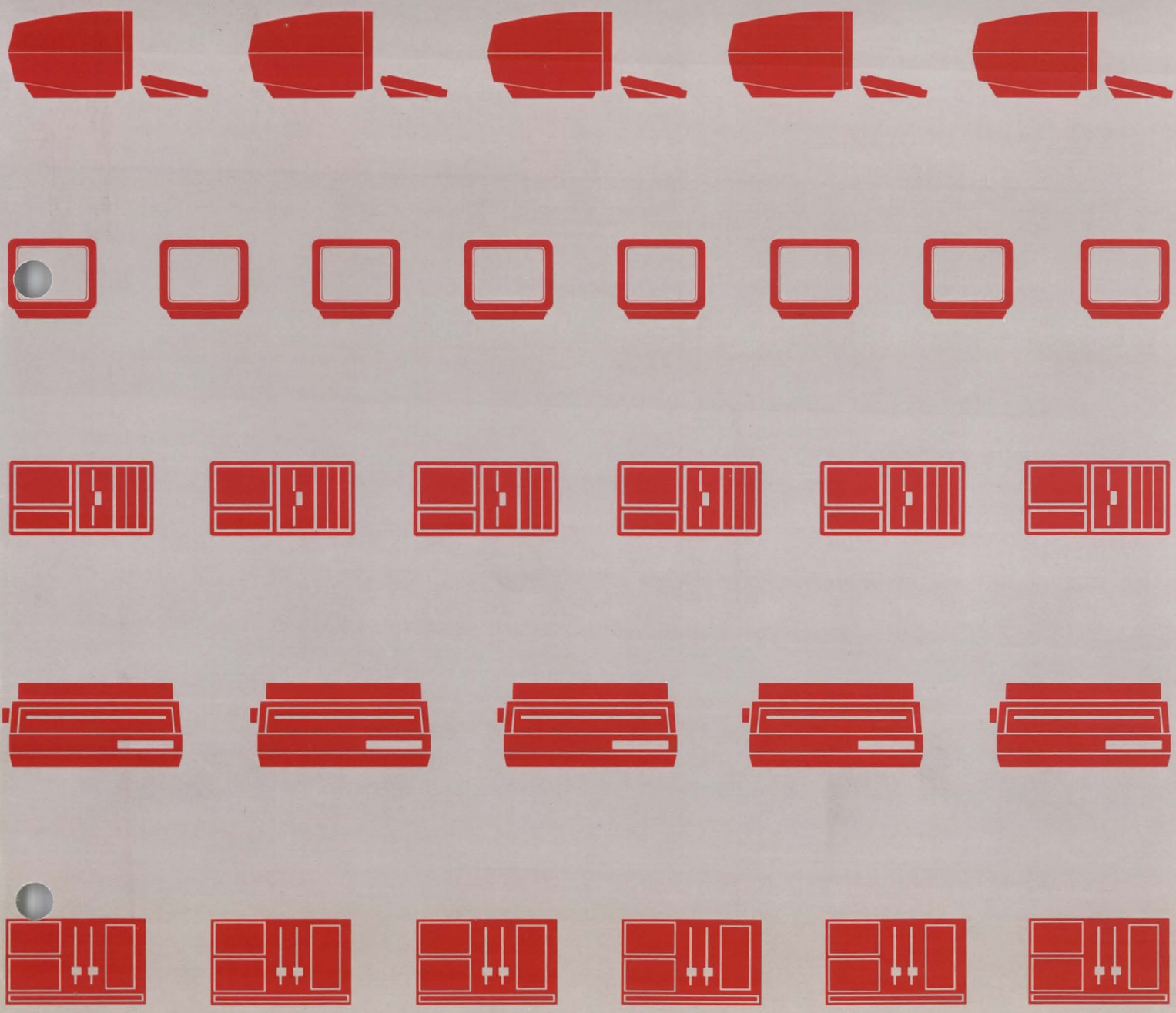
Cromemco

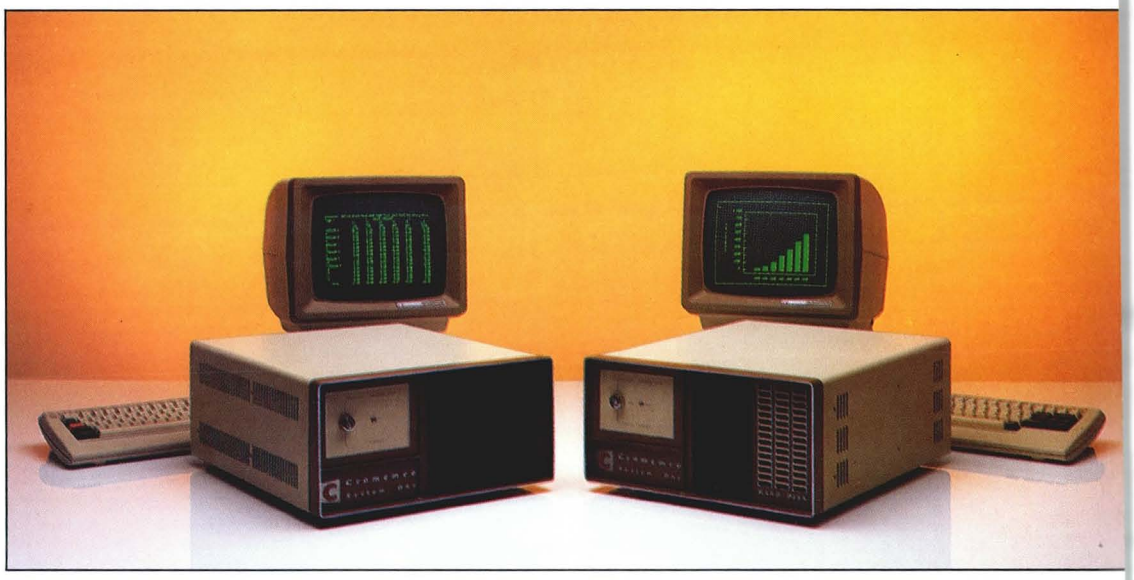
Systems Catalog



Cromemco

Systems Catalog

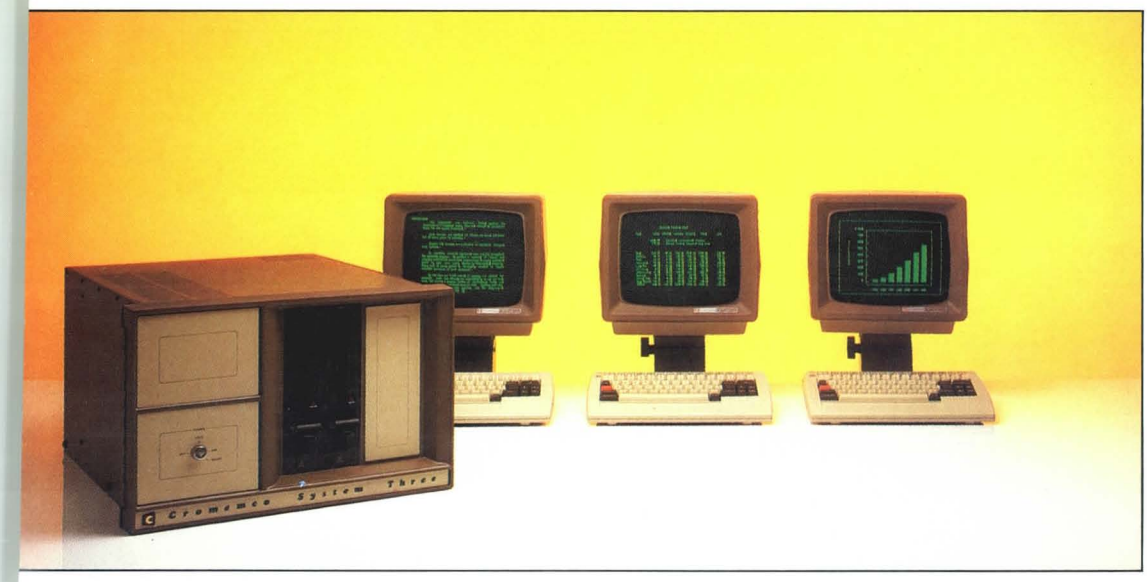
CONTENTS



Cromemco is one of the oldest companies in the microcomputer industry and has always played a leading role in advancing the state of the art in microcomputers. We have evolved into a complete computer company by offering lines of systems, personal computers, board level products, software, and peripherals that match system performance to system needs at an affordable price.

At Cromemco, the philosophy is that all products of the company should be interrelated so that the customer gains the true advantage of superior design and benefits from buying from a single supplier.

For example, most of our systems are bus-oriented so you can configure them to *your needs*. You can expand memory, add peripherals, network systems, add graphics, and connect to phone lines. You can set up a personal work station or a network of hundreds of work stations; interface to large data bases or build your own.



Our boards fit with our systems and with each other. Our Personal Computer works by itself, or with our larger microcomputers. And all of these products are supported by a broad line of software and peripherals.

We have a Personal Computer that gives you more than most PC's. Our low-priced C-10 is a full-featured personal computer with tremendous capability, it can be interconnected to larger systems or used in communication networks.

Looking for software? Cromemco provides some of the best systems software, languages, and software tools available. And our systems are built around two of the most popular microprocessors in the industry, so you have access to a large library of other existing software.

Designing your own system? Use our microcomputers as prototype units, configured as you wish; or use our line of S-100 boards as prototype modules and save the huge costs of designing circuits with individual components.

Here's our point. Our product concept is that our product lines will work together; that one product must relate to all other products; that they be supported by excellent software and peripherals; that they represent the latest in technology and offer users complete solutions.

We try to anticipate your needs and make systems that are expandable and upgradable — with software and hardware.

We don't believe other computer companies can offer you all this:

- A wide choice of microcomputer systems, from personal computers to high performance systems.
- Custom-designed and manufacturer-supported software that takes full advantage of the hardware capabilities.
- The ability to upgrade and expand — efficiently, easily, and inexpensively.
- A broad product line that offers a wide variety of standard, off-the-shelf configurations or lets you design your own system.
- Access to a large library of existing software.
- Communications capability for distributed processing applications.

Computers should be made to work for people. You should be able to concentrate on what you do best: think; create; innovate; explore; make decisions; solve problems.

Cromemco microcomputers put you into this environment. You can have a personal system or one that accommodates many users. Compatible software does the routine jobs and lets you concentrate on the exceptional.

Look into Cromemco. We offer advantages that simply can't be found at any other computer manufacturer.

D-SERIES SYSTEMS

Cromemco's D-Series computer systems are based on the 68000 and Z-80A microprocessors and are designed to provide the high performance capabilities needed in a wide range of applications in business, engineering, education, industry, and science.

FEATURES

- 68000 and Z-80A microprocessors
- Ability to address up to 16 megabytes of memory
- 68000-based software including CROMIX, a UNIX-like operating system, a 68000 Assembler, linker and debugger, and high level languages including FORTRAN 77, Pascal, and C. Available soon COBOL and BASIC.
- Access to a large library of existing CP/M-based software written for the Z-80
- Communications capability with IBM mainframes and other host systems
- Stand-alone operation or local area networking capability through C-NET
- Easy expansion capability for applications which require additional memory or I/O
- Reliable components for demanding applications

Z-80A SYSTEMS

Cromemco's Z-80A based computer systems provide cost-effective solutions for professional and personal applications. These systems provide well-tested performance and give users access to the large library of existing high level languages and application software written for the Z-80A.

FEATURES

- Access to a large library of existing software written for the Z-80A
- Communications capability with IBM mainframes and other host systems
- Stand-alone or local area networking capability through C-NET
- Cost-effective solution for many applications
- Availability of high level languages such as FORTRAN, COBOL, BASIC, C, RATFOR, LISP, and RPG-II
- Upgradeable to D-Series systems
- Reliable components for demanding applications

D-SERIES
System One

Cromemco's desktop System One computer provides multi-user or single-user capabilities at a very affordable price. The D-Series System One is a cost-effective solution for applications which need to support multiple users and run multiple jobs.

In addition to the dual processor CPU board which contains both the 68000 and Z-80A microprocessors, a basic System One includes 780Kb of mass storage on two 5¼" floppy disk drives and an eight-slot card cage. System One configurations are available which include either 512Kb of error-correcting memory or 256Kb of RAM without the error-correcting feature. A heavy duty power supply, 110- or 220-volt operation, and an all-metal chassis are standard features on the System One.

The System One also comes with an RS-232 serial interface for connecting a CRT terminal.

If even more disk storage is required, a 21-megabyte hard disk is available. This configuration is identical to the basic System One except that the built-in hard disk takes the place of one of the floppy disk drives and a hard disk controller card is included.

The eight-slot card cage provides expansion capability for additional memory**, interfaces, and other options. Cromemco's full line of software and peripherals are also available for use with the System One.

The D-Series System One computers also offer multi-user capability when used with the CROMIX-D multi-user, multi-tasking operating system. By adding Cromemco's IOP and QUADART boards to a system, up to five terminals can be connected.

BUYER'S GUIDE

MODEL	CPU	RAM	FLOPPY DISK STORAGE	HARD DISK STORAGE†	S-100 BOARDS INCLUDED
CS1D2	68000 and Z-80A	256Kb	780Kb	none	DPU, 256KZ, 64FDC
CS1D5E	68000 and Z-80A	512Kb (ECC)*	780Kb	none	DPU, MCU, 512 MSU, 64FDC
CS1HD2	68000 and Z-80A	256Kb	390Kb	21Mb	DPU, 256KZ, WDI, 64FDC
CS1HD5E	68000 and Z-80A	512Kb (ECC)	390Kb	21Mb	DPU, MCU, 512MSU, WDI, 64FDC

*Error Checking and Correction capability

†Unformatted capacity

**With the 256K byte system you can add 256KZ boards to expand memory capacity. The 512K byte system memory can be expanded with additional 512MSU boards.

TECHNICAL SPECIFICATIONS

	68000 and Z-80A Based Systems			
	CS-1D2	**CS-1D5E**	**CS-1HD2**	**CS-1HD5E**
Processor	68000 and Z-80A			
Clock Rate	68000: 8 MHz / Z-80A: 4 MHz			
Instruction Set	68000: Over 1000 instructions in 56 main types / Z-80A: 158 instructions including the 78 instructions of the 8080A processor			
RAM Memory	256Kb	512Kb (ECC)*	256Kb	512Kb (ECC)*
ROM Firmware	RDOS and Diagnostics			
Serial Interface	RS-232 or current loop			
Processor Control	Software controlled switching between 68000 and Z-80A			
Floppy Disk Storage	780Kb	780Kb	390Kb	390Kb
Hard Disk Storage†	None	None	21 Mb	21 Mb
Board Capacity	8 boards			
Boards Supplied	DPU, 256KZ, 64FDC	DPU, MCU, 512MSU 64FDC	DPU, 256KZ, WDI, 64FDC	DPU, MCU, 512MSU WDI, 64FDC
Bus	S-100			
Power	Operates from 100/115/130/220/240/260 volts; 50/60 cycle			
Power Consumption	300 watts	300 watts	325 watts	325 watts
Power Supply	+8 volts @10A, +18 volts @2A. −18 volts @ 1A			
Dimensions	14.2"W × 7.0"H × 17.8"D (36cm × 17.8cm × 45.2cm)			
Weight	45 lbs.	46 lbs.	51 lbs.	52 lbs.
Mounting	Cabinet; optional rack-mount brackets available			
Operating Environment	0-40°C			

* Error Checking and Correction.

†Unformatted capacity.

