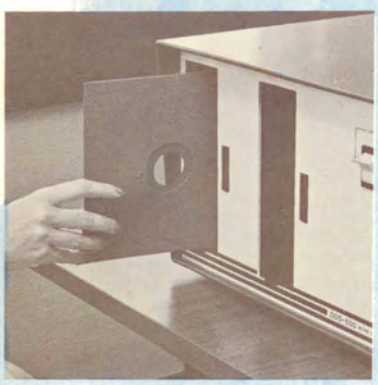
For classroom use, the MCM/800 provides a full service computer at a price comparable to that of a shared terminal or advanced calculator. More important, however, is the fact that because of the APL language, students can spend more time using the computer as a learning tool . . . rather than expending hour after hour just learning to program.

The fact that MCM/800 is operable from standard electrical current means that any classroom can become the "computer" room. No special wiring is needed, no communications lines to remote locations and no rescheduling of learning activities because the big, distant computer is not available. The MCM/800 is ready to start students in the learning process as soon as it's plugged in.

At the college and the university, the MCM/800 is able to provide full service information processing in the laboratory, and even off campus.

Students, instructors, and professors can have personal use of stand-alone, go-anywhere information processing whatever their needs. With the simple cassette system MCM/-800 uses, each person employing the computer can now have a personal library of both data and programs for study projects, research programs and direct teaching/learning activities throughout the semester.

WITH TOTAL SYSTEM CAPABILITY



MCM/800 THE HEART OF THE SYSTEM

Despite its small size, MCM/800 can perform almost any operation and execute any task that a large-scale computer can. Within its compact chassis are all the features and capabilities of a total data processing system.

These include a full alphanumeric keyboard with numeric pad, a plasma display panel with high-legibility characters, a Central Processing Unit with 4K bytes of Read/Write Memory that is expandable to 16K bytes. An Integrated Magnetic Tape Cassette expands the memory capacity by more than 100K bytes. Also included is a resident operating system which includes: a Virtual Operating System, Omniport Input/Output Interface, a complete APL interpreter, and a battery-operated Power Fail Protection System.

FULL SCALE FLEXIBILITY

One of the optional features MCM/800 offers, for added flexibility, is practically unlimited expansion of user workspace by connecting external diskette memory. This allows the user to input both programs and data from a self-developed library that can be made as personally useful and flexible as notebooks, workfiles and other business tools. The diskette operating system expands the directly accessible on-line storage to up to 2 million bytes . . . with a Virtual memory work space of 256K bytes.

Also adding to MCM/800's flexibility is its advanced file system which simplifies the user interface to large amounts of data or programs.

This, in addition to its built-in protection against damage or loss of data because of power failure, are all part of MCM/800's standard total system flexibility.

UNIVERSAL INTERFACING

MCM/800's Omniport interface feature allows it to present parallel data to a wide selection of external peripheral equipment and attachments just as with any large-scale computer. Utilizing available interface modules, MCM/800 can drive printers, plotters, remote displays, diskettes and analog/digital converters. The MCM Communications Subsystem provides serial data I/O compatible with EIA Standard Interface specification RS232/C, as well as standard protocols for ASCII, EBCDIC, Correspondence Code and Tektronix 4013 Graphics. Utilities made available by MCM also facilitate interactive communications with large-scale operating systems.

SPECIFICATIONS

HARDWIRED APL INTERPRETER AND OPERATING SYSTEM

Size:	32768 bytes Read-Only Memory
Expandable:	Yes
Built-in Primitive Functions:	87
Built-in System Functions:	29
Range:	-7×10^{75} to $+7 \times 10^{75}$
Precision:	16 digits

Built-in Trigonometric Functions include:
Sine, Cosine, Tangent, Arcsin, Arcos, Arctan, Pi, Hyperbolics

Built-in Logical and Relational Functions:
$< \leq = \neq \geq >$ And, Or, Nand, Nor, Not, Membership

Built-in Data Structuring Functions include:
Reshape, Reverse, Rotate, Transpose, Ravel, Catenate, Take, Drop, Compress, Expand

Built-in Mathematical and Data Manipulation Functions include:
All Arithmetic Functions, Sort, Power, Root, Factorial, Random Number, Inner Product, Outer Product, Natural Log, Base X Log, Reduction, Scan, Absolute Value, Encode, Decode, Minimum, Maximum, Format

MCM/APL

Compatibility:	APL/360; APL.SV
Extension:	Execute, Dyadic Null, Extended Format, Scan, Quad System Functions and Variables Dyadic Quote-Quad, Advanced Function Editing
Data Types:	Character, Integer, Real, Logical
Data Structures:	Scalar, Vector, Matrix, Arrays to Rank 32

AVS VIRTUAL OPERATING SYSTEM

Groups per Volume:	Up to 256
Names per Group:	Up to 256
Built-in Functions:	Read, Write, Names, Initialize, Select, Close, Create, Append, Delete

POWER — FAILURE PROTECTION

Method:	Internal Batteries
Transient Power Loss:	System continues under battery power
Extended Power Loss:	Initiate orderly shutdown; workspace saved on to AVS-active casette tape; automatically reloads and continues when power restored.