D-SERIES
System Two

Cromemco's D-Series System Two is a rugged, industrial-grade, rack-mount computer that was especially designed for applications in areas such as industrial automation and process control. The System Two can also easily be configured for specific applications with Cromemco's add-on memory and I/O boards, including multi-processing, analog-to-digital, networking interfaces, and a variety of serial and parallel interfaces.

A basic D-Series System Two includes the dual processor CPU board which contains both the 68000 and Z-80A microprocessors, 780Kb of floppy disk storage on two 5¼" floppy disk drives, a 21-slot shielded motherboard which provides expansion capability for system options, a heavy duty power supply, an all-metal chassis, and rack-mount construction usable with standard industrial cabinets. Models come with either 512Kb of error-correcting memory or 256Kb of standard memory.**

Models with a 21-megabyte hard disk option are also available.

The System Two can be expanded to include up to 4 megabytes of internal memory and to handle multi-user, multi-tasking applications.

An optional air cooling unit, the Model BRZ-2, is available for use with larger System Two configurations in warm environments.

BUYER'S GUIDE

MODEL	CPU	RAM	FLOPPY DISK STORAGE	HARD DISK STORAGE†	S-100 BOARDS INCLUDED
CS2D2	68000 and Z-80A	256Kb	780Kb	none	DPU, 256KZ, 64FDC
CS2D5E	68000 and Z-80A	512Kb (ECC)*	780Kb	none	DPU, MCU, 512MSU, 64FDC
CS2HD2	68000 and Z-80A	256Kb	780Kb	21Mb	DPU, 256KZ, 64FDC, WDI
CS2HD5E	68000 and Z-80A	512Kb (ECC)	780Kb	21Mb	DPU, MCU, 512MSU, 64FDC, WDI

*Error Checking and Correction capability

†Unformatted capacity

**With the 256K byte system you can add 256KZ boards to expand memory capacity. The 512K byte system memory can be expanded with additional 512MSU boards.

TECHNICAL SPECIFICATIONS

	68000 and Z-80A Based Systems			
	CS-2D2	**CS-2D5E**	**CS-2HD2**	**CS-2HD5E**
Processor	68000 and Z-80A			
Clock Rate	68000: 8 MHz / Z-80A: 4 MHz			
Instruction Set	68000: Over 1000 instructions in 56 main types / Z-80A: 158 instructions including the 78 instructions of the 8080A processor			
RAM Memory	256Kb	512Kb (ECC)*	256Kb	512Kb (ECC)*
ROM Firmware	RDOS and Diagnostics			
Serial Interface	RS-232 or current loop			
Processor Control	Software controlled switching between 68000 and Z-80A			
Floppy Disk Storage	780Kb			
Hard Disk Storage†	None	None	21 Mb	21 Mb
Board Capacity	21 boards			
Boards Supplied	DPU, 256KZ, 64FDC	DPU, MCU, 512MSU 64FDC	DPU, 256KZ, 64FDC, WDI	DPU, MCU, 512MSU WDI, 64FDC
Bus	S-100			
Power	Operates from 100/115/130/220/240/260 volts; 50/60 cycle			
Power Consumption	500 watts	500 watts	615 watts	615 watts
Power Supply	+8 volts @ 30A, +18 volts @ 15A, −18 volts @ 15A			
Dimensions	12-1/4"H × 19"W × 20-3/4"D (31.1 × 48.2 × 52.7 cm)			
Weight	56 lbs.	57 lbs.	62 lbs.	63 lbs.
Mounting	For Rack Mounting			
Operating Environment	0-40°C			

* Error Checking and Correction.

†Unformatted capacity.

D-SERIES
System Three

The Cromemco System Three, which combines large disk storage with processing power and room for expansion, is ideal for commercial applications. The D-Series System Three can easily handle multiple users performing multiple jobs such as the manipulation of large data bases, data analysis, accounting, word processing, and a variety of similar applications.

A D-Series System Three comes with the dual processor CPU board which contains both the 68000 and Z-80A microprocessors, two 8″ floppy disk drives which provide a total of 2.4 megabytes of storage, a 21-slot shielded motherboard, a heavy duty power supply, 110- or 220-volt operation, an all-metal chassis, and can be rack mounted or mounted into the MDSK computer work station desk (see page 33). System Three models are available with 512Kb of error-correcting memory or 256Kb of standard memory.**

Models with a hard disk are also available. In these models, one of the floppy disk drives is replaced with a 21-megabyte hard disk.

The D-Series System Three can be expanded to include up to 4 megabytes of internal RAM and is ideal for sophisticated multi-user, multi-tasking requirements.

With the large number of available card slots, the System Three can be easily configured for specific applications with Cromemco's system and software components. These components include multi-processing boards, networking interfaces, and a variety of serial and parallel interfaces. High level programming languages such as FORTRAN 77, C, and Pascal (COBOL and BASIC available soon) are also available for use with the D-Series System Three.

BUYER'S GUIDE

MODEL	CPU	RAM	FLOPPY DISK STORAGE	HARD DISK STORAGE†	S-100 BOARDS INCLUDED
CS3D2	68000 and Z-80A	256Kb	2.4Mb	none	DPU, 256KZ, 64FDC
CS3D5E	68000 and Z-80A	512Kb (ECC)*	2.4Mb	none	DPU, MCU, 512MSU, 64FDC
CS3HD2	68000 and Z-80A	256Kb	1.2Mb	21Mb	DPU, 256KZ, 64FDC, WDI
CS3HD5E	68000 and Z-80A	512Kb (ECC)	1.2Mb	21Mb	DPU, MCU, 512MSU, WDI, 64FDC

*Error Checking and Correction capability

†Unformatted capacity

**With the 256K byte system you can add 256KZ boards to expand memory capacity. The 512K byte system memory can be expanded with additional 512MSU boards.

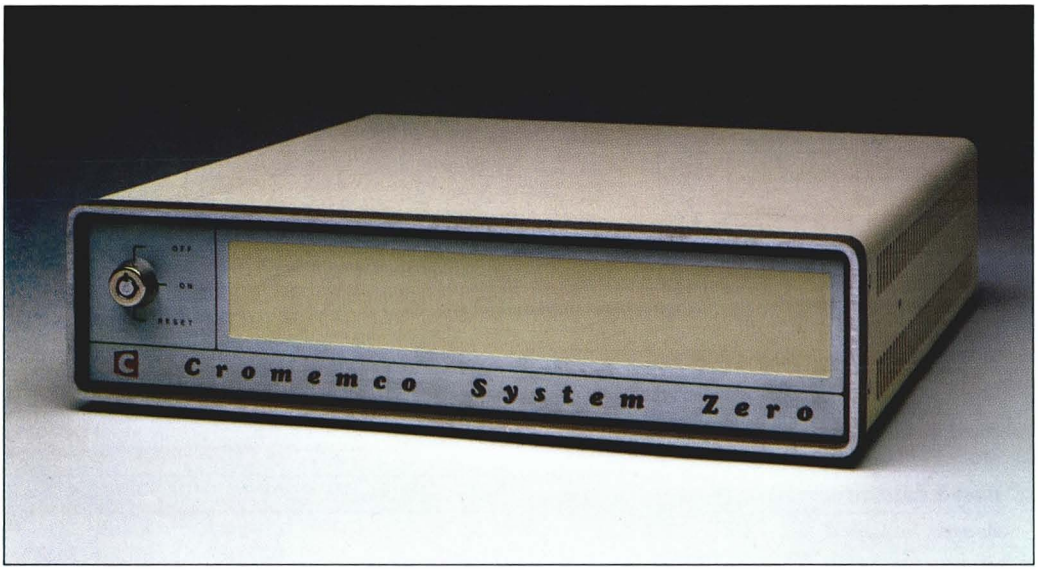
TECHNICAL SPECIFICATIONS

	68000 and Z-80A Based Systems			
	CS-3D2	**CS-3D5E**	**CS-3HD2**	**CS-3HD5E**
Processor	68000 and Z-80A			
Clock Rate	68000: 8 MHz / Z-80A: 4 MHz			
Instruction Set	68000: Over 1000 instructions in 56 main types / Z-80A: 158 instructions including the 78 instructions of the 8080A processor			
RAM Memory	256Kb	512Kb (ECC)*	256Kb	512Kb (ECC)*
ROM Firmware	RDOS and Diagnostics			
Serial Interface	RS-232 or current loop			
Processor Control	Software controlled switching between 68000 and Z-80A			
Floppy Disk Storage	2.4 Mb	2.4 Mb	1.2 Mb	1.2 Mb
Hard Disk Storage†	None	None	21 Mb	21 Mb
Board Capacity	21 boards			
Boards Supplied	DPU, 256KZ, 64FDC	DPU, MCU, 512MSU 64FDC	DPU, 256KZ, WDI, 64FDC	DPU, MCU, 512MSU WDI, 64FDC
Bus	S-100			
Power	Operates from 100/115/130/220/240/260 volts; 50/60 cycle			
Power Consumption	550 watts	550 watts	650 watts	650 watts
Power Supply	+8 volts @ 30A, +18 volts @ 15A, −18 volts @ 15A			
Dimensions	12-1/4"H × 19"W × 20-3/4"D (31.1 × 48.2 × 52.7 cm)			
Weight	84 lbs.	85 lbs.	90 lbs.	91 lbs.
Mounting	For Rack Mounting			
Operating Environment	0-40°C			

* Error Checking and Correction.

†Unformatted capacity.

Z-80A
System Zero



The System Zero is ideal for ROM-based, dedicated applications. A basic System Zero includes a fast, Z-80A based single card computer, 8K bytes of on-board 2716 PROM capacity (PROMs not included), and 1K byte of static RAM memory. Interfacing is through an RS-232 (or 20mA current loop) serial interface with programmable baud rates to 76,800 baud. The single card computer also provides 24 bits of bidirectional parallel I/O, five programmable timers, vectored interrupts, and compatibility with all Cromemco cards. Consequently, additional memory or I/O cards can be added to configure the system for specific needs.

The System Zero includes a 4-slot shielded motherboard, a heavy duty power supply, 110- or 220-volt operation, an all-metal chassis, and cabinet or optional rack mounting.

TECHNICAL SPECIFICATIONS

Model:
CS-0

Processor:
Z-80A

Clock Rate:
4 MHz

Instruction Set:
158 instructions including the 78 instructions of the 8080 processor

Memory:
1Kb Static RAM

Firmware:
Monitor and Control Basic

Serial Interface:
RS-232 or current loop

Floppy Disk Storage:
Optional (See Model DDF Disk Drive)

Hard Disk Storage:
None

Board Capacity:
4 boards

Boards Supplied:
SCC

Bus:
S-100

Power:
Operates from 110/120/220/240 volts; 50/60 cycle

Power Consumption:
80 watts

Power Supply:
+8 volts @ 5A, +18 volts @ 1A, −18 volts @ 500mA

Dimensions:
14.2"W × 3.45"H × 13.4"D (36cm × 8.8cm × 34cm)

Weight:
15 lbs.

Mounting:
Cabinet or optional rack mounting

Operating Environment:
0° to 55°C

Z-80A
System One

The Z-80A based System One is a desktop computer which is ideal for users who need bus structured expandability in an affordable small computer. The availability of a large base of software written for the Z-80A processor and the ability to handle multiple jobs and multiple users, make the System One an effective solution to a wide range of personal and business applications.

The basic System One includes the Z-80A processor, 64Kb of RAM memory, 780Kb of mass storage on two 5¼" floppy disk drives, a CRT interface, and an eight-slot card cage. A heavy duty power supply, 110- or 220-volt operation, and an all-metal chassis are also standard features of the System One.

If even more disk storage is required, a 21-megabyte hard disk is available. This configuration is identical to the basic System One except that the built-in hard disk takes the place of one of the floppy disk drives and a hard disk controller card is included.

The eight-slot card cage provides expansion capability for additional memory, interfaces, and other options. Cromemco's full line of software and peripherals is also available for use with the System One.

The System One also offers multi-tasking, multi-user capability when used with the CROMIX Operating System and a minimum of 128KB memory.

BUYER'S GUIDE

MODEL	CPU	RAM	FLOPPY DISK STORAGE	HARD DISK STORAGE†	S-100 BOARDS INCLUDED
CS-1	Z-80A	64Kb	780Kb	none	ZPU, 64KZ, 64FDC
CS-1H	Z-80A	64Kb	390Kb	21Mb	ZPU, WDI, 64KZ, 64FDC

TECHNICAL SPECIFICATIONS

	CS-1	CS-1H
Processor	Z-80A	
Clock Rate	4 MHz	
Instruction Set	158 instructions including the 78 instructions of the 8080A processor	
RAM Memory	64Kb	
ROM Firmware	RDOS	
Serial Interface	RS-232 or current loop	
Processor Control	N/A	
Floppy Disk Storage	780Kb	390Kb
Hard Disk Storage†	None	21 Mb
Board Capacity	8 boards	

†Unformatted capacity.

Boards Supplied	ZPU, 64KZ, 64FDC	ZPU, WDI, 64KZ, 64FDC
Bus	S-100	
Power	Operates from 100/115/130/220/240/260 volts; 50/60 cycle	
Power Consumption	300 watts	325 watts
Power Supply	+8 volts @10A, +18 volts @2A. −18 volts @ 1A	
Dimensions	14.2"W × 7.0"H × 17.8"D (36cm × 17.8cm × 45.1cm)	
Weight	45 lbs.	51 lbs.
Mounting	Cabinet; optional rack-mount brackets available	
Operating Environment	0–40°C	

Z-80A
System Two

Cromemco's Z-80A based System Two is a rugged, industrial-grade, rack-mountable computer that provides a cost-effective solution for applications such as process control, industrial automation, measurement systems, monitoring systems, and similar applications.

The standard System Two includes the Z-80A processor, 64Kb of RAM, 780Kb of floppy disk storage on two 5¼" floppy disk drives, a 21-slot shielded motherboard, a heavy duty power supply, an all-metal chassis, and standard rack-mountable construction usable with standard industrial cabinets.

A System Two model is also available which includes a 21-megabyte hard disk in addition to the floppy disk drives.

The full 21-slot card cage allows for easy configuration for special applications. Cromemco's full line of add-on memory and I/O cards includes multi-processing cards, analog-to-digital cards, networking interfaces, and a variety of serial and parallel interfaces.

An optional air handling unit, the Model BRZ-2, is available for use with larger System Two configurations located in warm environments.

BUYER'S GUIDE

MODEL	CPU	RAM	FLOPPY DISK STORAGE	HARD DISK STORAGE†	S-100 BOARDS INCLUDED
CS-2	Z-80A	64Kb	780Kb	none	ZPU, 64KZ, 64FDC
CS-2H	Z-80A	64Kb	780Kb	21Mb	ZPU, WDI, 64KZ, 64FDC

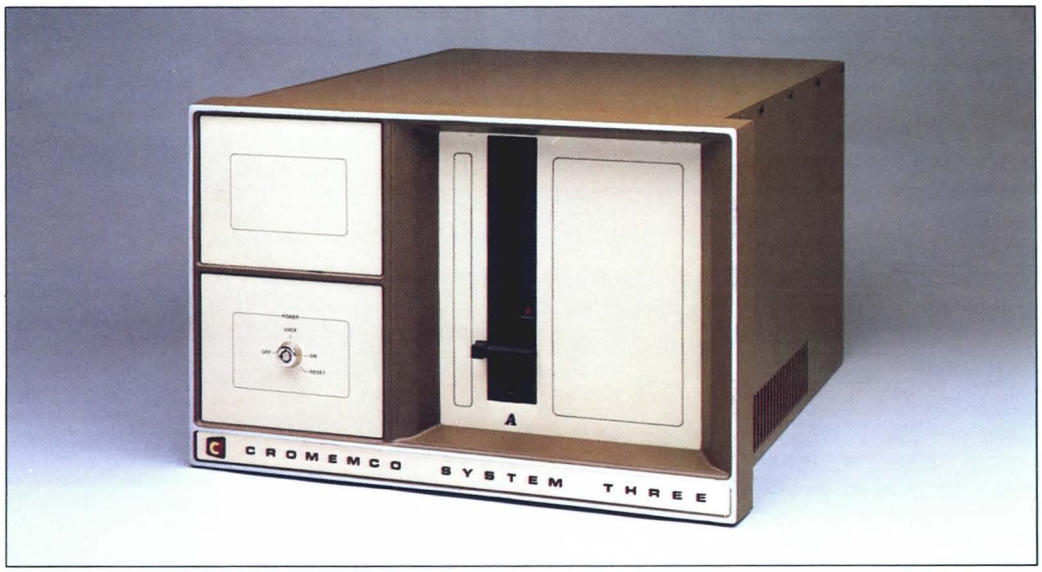
TECHNICAL SPECIFICATIONS

	CS-2	CS-2H
Processor	Z-80A	
Clock Rate	4 MHz	
Instruction Set	158 instructions including 78 instructions of the 8080A processor	
RAM Memory	64Kb	
ROM Firmware	RDOS	
Serial Interface	RS-232 or current loop	
Processor Control	N/A	
Floppy Disk Storage	780Kb	
Hard Disk Storage†	None	21 Mb
Board Capacity	21 boards	

Boards Supplied	ZPU, 64KZ, 64FDC	ZPU, WDI, 64KZ, 64FDC
Bus	S-100	
Power	Operates from 100/115/130/220/240/260 volts; 50/60 cycle	
Power Consumption	500 watts	615 watts
Power Supply	+8 volts @ 30A, +18 volts @ 15A, −18 volts @ 15A	
Dimensions	12-1/4"H × 19"W × 20-3/4"D (31.1 × 48.2 × 52.7 cm)	
Weight	56 lbs.	62 lbs.
Mounting	For Rack Mounting	
Operating Environment	0–40°C	

†Unformatted capacity.

Z-80A System Three



The basic System Three comes with a Z-80A processor, 64Kb of RAM memory, two 8" floppy disk drives which provide a total of 2.4 megabytes of storage, a 21-slot shielded motherboard, a heavy duty power supply, 110- or 220-volt operation, an all-metal chassis, and rack or optional bench cabinet mounting.

A hard disk is also available for use with the System Three. In this model, a 21-megabyte hard disk replaces one of the floppy disk drives.

Using the CROMIX operating system multi-user configurations of the System Three are available to support one to six users.

With the large number of card slots available, the System Three can easily be expanded from a single-user system to a multi-user system or configured for specific applications using Cromemco's system and software components. Cromemco offers a full line of peripherals and add-on memory and I/O cards for use with the System Three, including multi-processing cards, networking interfaces, terminals, printers, tape subsystems, and disk subsystems.

BUYER'S GUIDE

MODEL	CPU	RAM	FLOPPY DISK STORAGE	HARD DISK STORAGE†	S-100 BOARDS INCLUDED
CS3A	Z-80A	64Kb	2.4Mb	none	ZPU, 64KZ, 64FDC
CS3H	Z-80A	64Kb	1.2Mb	21Mb	ZPU, WDI, 64KZ, 64FDC

TECHNICAL SPECIFICATIONS

	CS-3	CS-3H
Processor	Z-80A	
Clock Rate	4 MHz	
Instruction Set	158 instructions including the 78 instructions of the 8080A processor	
RAM Memory	64Kb	
ROM Firmware	RDOS	
Serial Interface	RS-232 or current loop	
Processor Control	N/A	
Floppy Disk Storage	2.4 Mb	1.2 Mb
Hard Disk Storage†	None	21 Mb
Board Capacity	21 boards	

Boards Supplied	ZPU, 64KZ, 64FDC	ZPU, WDI, 64KZ, 64FDC
Bus	S-100	
Power	Operates from 100/115/130/220/ 240/260 volts; 50/60 cycle	
Power Consumption	550 watts	650 watts
Power Supply	+8 volts @ 30A, +18 volts @ 15A, −18 volts @ 15A	
Dimensions	12-1/4"H × 19"W × 20-3/4"D (31.1 × 48.2 × 52.7 cm)	
Weight	84 lbs.	90 lbs.
Mounting	For Rack Mounting	
Operating Environment	0–40°C	

†Unformatted capacity.

C-10 Personal Computer

The Cromemco C-10 personal computer product line meets the most exacting professional needs at a very affordable price.

The basic C-10 includes the Z-80A microprocessor, 64K bytes of RAM, 24K bytes of ROM, and a high resolution 12″ green phosphor CRT capable of displaying 80 columns and 25 lines of text or 160 columns and 72 lines of business graphics characters.

The C-10SP Super Pak provides the same high quality Cromemco C-10 computer plus a keyboard and a 5¼″ disk drive with 390Kb capacity. A variety of software packages are also included with the Super Pak such as a word processor, a financial spread sheet, Structured BASIC, an investment analysis program, the CDOS operating system (Cromemco's enhanced version of CP/M), and complete operating instructions.

The keyboard, screen, and system layout is the result of an extensive human factors engineering program that provides maximum comfort and efficiency.

The C-10 uses Cromemco's enhanced version of CP/M which allows the user access to the extensive library of current CP/M programs and to the wide variety of advanced programming languages available from Cromemco. This gives the user access to higher level languages such as FORTRAN, COBOL, RATFOR, and LISP. Furthermore, software programs that are developed for use with the C-10 can be used on larger Cromemco systems—even the high performance, 68000-based, multi-user computers.

The C-10 can emulate a wide variety of terminals and data protocols. Several units can be interconnected and used as distributed work stations, interfaced to larger Cromemco systems, or used as front end processors for mainframe computers.

A number of options are available for the C-10 including a second 5¼'' floppy disk drive (CFD), a letter-quality 120-words-per-minute Daisy wheel printer (CLQ), and a swivel-and-tilt ergonomic stand (CST).

TECHNICAL SPECIFICATIONS

Processor: High speed Z-80A microprocessor operating at 4 MHz clock frequency

Internal Memory: 64K bytes of internal Random Access Memory, 24K bytes of internal Read Only Memory

Operating System: Cromemco's enhanced CP/M operating system

Display: High resolution 12″ CRT for professional quality displays and graphics
- Graphics modes:
  - Pixel: 160 × 72
  - Line: High resolution (640 × 225)
  - Character: Special graphic characters
- P-31 green phosphor, standard
- 25 lines of 80 characters each
- Four character sets included:
  - ASCII, Boldface, Graphics, Scientific/Technical

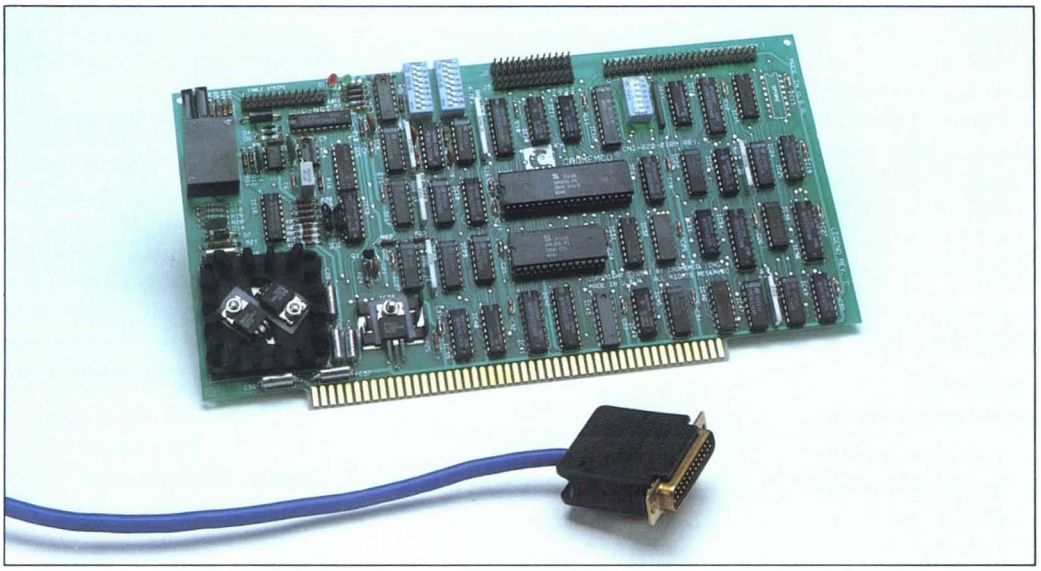
Keyboard: Standard Qwerty (Model CBKA)

Data Communications: RS232 serial data communications port, Parallel I/O expansion and printer port, Serial printer port. Can emulate a wide variety of terminals and protocols.

Peripherals: 5¼″ floppy disk available with 390K bytes storage capacity per diskette. Up to two drives per system. Daisy wheel letter-quality printer, ergonomic stand (optional).

Software: Included in C-10 SuperPak:
- Operating system
  - WriteMaster Word Processing
  - Spread Sheet Calculator
  - MoneyMaster Investment Analysis
  - Structured BASIC
- Also available: RATFOR, COBOL, FORTRAN, LISP, Macro Assembler, Spelling Correction Program, and a variety of CP/M programs.

C-NET
Local Area Network



Minimum Network Station: A complete network station consists of a power supply, an IOP board with downloaded network station software, a CNI board, and a CRT terminal.

FEATURES

- Carrier Sense Multiple Access Protocol
- Rugged Physical Link
- Low Cost Local Area Network
- Protects Against Individual Node Failure
- Full Collision Detection and Contention Resolution
- Fault Tolerant Architecture
- Bus Oriented Topology
- Broadband Architecture
- Multi-Vendor Support

A RUGGED LOCAL AREA NETWORK

The C-NET network is a Local Area Network designed for applications in offices, factories, scientific laboratories, educational institutions, or any location where microcomputers can be linked together to form distributed processing systems. With its rugged physical link and low-cost LSI-based implementation, the C-NET network is a reliable, durable, flexible, and cost-effective alternative for microcomputer local area networks.

C-NET network is a Carrier Sense Multiple Access network with full Collision Detection (CSMA/CD), and contention resolution. The network topography is bus oriented (multi-drop).

C-NET STANDARD

The C-NET local network's physical link and network interface is similar to Military Standard 1553B (which governs the design of internal data bases for use aboard military aircraft). The C-NET configuration uses a low-cost, shielded twin-axial cable. This cable provides the reliability of a 25-MHz bandwidth constant impedance twisted pair inside of a heavy braid ensuring shielding of stray noise. The cable is driven through an isolation transformer by a differential transmitter/receiver to provide common-mode noise rejection and complete isolation between network cable and hardware interface. This prevents the failure of a single node from affecting the entire network. Conversely, the computers are isolated from any faults on the network cable itself.

COST EFFECTIVE STANDARD FOR MICROCOMPUTER LANs

Use of off-the-shelf components and cables keeps the cost of the C-NET low enough to make it a realistic choice for use with popular low-cost microcomputers as well as sophisticated factory or laboratory equipment.

Furthermore, each node on the C-NET bus can be used either by a multi-tasking, multi-user, interrupt-driven computer operating system such as CROMIX or by multiple CDOS single-user operating systems. This approach distributes the cost of each network node over many users.

HARDWARE IMPLEMENTATION

The hardware implementation of the C-NET interface is based on the industry standard Z-80A microprocessor for system control and the Z-80 SIO (Serial Input/Output) chip for SDLC bit protocol selection and data transfer. The Z-80 CTC (Counter Timer Circuit) peripheral is used as a control and interrupt timer for the data-transfer process.

The CNI, C-NET interface board is connected to a control processor through the C-Bus. This control processor, the I/O Processor (Model IOP), is a Z-80A-based, single card computer which provides multi-processor capability. The IOP has 16K bytes of on-board RAM and 32K bytes of ROM which are used to hold the network servicing software and message buffer space. The IOP processor communicates with the host computer through the S-100 bus. The host computer can be either a Z-80A-based microcomputer or a Cromemco D-series microcomputer which is based on a dual 68000/Z-80A processor. The application layer is done by the host computer under the control of the host's operating system.

ACCESS TO DIVERSE LOCAL NETWORKS

To ensure compatibility with other local networks, the C-NET system conforms to the bottom four layers of the ISO-ANSI Reference Model of Open Systems Interconnection (see table — C-NET and ISO-ANSI Network Standard).

Future provision of the C-NET architecture will allow C-NET systems to be linked together to form "super" networks. C-NET networks may also be linked to satellite ground stations for long distance communications or connected to various mainframe computers.

C-NET AND ISO-ANSI NETWORK STANDARD

ISO-ANSI Reference Model	C-NET
Application layer Presentation layer Session layer	Host computer software
Transport layer	Software service for C-NET interface
Network layer	Input/output Z80 processor
Data-link layer	Serial input/output Z80-SIO controller
Physical layer	Differential transceiver and twin-axial cable

TRANSMISSION CAPABILITIES

C-NET network is not limited to data transmission. Its circuit configuration and broadband cable also offer the possibility of additional voice and video transmission as future options.