OMNIPORT I/O INTERFACE

Addressable Devices:	199
Data:	8 bits parallel
Address:	8 bits parallel
Status:	8 bits parallel
Character transfer rate:	480 characters per second
Bit mode transfer rate:	96 bits per second
Input buffer:	132 characters
Output buffer:	132 characters
Logic Levels:	5 - volt CMOS; TTL Compatible

READ/WRITE MEMORY

Word length:	8-bit byte
Capacity:	4096 bytes expandable to 8192 or 16,384 bytes
Storage:	Instruction characters: 1 byte each Data characters: 1 byte each Integer numbers: 1 to 8 bytes each Decimal Numbers: 8 bytes each
Overhead Loss:	500 bytes, approx. at turn-on.

MAGNETIC TAPE CASETTE

Capacity:	102,400 bytes per 300 foot cassette
Drives:	One built into unit One external drive optional
Block size:	128 bytes
Read/Write Speed:	10 inches per second
Search Speed:	40 inches per second
Recording Density:	650 bits per inch
Transfer Rate:	810 bytes per second
Recording Method:	Bi-phase level encoding
Checking:	Read-after-write; Byte parity; Block check sum
System Access:	Virtual (AVS) or Externally Addressable (EASY)

DISPLAY

Capacity:	1 line of 32 characters
Type:	Plasma
Character format:	5 x 7 dot matrix
Response indicators:	3
Latency:	0.1 to 25.5 seconds; or infinite

KEYBOARD

Compatibility:	IBM 2741 plus start and control keys Auxiliary numeric keyboard. Auto-repeat
Input buffer:	85 characters

CS COMMUNICATIONS OPTION
Internally Mounted in MCM 800

Compatibility:	RS 232C; Teletype® terminals; Bell 103 Dataset; Bell standard telephone handset; IBM Correspondence-code; DECwriter® terminals; DECscope® CRT terminals; Tektronix 4013 terminal; compatible with all terminals and computers.
Code Tables:	APL/ASCII ASCII IBM Correspondence Any 5, 6, 7, or 8-level code table may be entered from tape cassette or keyboard
Speeds:	110, 134.5, 150, 300, 600, 1200, 2400, 4800 baud user-selected under program control

POWER: AC Input:
85-140 VRMS; 1 Amp; 50 - 500 Hz
DC Input: (Optional)
14 Volts DC at 5 Amps
External DC Source via 2 prong connector at rear.

ENVIRONMENT: Operating Temperature 10° C to 35° C
(50° F to 95° F)
Storage Temperature
—18° C to 70° C
(0° F to 158° F)
Relative Humidity 10% to 90% without condensation

DIMENSIONS: Height 7.5 in. (19 cm)
Width: 16.5 in. (42 cm)
Depth 19 in. (48 cm)

WEIGHT: Approx. 25 lb. (11 kg)

PERIPHERALS & ATTACHMENTS (optional)

All peripherals below are fully supported, including special software drivers, hard-wired into computer, and are attached to the computer through the omniport cable.

MCP - 132 PRINTER/PLOTTER

Printer Speed:	30 to 45 characters per second
Print Line:	132 columns
Forms Width:	15 inches
Character fonts:	APL, Elite, Pica, Courier, Manifold, French, German, Scandia, Kana

SDS - 250 SINGLE DISKETTE AND
DDS - 500 DUAL DISKETTE SYSTEMS

Capacity:	256 Kilobytes per diskette
Access Time (Average):	260 ms
Head(s) automatically unloaded after 2½ seconds of no activity	
Tracks:	64 plus reserve tracks
Sectors:	16 per track; 256 bytes per sector
Transfer Rate:	Read 24 sectors/sec Write 7.5 sectors/sec
Checking:	Verify — after — write Block checksum

PMR - 400 CARD READER

Speed:	400 cards per minute
Type:	Punch or Mark 80-column cards
Hopper Capacity:	1000
Stacker Capacity:	500

VDU - 2480 CRT

Character Set:	APL/ASCII ASCII (Upper and Lower Case)
Per Line:	80 characters
Lines:	24
Screen Size:	12 inch (Requires CS option or SCI-1200)

SCI-1200 COMMUNICATIONS SUBSYSTEM
(Externally mounted subsystem which provides same facilities as CS Option)

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