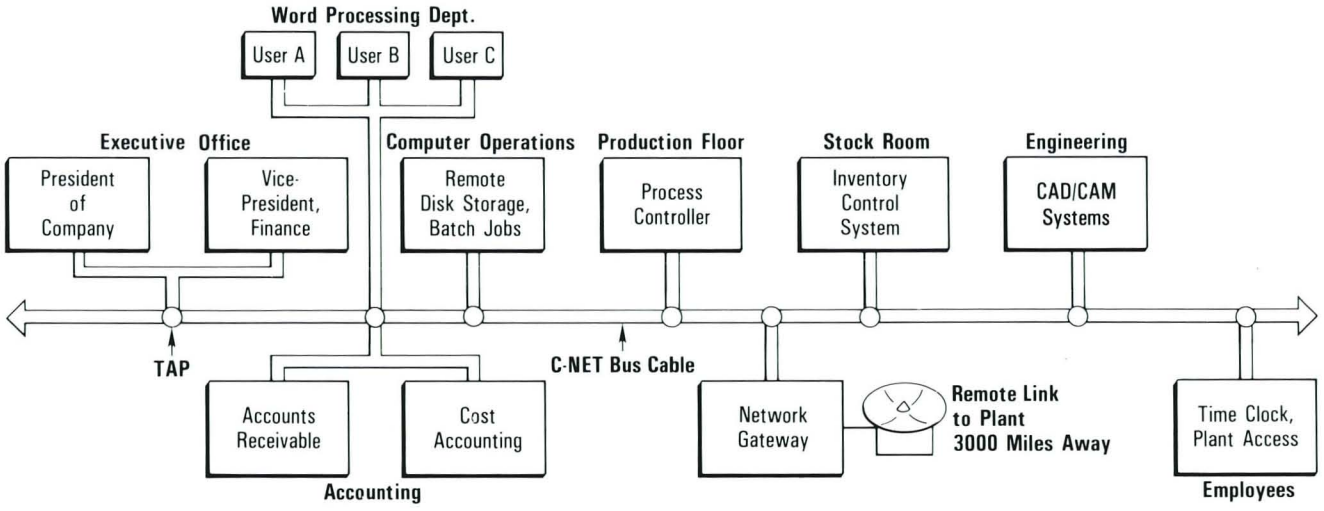
MULTI-VENDOR SUPPORT

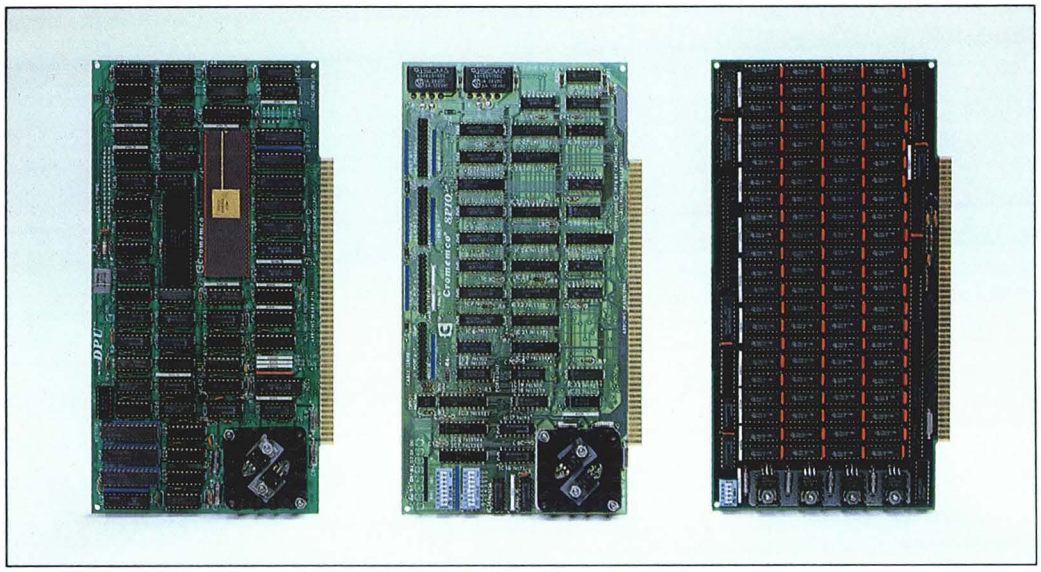
Equipment can be attached to the C-NET network by either a plug-in S-100 computer board or through an RS-232 serial link provided by Cromemco. The Cromemco C-NET network is being made available as a multi-vendor, industry-wide standard for microcomputer Local Area Networks.

TECHNICAL SPECIFICATIONS

Data Rate: Nominal: 500 Kbits/sec
Maximum: 880 Kbits/sec
Network Topology: Bus
Maximum Station Separation: 2000 meters
Maximum Number of Stations: 255 per cable segment
Physical Medium: Standard Twin-axial Cable
Driver Type: Differential
Maximum Number of Data Bytes/Packet: 1500
Collision Detection: Yes
Contention Resolution: Yes
CRC Error Detection: Yes
High Noise Rejection: Yes
Isolated Medium: Yes
Standard Components: Yes
Supports RS-232 Devices: Yes

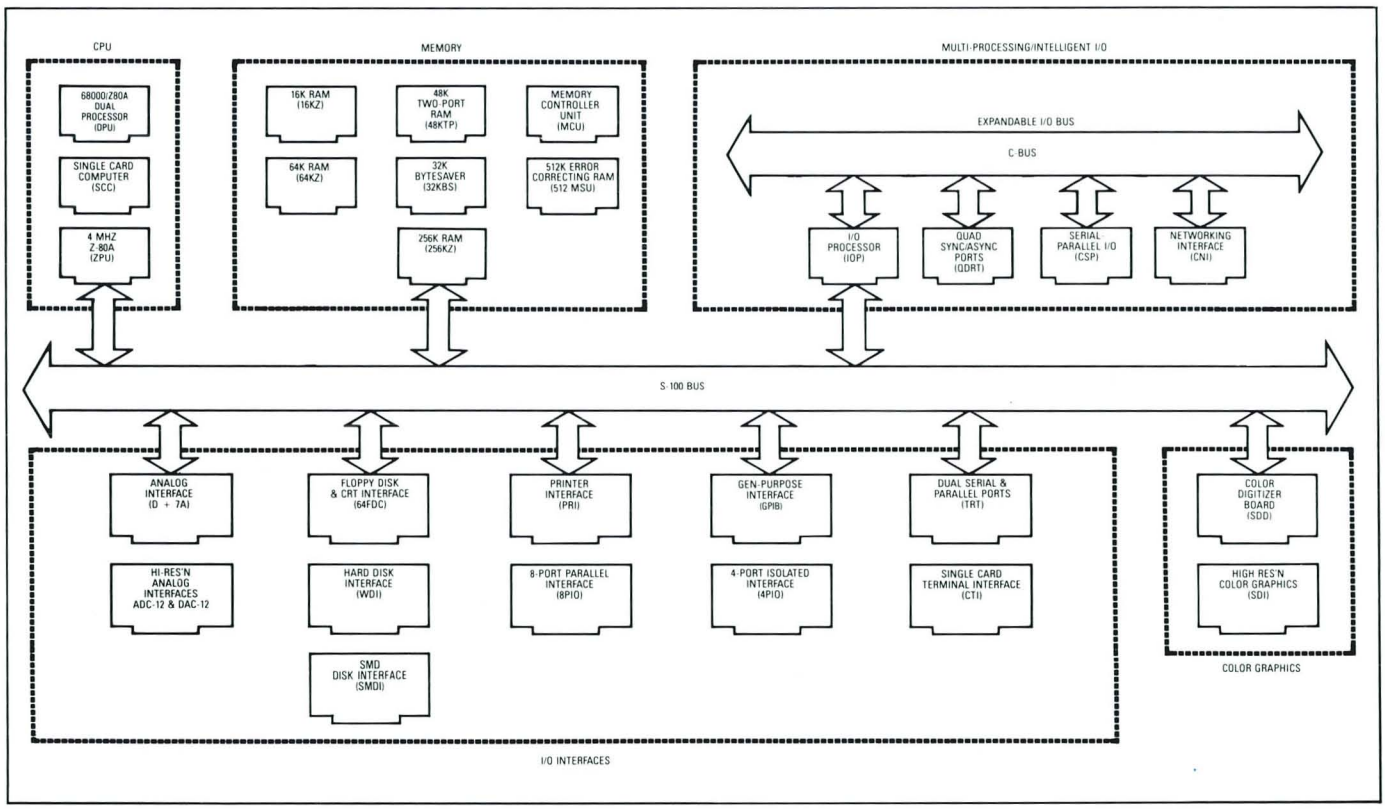
TYPICAL C-NET INSTALLATION





Cromemco offers a wide variety of board-level products which are designed to expand the capability of Cromemco systems. These products include CPUs, memory boards, and I/O boards. All boards have been fully integrated with each other and with Cromemco systems to assure reliability. With these S-100 bus (IEEE-696 standard) boards, systems can be easily configured for specific applications in any field.

To assist in selecting boards suited to a particular application, Cromemco's board-level products are presented schematically in the diagram below. A complete in-depth catalog of current boards is also available separately.



CPU BOARDS

Cromemco offers a Dual Processor Unit (Model DPU) based on the 68000 and Z-80A microprocessors, a Z-80A based (Model ZPU) processor, and a Z-80A based Single Card Computer (Model SCC).

MEMORY BOARDS

Cromemco also offers a selection of RAM memory boards for users who want to configure multi-user systems or expand the available internal memory.

For use with the DPU, Cromemco offers a 512-kilobyte (Model 512MSU) board with built-in error checking and correction capability (ECC). This unit works under the control of a Memory Controller Unit (Model MCU) which supports either byte or word-width operation and includes an error-logging feature. Multiple MSU units can be controlled by a single MCU.

A 256Kb RAM board (Model 256KZ) can be used with the DPU or ZPU based systems. This board does not need the MCU.

Memory boards available for use with Z-80A based Cromemco systems include a 64Kb RAM card (Model 64KZ-II), and a 16Kb RAM card (Model 16KZ).

I/O BOARDS

A full range of I/O boards are available through Cromemco which allow users to interface to a variety of peripherals such as printers, disk drives, and tape drives. Multi-processing boards, analog-to-digital boards, networking interfaces, a variety of serial and parallel interfaces, and a high-resolution color graphics interface (Model SDI) are also available from Cromemco. The SDI can be used to display an image in color or black and white and is NTSC or PAL compatible.

The following S-100 computer boards are available for use with Cromemco computer systems.

CPU BOARDS

Model	Description
DPU	68000/Z-80A Dual Processor Unit
SCC	Z-80A Single Card Computer
ZPU	Z-80A Central Processor Unit

MEMORY BOARDS

Model	Description
RAM Boards	
512MSU	512K byte Error-Correcting Memory
MCU	Memory Controller Unit (required for error-correcting memory)
256KZ	256K byte RAM Memory
64KZ	64K byte RAM Memory
16KZ	16K byte RAM Memory
48KTP	48K byte, 2-Port Memory (for use with SDI graphics systems only)
PROM Boards	
32KBS	32K Bytesaver Memory and PROM Programmer for Intel 2716 u.v. erasable PROMs

I/O BOARDS

Model	Description
Color Graphics Interface Boards	
SDI	High Resolution Color Graphics Interface
SDD	Color Digitizer Board
Multi-Processing/Intelligent I/O Boards	
IOP	Input/Output Processor
QDRT	4-Channel Synchronous/Asynchronous Interface (requires IOP)
CSP	C-Bus Serial/Parallel Interface (requires IOP)
CNI	Network Interface (requires IOP)
Analog/Digital Boards	
DAC12	12-Bit D/A Converter (provides two independent channels of D-to-A conversion)
ADC12	12-Bit A/D Converter (provides 16 channels of A-to-D conversion)
D + 7A	Digital/Analog Interface (provides seven channels of 8-bit A-to-D conversion and seven channels of D-to-A conversion)
Disk I/O Boards	
64FDC	Double Density Floppy Disk Controller
SMDI	SMD Hard Disk Interface
WDI	Winchester Hard Disk Interface
Digital I/O Boards	
4PIO	4-Port Parallel I/O Interface (electrically isolated)
8PIO	8-Port Parallel Interface
TRT	Twin UART Digital Interface (includes 2 parallel and 2 serial ports)
GPIB	IEEE-488 Interface
PRI	Printer Interface Card
Display I/O Boards	
CTI	Single Card Terminal Interface (for use with C-1 display and CKBA Keyboard)

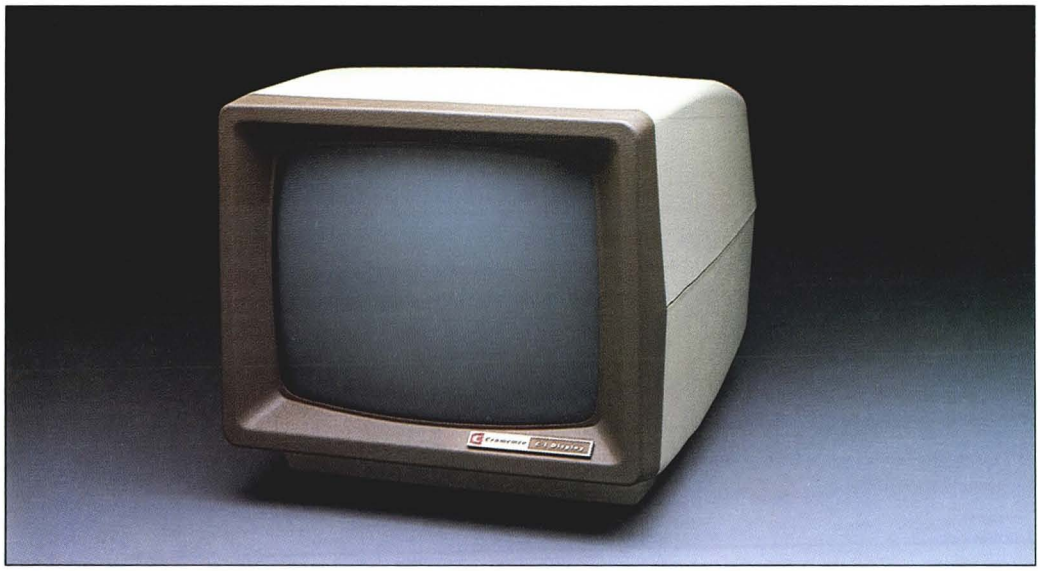
PERIPHERALS

Cromemco systems are available with a wide variety of optional peripherals which allow users to optimize systems for specific applications.

These include peripheral:

- Terminals, Monitors, and Keyboard
- Printers
- Disk Subsystems
- Tape Subsystem

MODEL C-1
CRT Monitor Unit



The Model C-1 video display is a high-resolution 12″ CRT which can be used for professional quality displays and graphics presentations. The Model C-1 uses the P-31 green phosphor standard and has a display capability of 80 columns and 25 lines.

Display electronics for the C-1 are on the Model CTI board. Four character sets (American, American Bold, Graphics, and Scientific) are supplied in 8Kb of ROM on the CTI. Through its S-100 interface, the CTI has an effective data transfer rate of more than 25,000 baud. An additional serial port for driving auxiliary devices, such as a serial printer, is also included on the CTI board.

The C-1 is designed to work with the Model CKBA intelligent keyboard. This keyboard is designed to accommodate all of the special functions that are assigned to separate function keys on more expensive keyboards. The CKBA includes a standard four-wire coiled modular telephone cable which connects to the C-1.

TECHNICAL SPECIFICATIONS

Dimensions:
11-1/4″H × 12-3/8″W × 16-1/2″D
(28.6 cm × 31.4 cm × 41.9 cm)

Power Requirements:
Supplied from CTI Board

Operating Environment:
10–40°C.

Weight:
18 lbs (8.16Kg)

MODEL C-10
Intelligent CRT Terminal/Computer

The basic C-10 includes the Z-80A microprocessor, 64Kb of RAM, 24Kb of ROM, and a high-resolution 12″ green phosphor CRT, which is capable of displaying 80 columns and 25 lines of data.

See page 12, C-10 Personal Computer for more details.

TECHNICAL SPECIFICATIONS

Processor:
4 MHz Z-80A

Memory:
64K bytes of internal user-accessible RAM;
24K bytes of internal ROM

Display:
High-resolution 12″ CRT; P-31 green phosphor standard; display capability of 25 lines, 80 characters per line; four character sets including graphics, supplied in 4Kb of ROM.

Data Communications:
RS-232 serial data communications port; parallel Centronics printer port; serial printer interface port; can emulate a wide variety of terminals and data protocols.

Dimensions:
11-1/4″H × 12-3/8″W × 16-1/2″D
(28.6 cm × 31.4 cm × 41.9 cm)

Power Requirements:
90-130 VAC @ .8A, 60 Hz
180-260 VAC @ .4A, 50 Hz

Power Consumption:
50 watts

Operating Environment:
10–40°C

Weight:
22 lbs (10kg)

MODEL RGB-13
RGB Color Monitor

The RGB-13 monitor is a red/green/blue monitor which is available for use with Cromemco's SDI high-resolution graphics system. This high-performance, color-imaging system is designed for applications in business, medical imaging, process control, engineering, science, and other work.

The monitor has a wide video bandwidth of 15MHz. Design of the RGB-13 is all solid state, with the exception of the CRT. Separate inputs are provided for the red, green, and blue signals.

TECHNICAL SPECIFICATIONS

CRT:
13″ shadow mask, delta gun

Technology:
All solid state except for CRT.

Video Signal Input:
RGB 0.3–2.0V, 75-ohm. Fully compatible with Cromemco Model SDI interface outputs.

Video Amplifier Bandwidth:
50Hz to 15MHz, ± 3dB

Power Requirements:
100/120/220/240 volts, 50/60 cycle

Power Consumption:
100 Watts

Dimensions:
18″H × 14″W × 15″D
(45.7 cm × 35.5 cm × 38.1 cm)

Weight:
45 lbs (20Kg)

Operating Environment:
5° to 40°C

MODEL CKBA
Intelligent Keyboard

The Model CKBA is an intelligent keyboard which is designed to accommodate all of the special functions that are assigned to separate function keys on more expensive keyboards. The CKBA includes a standard four-wire coiled modular telephone cable which connects to the Model C-1 CRT terminal or the Model C-10 Personal Computer.

The keyboard also includes features such as key click, automatic character repetition, and a hidden numeric pad, which are available under the user's control.

TECHNICAL SPECIFICATIONS

Keytops:
Fully sculptured

Key Layout:
Standard ASCII, 60 keys

Electronics:
Contain internal microcomputer for communication with terminal

Terminal Connection:
Standard four wire modular telephone connector and cable

Ergonomics:
low profile
tilt adjustment
palm rest.

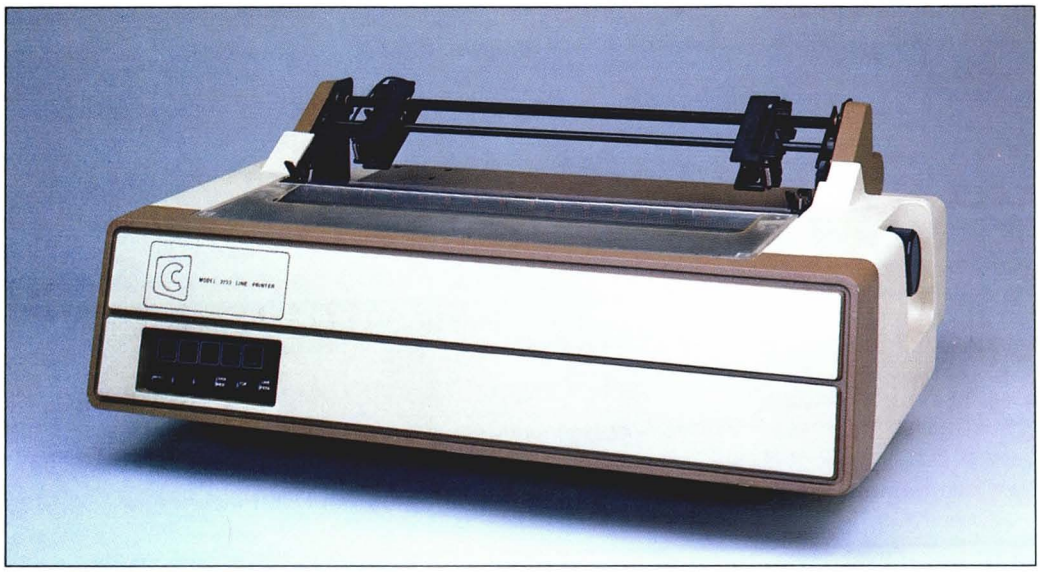
Power Requirements:
Supplied by C1 or C10

Weight:
2 pounds

Dimensions:
2.25"H × 13.75"D × 7.5"W
(5.7 cm × 34.9 cm × 19 cm)

Operating Environment:
Temperature, 5° to 40°C

MODEL 3703
Dot-Matrix Printer



The Model 3703 is a high-speed, impact, dot-matrix printer. The Model 3703 prints 180 characters per second and up to 132 columns.

Two character sets are provided in the unit. The primary character set is a 9 × 9 dot matrix, 96 ASCII character set, which is used to print standard-sized alphanumeric characters. The secondary character set uses a 6 × 9 dot matrix and consists of graphics shapes and symbols that are used to form large characters, graphics presentations, and bar codes.

When operating in the primary character set mode, maximum throughput is achieved by bidirectional printing and logic seeking whereby the printer electronics determine the shortest path to the next line of characters when printing successive lines of data.

TECHNICAL SPECIFICATIONS

Format:
180 cps; 132 columns; 18″ platen; 10 characters per inch.

General:
Form feed; bidirectional printing and double buffering for high performance; tractor feed accommodates standard computer fanfold forms and roll paper.

Dimensions:
8″H × 19.5″D × 24.5″W
(20.3cm × 49.5cm × 62.2cm)

Interface:
Centronics Parallel

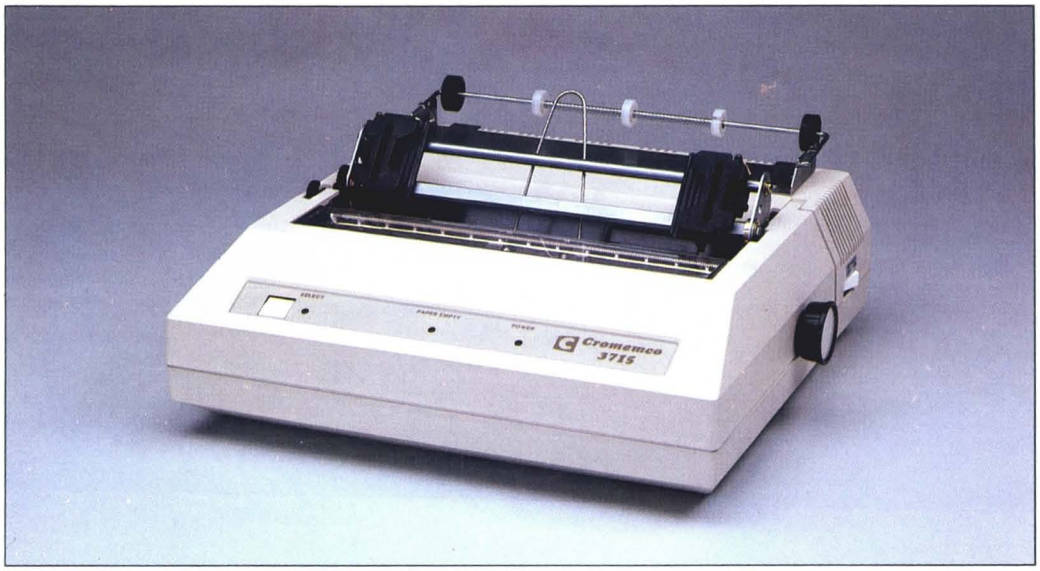
Weight:
60 lbs (27kg)

Operating Environment:
5° to 40°C

Power Requirements:
115/220 volts, 50/60 cycles

Power Consumption:
300 watts

MODEL 3715
Dot-Matrix Printer



The Model 3715 is a dot-matrix impact printer that operates at 150 characters per second. Up to 80 characters per line can be printed at 10 cpi and up to 132 characters per line can be printed at 16.36 cpi. The unit prints 9 × 7 dot-matrix characters.

TECHNICAL SPECIFICATIONS

Format:
150 cps; prints either 80 characters per line or 132 characters per line; 6″ line length; characters can be elongated.

General:
Bidirectional printing; accommodates standard computer fanfold forms, roll paper, and single sheets.

Dimensions:
15″W × 14″D × 6″H
(38cm × 36cm × 16cm)

Interface:
Centronics Parallel

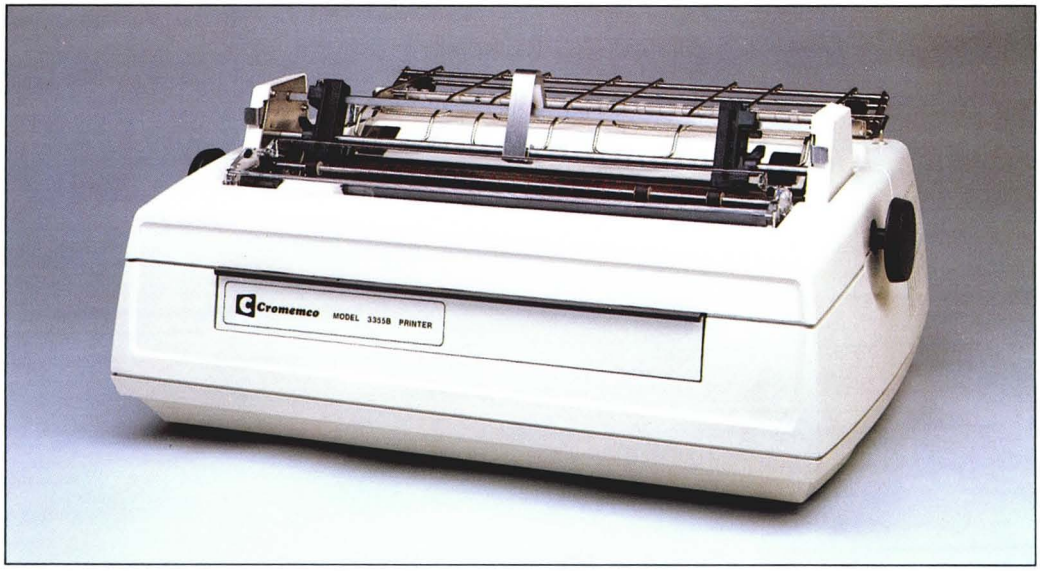
Weight:
20 lbs (9kg)

Operating Environment:
5° to 40°C

Power Requirements:
115/220 volts, 50/60 cycles

Power Consumption:
300 watts

MODEL 3355B
Fully Formed Character Printer



The Model 3355B operates at 55 characters per second with both tractor feed and friction platen for letter quality printing. The 3355B uses a reinforced plastic print element called a "thimble" that contains up to 128 fully-formed characters of various typefaces.

TECHNICAL SPECIFICATIONS

Format:
55 cps; 16″ platen

General:
Bidirectional printing; tractor feed and friction platen; quality impression suited to camera-ready copy.

Dimensions:
21.18″W × 12.62″D × 8.68″H
(53.8cm × 34.6cm × 22.1cm)

Interface:
5500 Q Qume

Weight:
30.8 lbs (14kg)

Operating Environment:
5° to 38°C

Power Requirements:
115/230 VAC, ±15%, 47–63 Hz

Power Consumption:
180 watts (operating)

MODEL CLQ
Fully Formed Character Printer

The Model CLQ is a letter-quality printer which produces fully formed characters and operates at 120 words per minute. The CLQ is only for use with the C-10 Personal Computer.

TECHNICAL SPECIFICATIONS

Format:
120 words per minute

General:
Unidirectional printing; friction platen; quality impression suited to camera-ready copy.

Dimensions:
(16.2cm × 49.5cm × 31.5cm)

Interface:
Serial

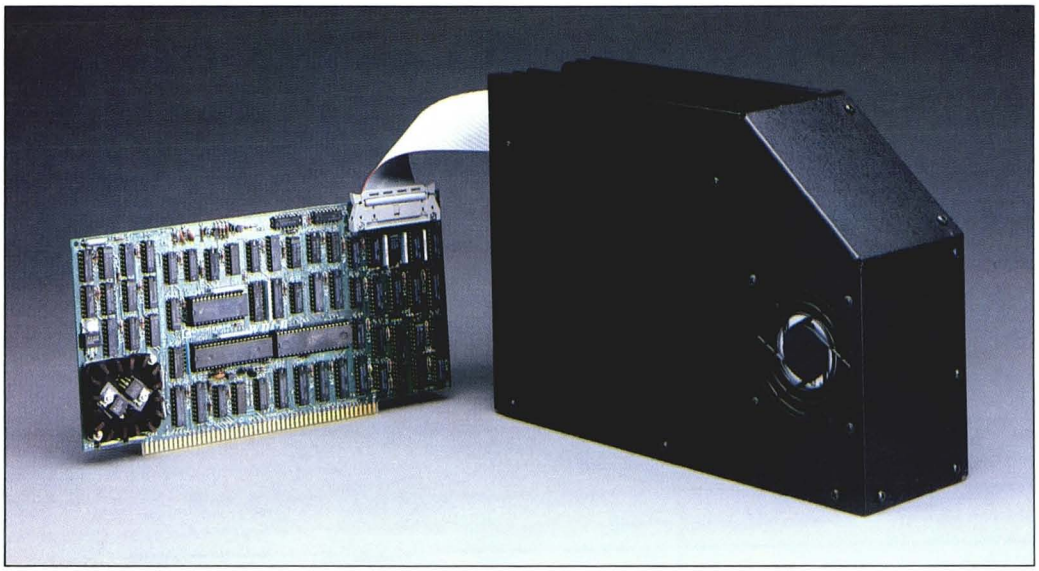
Weight:
18.5 lbs (8.40kg)

Operating Environment:
13° to 40°C

Power Requirements:
117 VAC, ±10%, 60 Hz

Power Consumption:
120 watts

MODEL HD-20
21 Megabyte Hard Disk Subsystem



The Model HD-20 is a 21-megabyte hard disk subsystem which allows users who require large storage capacity to upgrade their systems. The Model HD-20 consists of a state-of-the-art Winchester technology disk drive and Cromemco's WDI-II hard disk interface card.

This high-performance drive uses a simple, reliable stepper-motor design that permits slewing from track to track. This feature provides speed of operation that is comparable to more complicated (but often less reliable) servo drives.

The HD-20 contains a sealed chamber for the media and read/write heads which eliminates airborne contamination. The read/write heads are designed to fly above the surface of the disk while the disk is spinning (Winchester technology). The result is a much greater recording density than is possible with removable media.

The ultra-hard, thin-film-plated media also lessens possibility of damage due to handling.

The HD-20 is designed to mount inside the cabinet of a Cromemco System Two or Three. Housing for the HD-20 includes a cooling fan and power supply regulating circuitry. Power for the unit is obtained from the unregulated DC supply voltages available on the rear panel of the System Two and System Three.

TECHNICAL SPECIFICATIONS

Disk Type:
Fixed

Disk Platter Size:
5¼"

Number of Platters:
3

Storage Capacity (Unformatted):
21 Megabytes

Average Access Time:
125 msec including settling

Track to Track Access Time:
2.2 msec

Rotational Speed:
3600 rpm

Media Type:
Plated thin film

Shock Mounted:
Yes

Dimensions:
5.75"W x 8.0"D x 3.25"H
(14.6cm x 20.3cm x 8.2cm)

Weight:
5 lbs (2.27kg)

Operating Environment:
4° to 50°C,
8% to 80% relative humidity

Power Requirements:
Obtains power from CS-2 or CS-3.

Power Consumption:
20 watts

MODEL CFD
Floppy Disk Subsystem

The Model CFD is a 5¼" Floppy Disk Drive which is designed for use with Cromemco's C-10 personal computer. This double-density, double-sided drive provides 390K bytes of storage.

TECHNICAL SPECIFICATIONS

Disk Drive Capacity (Formatted):
390K bytes

Media:
5¼" double-sided, double-density diskette

Dimensions:
3.38"H x 5.87"W x 8"L
(8.6cm x 14.9cm x 20.3cm)

Disk Speed:
300 rpm

Start/Stop Time:
250/150 msec (max)

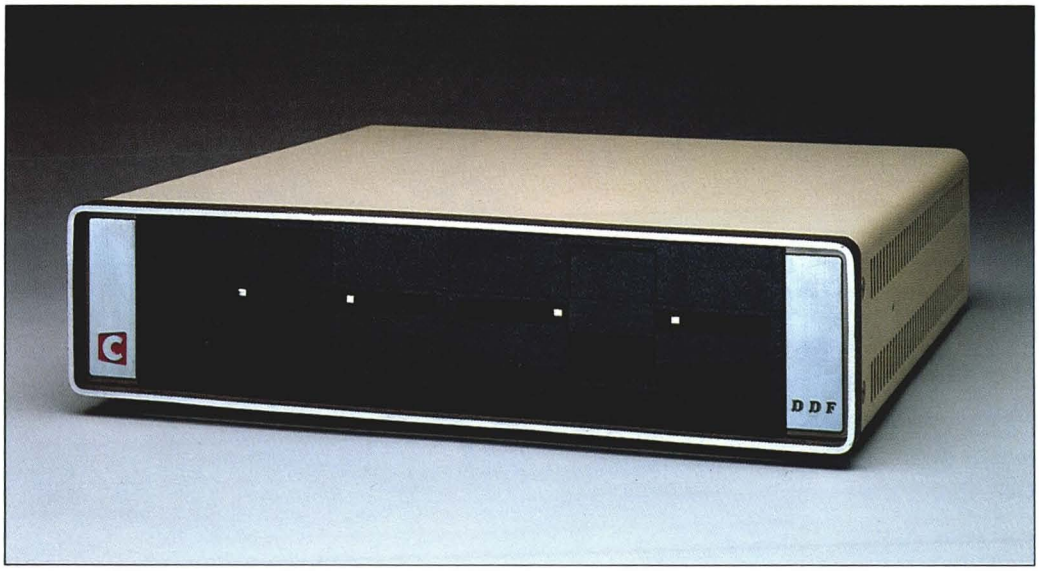
Transfer Rate:
FM: 125,000 bps; MFM: 250,000 bps

Weight:
3.2 lbs (1.45kg)

Operating Temperature:
10° to 40°C

Power Requirements:
Supplied by the C-10 computer

MODEL DDF
Dual Floppy Disk Drive



The Model DDF is a dual disk drive which is designed for use with Cromemco's System Zero. The double-sided, double-density drives provide a total of 780K bytes of storage.

TECHNICAL SPECIFICATIONS

Disk Drive Capacity:
390K bytes per drive

Media:
Industry-standard 5¼" diskette

Dimensions:
14.2"W × 3.45"H × 13.4"D
(36cm × 8.8cm × 34cm)

Disk Speed:
300 rpm

Start/Stop Time:
250/150 msec (max)

Transfer Rate:
FM: 125,000 bps; MFM: 250,000 bps

Weight:
15 lbs (6.8kg)

Operating Temperature:
10° to 40°C

Power Requirements:
110/220 volts; 50/60 cycle

Power Consumption:
180 watts

MODEL TDS
Nine-Track Tape Drive

The Model TDS is a nine-track tape drive which provides large storage capability as well as data exchange with other IBM/ANSI systems using the 1600 bpi format. The drive can store over 40 million bytes on a reel of tape.

The unit is easy to operate, since the drive automatically centers the tape reel, threads the tape, checks tape tension, and positions the tape. A system of interlocks gives safe operation for the tape. The drive also includes self-test and diagnostic capability.

The unit operates at tape speeds of 25 and 100 ips. Start/stop mode is available. Mode and reel speed may be selected by the intelligent controller in the unit.

With the Cromemco Model CSP interface board, which is included with the tape drive, up to eight drives may be daisy-chained. Multiple interface boards may be connected to Cromemco's I/O Processor (Model IOP). This is done through the Cromemco C-bus which interconnects the I/O processor and the interface boards.

TECHNICAL SPECIFICATIONS

Storage Capacity:
More than 40 million bytes

Tape Speeds:
25 and 100 ips

Format:
IBM/ANSI standard, 1600 bpi

Operating Modes:
Start/stop and streaming; may be selected by controller.

Self-Test:
Includes self-test and diagnostic capability.

Dimensions:
8.75"H x 17.0"W x 22.0"D
(22.2cm x 43.1cm x 55.8cm)

Weight:
80 lbs (36.3kg)

Operating Environment:
5° to 40°C..

Power Requirements:
110/210/220/240 volts; 50/60 cycle

Power Consumption:
270 watts

SYSTEM ACCESSORIES AND DESKS

MODEL BRZ-2
Airflow Unit for System Two

The Model BRZ-2 is an optional air handling unit which is recommended for use with large System Two configurations located in warm environments.

MODEL MDSK
Computer Workstation Desk

The Model MDSK is a computer workstation desk designed for use with the System Three computer. The desk accommodates the computer and CRT terminal and also provides extra work space.

MODEL SDSK
Computer Workstation Desk – Small

The Model SDSK is a small computer workstation desk which is useful for a printer or terminal.

Cromemco has developed one of the broadest lines of software in the microcomputer industry today. Available software includes operating systems, high-level languages, software tools, and end-user tools.

Each software package is supported by clear, comprehensive documentation.

All software packages are available on either 5¼" (S) or 8" (L) floppy diskettes.

Operating Systems and Diagnostics

Cromemco provides two operating systems: a single-user operating system called CDOS and a multi-user, multi-tasking system called CROMIX.

CDOS, the single-user operating system, requires 64Kb of RAM and implements or emulates many of the functions of CP/M. However, CDOS offers more features than CP/M. CDOS is easy for new users to understand and learn. It is also designed to protect inexperienced users from operations that could cause problems. CDOS also provides read-after-write with verify, a powerful technique which ensures the integrity of data written to the disk.

CROMIX, the multi-user, multi-tasking operating system, emulates many of the functions of UNIX. Additionally, the CROMIX operating system provides enhanced file protection, including record level locking.

To verify that all components of a system are operating correctly, Cromemco has developed a set of diagnostic programs. The Cromemco Diagnostics Software (CDS) package can be used to debug a number of critical components of a system.

Languages

Cromemco offers an extensive line of languages for both the Z-80A and the 68000-based processors. This allows programmers the flexibility to choose the language which most fits their needs.

Available languages include the following:

Language	Z-80	68000	Language	Z-80	68000
Macro Assembler	X	X	**FORTRAN-IV**	X	
C Compiler	X	X	**FORTRAN-77**		X
COBOL	X	X	**Pascal**		X
RPG-II	X		**RATFOR**	X	
Structured BASIC	X		**LISP**	X	
BASIC		X			

Software Tools

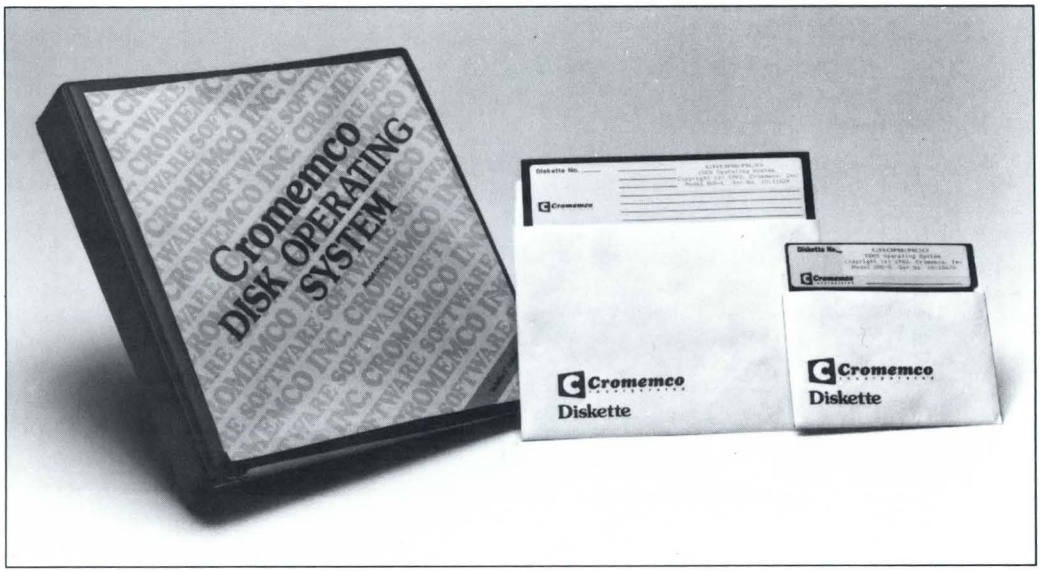
Cromemco also provides a variety of software tools which address specific needs. These tools include document formatting, graphics, communications, data base management, and additional packages which are designed to handle general applications.

End-User Tools: The Master Series

In addition to the operating systems, languages, and software tools described above, Cromemco provides a number of end-user tools. These programs, which address specific needs, are designed to be easy to use and to learn.

Cromemco's Master Series of end-user tools includes a word processing program, a spelling correction program, a financial planning package, and a statistical analysis package.

MODEL DOS
Z-80 CDOS Operating System



Cromemco's CDOS single-user operating system is a CP/M-similar system which is available for use on all Cromemco microcomputer systems having a minimum of 64Kb of read/write memory (RAM). Cromemco provides versions of the Z-80-based CDOS for both standard computer systems and the C-10 personal computer.

CDOS (an acronym standing for Cromemco Disk Operating System) is a simple to use disk file management program which allows users to create and manipulate both sequential and random access disk files using symbolic names. CDOS also processes all console terminal I/O and printer output.

CDOS was written to be as similar as possible to the CP/M operating system at the system call level while at the same time providing extra capability for Cromemco software. CDOS emulates most CP/M system calls. However, system calls 28, 30, and 37 are ignored by CDOS but cause a return with no error, and system call 31 is not emulated by CDOS.

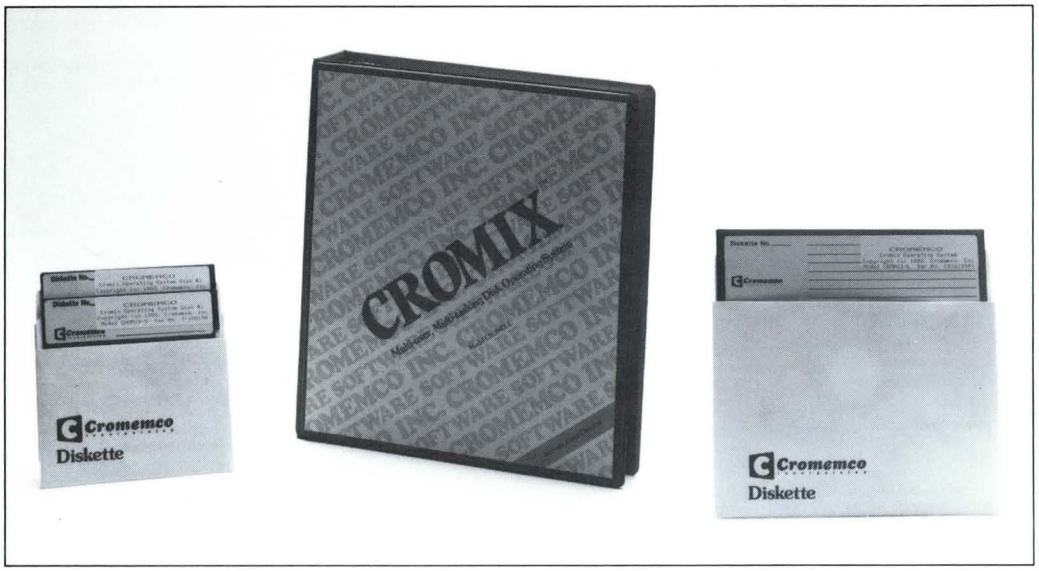
The CDOS operating system was developed with a fast, single-directory file structure for both floppy and hard disks. Any type of Cromemco floppy disk format can be handled from single-sided, single-density to double-sided, double-density, 8″ or 5¼″ disks. Cromemco hard disks are also handled by CDOS.

CDOS is supplied with a number of utility programs which augment its capabilities. Foremost among these is a powerful, yet easy to use, screen-oriented text editor designed with the programmer in mind. Also included are a batch command processor utility, a file transfer utility, a file binary dump utility, a character-oriented text editor, and utilities for formatting disks and displaying system status.

IMPORTANT FEATURES

- User-friendly command processor which executes all programs, processes command lines with arguments, and allows display and manipulation of disk files.
- User-settable file access modes giving erase, read, and write protection of disk files.
- Automatic disk log-in protection whenever diskettes are exchanged in the drive at the CDOS prompt.
- Hard disk file integrity map stored on the disk.
- Read-after-write for disk write operations guaranteeing data integrity.
- Extensive file management capabilities for both sequential and random access files.
- Control through the operating system of more than 45 special CRT functions including cursor addressing, clear screen, cursor movement, intensity control, and numerous others.
- Preprogrammed and user-definable function key handling for Cromemco terminals.
- Date and time support.
- Optional direct access to disk records exclusive of file pointers.
- 30 additional system calls not found in CP/M version 2.
- Printer output control, duplicating current console terminal output as well as from executed programs.
- CDOS Generator program which allows creation of a custom CDOS for a particular disk and device configuration.

MODEL CROMIX
Z-80 CROMIX Operating System



Cromemco's CROMIX multi-user, multi-tasking operating system is a UNIX-like system which is available for use on all Cromemco Z-80A microcomputer systems with a minimum of 128Kb of RAM.

Cromemco provides compatible versions of CROMIX for both Z-80A-based systems (Model CROMIX) and 68000-based systems (Model CRO-D).

The CROMIX operating system was developed to take full advantage of the large amount of random access memory and hard disk storage available on Cromemco computer systems. The CROMIX operating system has many capabilities found in large mainframe or minicomputer operating systems.

IMPORTANT FEATURES

- Support of multiple tasks and multiple users on hard disk and floppy disk storage systems.
- Multiple hierarchical directories and subdirectories.
- Record level locking
- Interprocess communication using "pipes" and "signals."
- Execution of multiple processes in a single memory bank.
- Prioritized execution of processes.
- Compatible I/O which supports user redirection of input and output.
- A versatile SHELL program for flexible and reconfigurable user interface.
- A password security system limiting system and file access as well as protecting files with read, write, append, and execute attributes.
- Date and time support.
- Numerous file buffers for high-speed execution.
- Resident, swapping-free execution of tasks and servicing of users through bank selection for rapid context switching.

One of the key features of the CROMIX operating system is its file system comprised of hierarchical directories. The file system is a tree structure of three types of files: data files, directories, and device files. Device and file I/O is compatible among these file types. This means that input and output may be redirected from and to any source or destination completely interchangeably.

The tree structure allows different directories to be maintained for different users or functions with no chance of conflict. In addition, links may be established from directory to directory to allow the file to appear in multiple locations of the tree structure. Since a link to a file is merely a pointer to its location on the disk, all CROMIX links are of equal value.

The tree structure of the file system also incorporates demountable volumes. This means that each mass storage device becomes a subset of the hierarchical directory structure of the single file system. Thus, files on all disk devices are addressed in an identical manner.

Due to the hierarchical structure of the file system, the CROMIX operating system also maintains separate ownership of every file and directory. All files can thus be protected from access by other users of the system. Each file is individually protected by four separate access privileges in each of three categories of user of the CROMIX system.

The operating system allows a file to be accessed either exclusively or non-exclusively for each of the access privileges associated with that file.

The CROMIX operating system also provides a record level locking capability. With this feature, a user can "lock" only the record to be changed, thus preventing data loss due to several users making simultaneous modifications to the same file. The record level locking feature is especially useful in business applications where data files are maintained that can be accessed by many users simultaneously.

Finally, the flexible file system and generalized disk structure of the CROMIX operating system gives a disk address space in excess of one gigabyte per volume. This means that file size is limited only by the available disk capacity. Access to disk files has also been optimized for speed.

MODEL CRO-D
68000 CROMIX Operating System

Cromemco's 68000 CROMIX multi-user, multi-tasking operating system is a UNIX-like system available for use on all Cromemco D-Series computer systems with a minimum of 256Kb of RAM memory. The 68000 version of the CROMIX Operating System provides even more features than the Z-80 version of CROMIX described previously.

The 68000 CROMIX Operating System requires Cromemco's 68000/Z-80 Dual Processor Unit as its processor, and it requires at least one 256KZ board or one combination of a 512MSU and MCU for its RAM memory. Additional memory up to 4MB is supported. 128Kb of the RAM is devoted to the 68000 CROMIX Operating System, and the remainder is available for user processes.

These user processes may take as little as 4Kb of RAM memory up to the maximum available in the computer system since all of the memory is contiguous for the 68000. A program is allocated as much RAM memory as it requires when 68000 CROMIX first loads the process. Appropriate parameters passed to 68000 CROMIX system calls have been expanded to 32-bit addresses to allow direct addressing of up to the full 16M bytes of 68000 address space.

One of the most important features of the 68000 CROMIX Operating System is that it is capable of running processes on either the 68000 or the Z-80 microprocessor of the Dual Processor Unit. Switching between processors is performed as required by the operating system and is completely transparent to the user of the system.

Using the Cromemco CDOS and CP/M Simulator program, operating under the 68000 Operating System, it is possible to execute 68000 CROMIX programs, Z-80 CROMIX programs, and Z-80 CDOS or CP/M programs simultaneously. Thus, for example, one user could be running applications using any of Cromemco's 68000 languages (say, Pascal or FORTRAN-77), another could be using any of Cromemco's Z-80 languages (say, RPG II or COBOL), and a third could be running the Cromemco WriteMaster word processing system. Each of these programs would automatically be directed to its corresponding processor for execution during its time slice.

Programs executed on the Z-80 processor are allocated their own 64Kb segment of RAM memory. This segment may be located on any 64Kb boundary in available RAM and is not limited to a particular address space. If multiple segments are in use at one time, the 68000 processor and 68000 CROMIX automatically take care of switching between them. System calls performed by the Z-80 process are automatically transformed into 68000 CROMIX system calls for service.

The 68000 CROMIX Operating System is ideally suited for use as both a development system and an applications system for simulation studies, array and matrix processing, scientific, process control, or business applications.

The 68000 CROMIX Operating System can also provide automatic RAM memory error detection and error logging when used with Cromemco's MSU/MCU memory boards having an Error Checking and Correction (ECC) capability. These memory boards can provide automatic detection of double bit errors (in a 16-bit word) and automatic correction of single bit errors. 68000 CROMIX can be instructed to log on the disk any such errors which occur along with their memory address and time of occurrence. This allows the user to keep a running log of RAM errors and their frequency at particular addresses. The time between each error logging in 68000 CROMIX is user-settable and can also be turned off if desired.

In addition to all of these features, the 68000 CROMIX Operating System has all the standard features users have come to expect and appreciate in Cromemco's Z-80 CROMIX Operating System:

- Full multi-user, multi-tasking capability on both hard and floppy disk storage systems
- Multiple hierarchical directories
- Record and file level locking mechanisms
- Interprocess communications ("pipes" and "signals")
- Prioritized execution of processes
- Compatible directory, file, and device I/O supporting complete redirection of input and output
- Extensive system security features including file access modes and password log-in
- Four date and time stamps per file as well as system time
- Memory resident execution of tasks and servicing of users for maximum possible system throughput
- Powerful shell program capable of executing command procedures, programs, and intrinsic functions
- Extensive on-line manual "help" and training facility

The 68000 CROMIX Operating System is supplied with numerous utility programs which extend and augment its capabilities. These include a powerful screen-oriented text editor; multiple programs for backing up, copying, and moving files (both for CROMIX-format and CDOS-format disks); utilities for file system management such as mounting volumes and checking file system integrity; a powerful CROMIX program development linker; as well as many others.

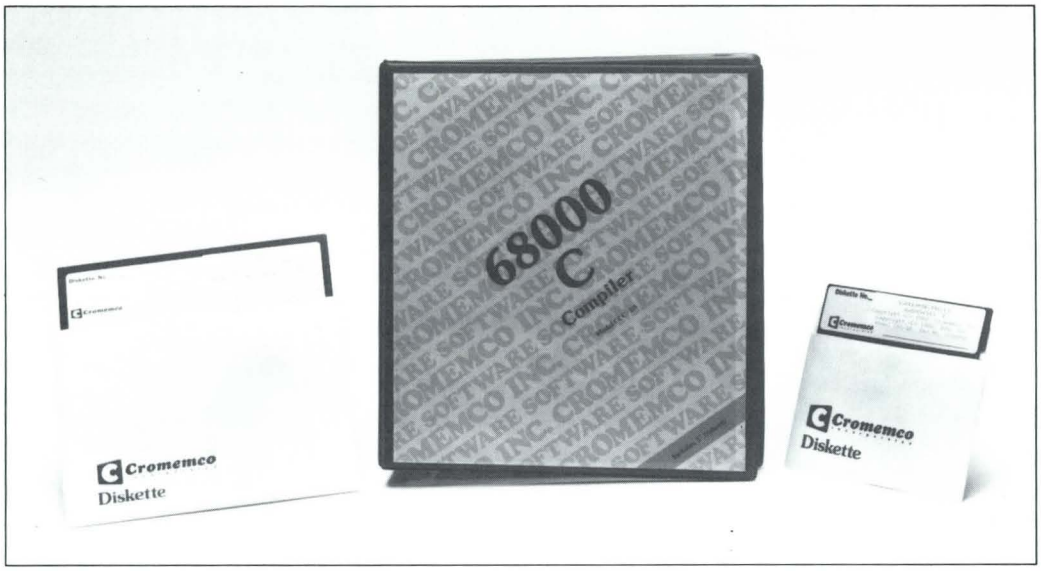
MODEL ASM-D
68000 Macro Assembler

The Cromemco 68000 Macro Assembler is a two-pass assembler which reads source code from a disk file, assembles it, and produces listings and an object file in relocatable format. It is both a Macro and Conditional Assembler. The Macro Assembler also contains powerful pseudo-opcodes designed to simplify the tasks of program creation and maintenance. These include pseudo-opcodes which include source files for assembling, specify relocatable libraries for the linker to search, push and pop multiple registers, specify that the contents of an address register can be used in address generation (USING), and execute or skip blocks of 68000 instructions depending on the values of condition codes (block IFcc, ELS, and FI).

The Cromemco Relocating Linker/Loader may then be used to load the assembled code into memory and resolve any external references. The completely assembled and linked machine code may then be saved in a disk file for execution. The assembler and linking loader allow one to create and assemble a number of different modules separately, and then link them together as desired at run-time. Assembled modules can also be connected and linked with 68000 FORTRAN-77, 68000 Pascal, and 68000 C modules.

Also included on the assembler disk is DEBUG68, a support program which allows machine language programs to be traced, disassembled, and patched. DEBUG68 also allows the user to establish break points, display and alter the 68000 registers, and initiate normal or step-by-step program execution.

MODEL CCC-D
68000 C Compiler



Cromemco's 68000-based C Compiler has all the features needed to permit applying structured programming techniques in solving a wide range of programming problems. In fact, it has all the features of the C language as described in the definitive text, *The C Programming Language*.

C programs consist of one or more functions that can be written in a single module or in several modules. These are then compiled separately and linked together.

Data types include character, integer, long integers, floating point, and double precision floating point. Single and double precision, gradual underflow and overflow, and representations for infinity and not-a-number are all implemented according to the IEEE Floating Point Standard. It provides up to 16 digits of accuracy for double precision values in the range – 10E308 to 10E308.

Data declarations in the Cromemco C language can be as simple or complex as needed. Pointer variables, structures (known as records in Pascal), and unions are all implemented.

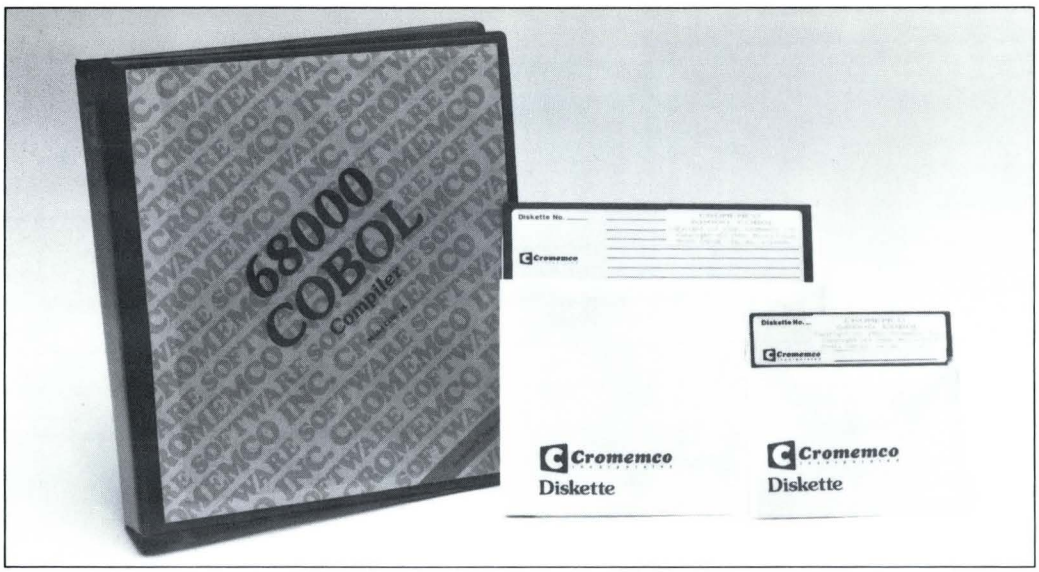
Cromemco C has the statements needed to write well-structured programs: if..else, for..while, do..while, continue, break, return, and switch.

More than 40 operators are included, such as arithmetic, bitwise, logical, relational, and shift operators, and unary operators like pre- and post-increment, address of, and size of.

The C library contains numerous functions that perform formatted and unformatted I/O to terminals, disk files, and printers.

C modules may be linked with 68000 Pascal, 68000 FORTRAN-77, or 68000 Assembler modules to form a single program.

MODEL COB-D
68000 COBOL Compiler



COBOL is the most widely used business programming language in the data processing industry. Cromemco's 68000 COBOL compiler was designed to meet the needs of that industry. Cromemco 68000 COBOL is a high-level COBOL compiler similar to mainframe COBOL compilers for ANSI-1974 COBOL programs. It enables Cromemco computers to compile and run programs written in full ANSI-1974 COBOL with minimal source code modification, thereby allowing users with an investment in existing COBOL programs to maintain and execute them on a microcomputer.

Cromemco's 68000 COBOL implements ANSI X3.23-1974 COBOL to the High Level of the Federal Information Processing Standard, the highest level of COBOL implementation defined by the U.S. Government, and has been tested and certified with no errors by the Federal Compiler Testing Center, an agency of the General Services Administration (GSA).

68000 COBOL offers the programmer the use of various types of data, including DISPLAY (ASCII), COMPUTATIONAL (binary), and COMPUTATIONAL-3 (binary coded decimal), for up to 18 digits of accuracy. SEQUENTIAL and RELATIVE files are available, as well as INDEXED files with more than 100 keys.

The PROCEDURE DIVISION statements available for the programmer's use include ACCEPT, ADD, ALTER, COMPUTE, DISPLAY, DIVIDE, EXIT, GO TO, IF, INSPECT, MOVE, MULTIPLY, PERFORM, SEARCH, STRING, STOP, SUBTRACT, UNSTRING, READ, WRITE, REWRITE, START, and DELETE.

Furthermore, this COBOL also implements the SORT, MERGE, RELEASE, and RETURN verbs to permit the creation of programs which sort existing data files on 1 to 128 sort keys.

A COBOL program can be written using SEGMENTATION to create fixed and independent segments. Independent segments are overlays which are stored on disk until the program needs to execute some or all of the routines in the segment. This powerful capability permits the execution of programs too large to fit into memory at one time.

Another feature which is useful when developing programs is the COPY facility. The use of this facility causes the compiler to read additional source files into a COBOL source program during compilation, thereby fostering the use of small, easily-edited source modules.

Cromemco 68000 COBOL contains the CALL verb which implements the means to create programs consisting of several independently-compiled modules. These modules can be written in COBOL or assembly language, depending on the needs of the application.

Two programmer productivity aids are available separately as companion programs to the 68000 COBOL Compiler. The first is called Level II Animator. It is a symbolic debugger that displays source code on the user's terminal as it is executing. Animator allows references to data items by name, multiple breakpoints, program restart from any COBOL source statement, and continuous data item monitoring.

The second companion program is FORMS-2. It is a COBOL source code generator that translates user screen layouts into COBOL record descriptions and generates an entire Level II COBOL program to allow data capture, update, and interrogation by means of application screens and an indexed sequential file.

MODEL FOR-D
68000 FORTRAN-77 Compiler

FORTRAN-77 provides a full implementation of the 1978 ANSI standard. The 16-bit, 68000 microprocessor which executes FORTRAN-77 gives this FORTRAN implementation speed, precision, and breadth.

Speed: Depending on the application, FORTRAN-77 runs up to 12 times faster than Z-80 FORTRAN.

Precision: Not only does FORTRAN have INTEGER*1, INTEGER*2, INTEGER*4, REAL*4, and LOGICAL data types, but it also contains CHARACTER strings, DOUBLE PRECISION, and COMPLEX data types. FORTRAN-77 executes DOUBLE PRECISION division problems up to 25 times faster than Z-80 FORTRAN.

Breadth: In addition to the standard logical IF and arithmetic IF statements, FORTRAN-77 has the Block IF-THEN-ELSE construct used in well-structured programs. It has 79 specific INTRINSIC functions plus a random number generator. FORTRAN statements include DIMENSION, COMMON, PARAMETER, EXTERNAL, INTRINSIC, SAVE, EQUIVALENCE, DO loops, CONTINUE, PAUSE, and three forms of GO TO. I/O statements include OPEN, CLOSE, READ, WRITE, PRINT, INQUIRE, BACKSPACE, REWIND, ENDFILE, PEEK and POKE.

Files may be random or sequential, formatted or unformatted. Format statements contain the usual edit descriptors plus a new descriptor, $ editing, to inhibit End-of-Record so the console may be prompted and a response read on the same line.

Cromemco 68000 FORTRAN-77 offers in one software package the data types, operators, and functions necessary for high-speed arithmetic computation; a full implementation of the 1978 ANSI standard; and a language highly compatible with Cromemco Z-80 FORTRAN-IV.

MODEL PAS-D
68000 Pascal Compiler

Cromemco Pascal for the 68000 is a true native-code compiler which implements Pascal as defined in the 1982 proposed ISO Pascal standard except for the Pack and Unpack routines.

In addition to the features defined in the ISO definition, Cromemco Pascal supports many extensions to the language.

Program construction is made more flexible through independent compilation of UNITs, linked at link time. Units can be useful for sharing common code among different programs or as a means to avoid compiling a large program when only a small part has been changed. An INCLUDE option allows the compiler to use source from another file when compiling a program.

In addition to the data types provided in standard Pascal, Cromemco Pascal provides types to implement double precision reals, long integers, and strings. Variables of type DOUBLE are double precision reals in the range of approximately – 1.8D308 to + 1.8D308. Variables of type LONGINT occupy four bytes instead of two bytes of the standard integer data type and can take on values in the range – 2,147,483,648 to 2,147,483,647.

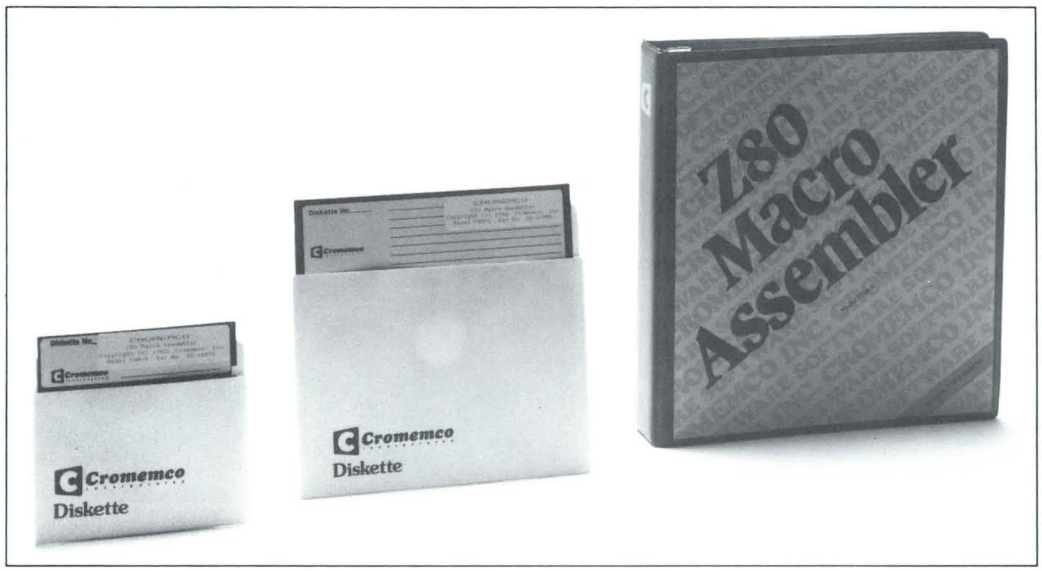
A STRING basic data type which has a dynamic as well as a static length is implemented. Facilities for handling STRING variables include CONCAT, COPY, DELETE, INSERT, LENGTH, POS, SCANEQ functions. These functions provide capabilities to concatenate strings, copy strings or substrings, delete or insert characters into strings, or search for a character or character pattern in a string.

Low-level routines, MOVELEFT, MOVERIGHT and FILLCHAR, move a block of bytes and fill a block of bytes with a character. A SIZEOF routine generates the number of bytes a type or variable is allocated. A POINTER function converts an integer expression to a pointer value. A unary operator, @, generates the address of a variable, function or procedure.

AND, OR and NOT operators may be applied to integer variables to perform bitwise logical operations and produce results of type integer.

Predeclared variables ARGC and ARGV provide the capability to pass parameters to a program from the command line which invokes the program.

MODEL FDA
Z-80 Macro Relocating Assembler



The Cromemco Z-80 Macro Assembler is a two-pass assembler which reads source code from a disk file, assembles it, and produces listings and an object file either in relocatable or in Intel hex format. It is both a macro and conditional assembler.

The Cromemco Relocating Linker/Loader may then be used to load the assembled code into memory and resolve any external references. The completely assembled and linked machine code may then be saved in a disk file for execution. The assembler and linking loader allow one to create and assemble a number of different modules separately, and then link them together as desired at run-time. These modules may include FORTRAN library routines as well as those generated by the FORTRAN and COBOL compilers.

Also included on the assembler disk is DEBUG, a support program which allows machine language programs to be traced, disassembled, patched, or programmed into PROM. DEBUG also allows the user to establish break points, display and alter the Z-80 registers, and initiate normal or step-by-step program execution.

MODEL CCC
C Compiler

Cromemco's Z-80-based C Compiler has all the features needed to permit applying structured programming techniques in solving a wide range of programming problems. In fact, it has all the key features of the C language as described in the text, *The C Programming Language*, by Kernighan and Ritchie.

Cromemco's Z-80 C Compiler is written in Cromemco C. C programs consist of one or more functions that can be written in a single module or in several modules. These are then compiled separately and linked together.

Data types include character, integer, long integers, floating point, and double precision floating point.

The floating point is BCD for a full 14 digits of accuracy in the range ±9.99E−65 to ±9.99E+62.

Data declarations in the Cromemco C language can be as simple or as complex as needed. Pointer variables, structures (known as records in Pascal), and unions are all implemented.

Cromemco C has the statements needed to write well-structured programs: if..else, for..while, do..while, continue, break, return, and switch.

More than 40 operators are included, such as arithmetic, bitwise, logical, relational, and shift operators, and unary operators like pre- and post-increment, address-of, and size-of.

The C library contains more than 40 functions that perform formatted and unformatted I/O to terminals, disk files, and printers.

Cromemco C programs must be compiled on a CROMIX system. They can be linked with either the CROMIX C function library to run on a CROMIX system or the CDOS C function library to run under either the CDOS or CROMIX operating systems.

MODEL FDC
COBOL Compiler

Cromemco's Z-80 COBOL Compiler contains all of the features of Level 1 COBOL as required by the 1974 American National Standard (ANSI) X3.23-1974, as well as the most useful options of Level 2.

The Level 1 features include the standard Nucleus, Sequential Files, and Table Handling. RELATIVE, INDEXED, and SEQUENTIAL files may be used. The COPY statement speeds program development by allowing the programmer to include source libraries. Cromemco COBOL also supports COMPUTATIONAL-3 data to give more compact storage of decimal data on a disk (by packing 2 digits per byte).

Powerful Level 2 features of Cromemco COBOL are COMPUTE, OPEN EXTEND, CALL, STRING, and UNSTRING.

For rapid error isolation, COBOL includes EXHIBIT, READY, TRACE, and RESET TRACE.

Another important feature is that the compiled code is relocatable and uses the same relocatable code format as Cromemco's FORTRAN-IV and Z-80 Macro Assembler. This means that segments of programs written in FORTRAN or Assembly Language may be easily called from a COBOL program.

Additional features of Cromemco COBOL include a SCREEN SECTION format in the Data Division that allows a concise description of one or more screen forms. Segmentation implemented to ANSI Level 1 allows compilation or execution of programs too large to fit directly into memory. File integrity protection measures are also provided.

COBOL programs compile and execute both under CDOS and the CROMIX operating systems with the Cromemco CDOS Simulator.

MODEL FDF
FORTRAN-IV Compiler

Cromemco Z-80 FORTRAN-IV is a complete implementation of ANSI standard FORTRAN X3.9-1966, except that there is no complex data type and specification statements must appear in a specific order.

Cromemco FORTRAN-IV operates under both the CDOS and CROMIX operating systems and provides both sequential and random disk file access. Files may be named at run time by use of the CALL OPEN statement. The ENCODE and DECODE statements provide the user with formatted data transfer within memory.

Variables may be declared as DOUBLE PRECISION for full 15-decimal digit precision. Other available data types include BYTE, LOGICAL*1, LOGICAL*2, INTEGER*1, INTEGER*2, INTEGER*4, REAL*4, and REAL*8. For ease in coding, FORTRAN allows the literal form of Hollerith data; that is, literals may be enclosed in apostrophes.

Since Cromemco FORTRAN-IV produces relocatable code, FORTRAN modules may be linked with the code produced by the Cromemco Macro Assembler, and the assembler can access scientific and arithmetic routines located in the FORTRAN-IV library. This library is searched by the linker to resolve any undefined subroutine calls. This means that only the specific subroutines and system routines required to run a Cromemco FORTRAN program are loaded before execution.

MODEL FDR
RATFOR with FORTRAN-IV

Cromemco Z-80 RATFOR (an acronym for RATional FORtran) is a FORTRAN preprocessor that brings the advantages of structured programming techniques to the widely used FORTRAN language.

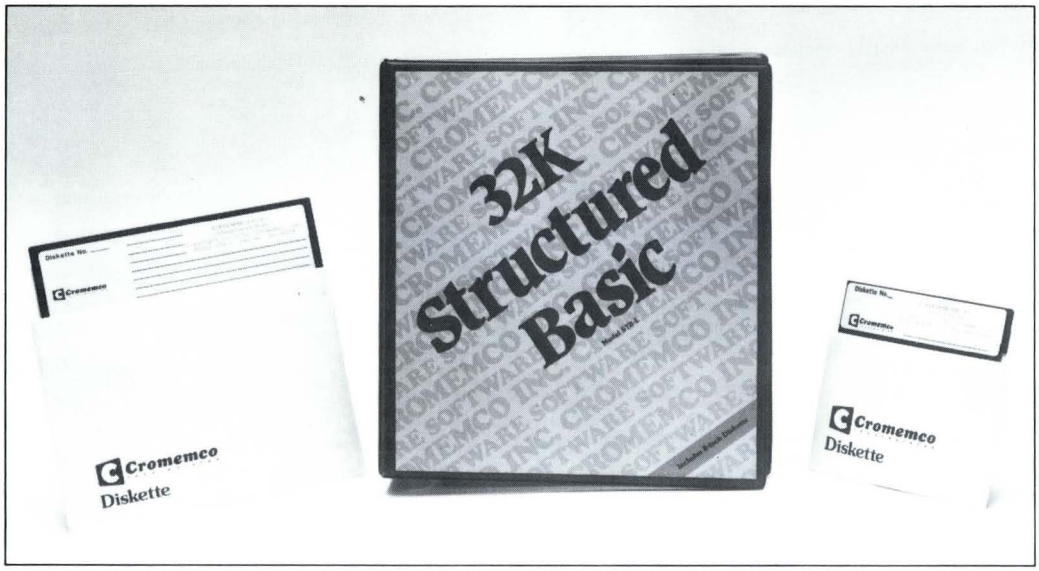
The new structures allowed in RATFOR include:

- IF-ELSE — branch implementation
- REPEAT-UNTIL — loop with test at end
- WHILE — loop with test at beginning
- FOR — loop with initialization and iterative condition
- BREAK — exits from a loop
- NEXT — skips remainder of loop.

The RATFOR preprocessor produces FORTRAN-IV code that can be compiled by the Cromemco FORTRAN compiler included with this software package.

The FORTRAN code produced by the RATFOR preprocessor is indented, for easy readability, in accordance with block-structured principles.

MODEL STB
Structured BASIC



Cromemco Structured BASIC is a semi-compiling design which combines the best features of both an interpreter and a compiler. This yields fast execution times. In addition to speed of execution, Structured BASIC also maximizes computational precision (a full 14 BCD digits) and programming power.

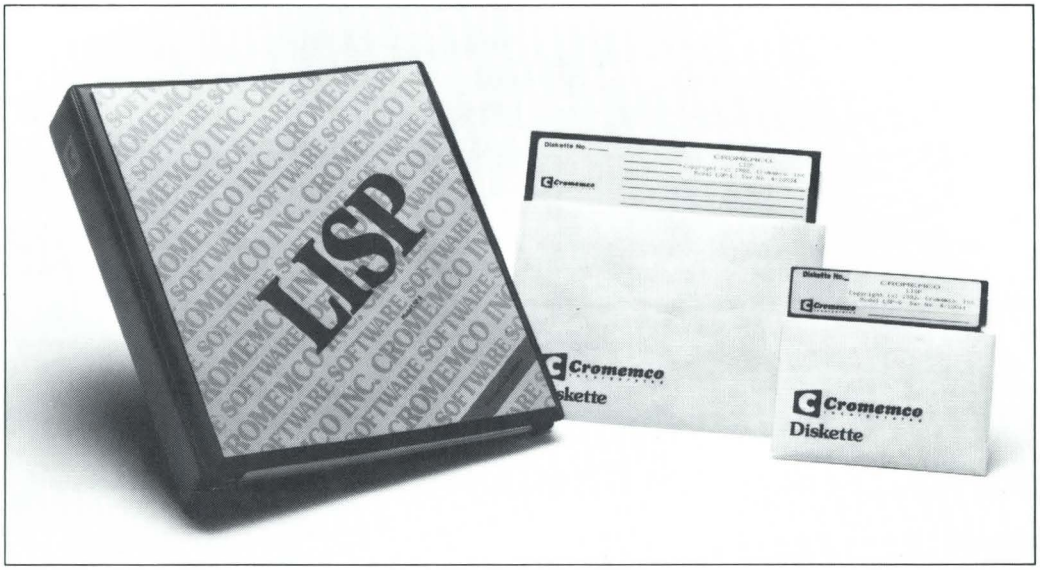
Other features of Structured BASIC include:

- Four types of variables: integer, short floating point, long floating point, and string
- Advanced disk I/O capabilities
- Binary and ASCII storage for both programs and data
- Sequential and random access files
- English language error messages
- Syntax error checking as program is entered
- Dynamic error trapping
- TRACE and immediate mode to facilitate debugging
- Advanced output formatting capabilities
- Advanced string handling capabilities
- Chaining of programs
- Direct machine language interaction.

A sophisticated KSAM (Keyed Sequential Access Method) has been incorporated in Cromemco's Structured BASIC. This feature is useful in establishing data bases for various applications.

The introduction of WHILE and REPEAT loops and the IF-THEN-ELSE instruction group in Structured BASIC makes it possible to create more readable code. This leads to faster debugging and easier maintenance of programs and systems.

MODEL LSP
LISP



Cromemco LISP is a highly-evolved high-level language used frequently in artificial intelligence work. It is used in such interactive data-base applications as systems that understand natural language, systems for symbolic manipulation of mathematical expressions, intelligent controllers, CAD, and design automation.

Programs in LISP are also used in such work as internal medicine for diagnostic assistance and in geology to assist in interpreting geological data.

Cromemco LISP has a virtual storage capability such that an "autoload" feature allows infrequently-used functions and symbols to be stored on disk, thereby allowing larger user programs. Comprehensive error-trapping capabilities have also been included in Cromemco LISP.

In addition, this LISP incorporates many advanced features including standard control constructs such as COND, PROGN, CATCH/THROW, OR, AND, IF DO, LET; complete string and character-processing capabilities; both fixed and floating-point arithmetic; a full complement of property-list functions to provide a powerful tool for constructing data bases; generalized I/O; the capability of interfacing with non-LISP procedures; a comprehensive library with over 150 utility functions; a table-driven, user-modifiable parser that allows the programmer to redefine the scanner and define a new LISP syntax; and MACRO facilities which include READ macros and general macros.

MODEL RPG
Z-80 RPG II Compiler

Cromemco RPG II is now in its second major release. The Panatec RPG-II series of test programs, which are designed to test RPG compilers, has been executed using Cromemco's RPG II compiler and run-time library. The Cromemco RPG II compiler passes the test programs with no errors with the exception of those test programs based on assumptions about the structure of EBCDIC, about IBM tape devices, or about IBM disk or sector structure. Test programs based on those assumptions will not execute without first being changed for similar assumptions on Cromemco systems (for example, ASCII must be used in place of EBCDIC).

Cromemco RPG II supports floppy disk, hard disk, printer, and CRT access methods. The compiler recognizes the following operations and RPG features: editing, control codes, report headings, sequential access files, direct access files, indexed sequential access methcds, random files, addrout, chaining, addition, subtraction, multiplication, division, xfoot, sqrt, move, move zone, compare, zone test, bit operations, branching, look-up operations, setting indicators, subroutines, force, exception reports, display, read, chain, debug, and basic I/O with devices. The Cromemco RPG II compiler does not recognize the invert edit operation.

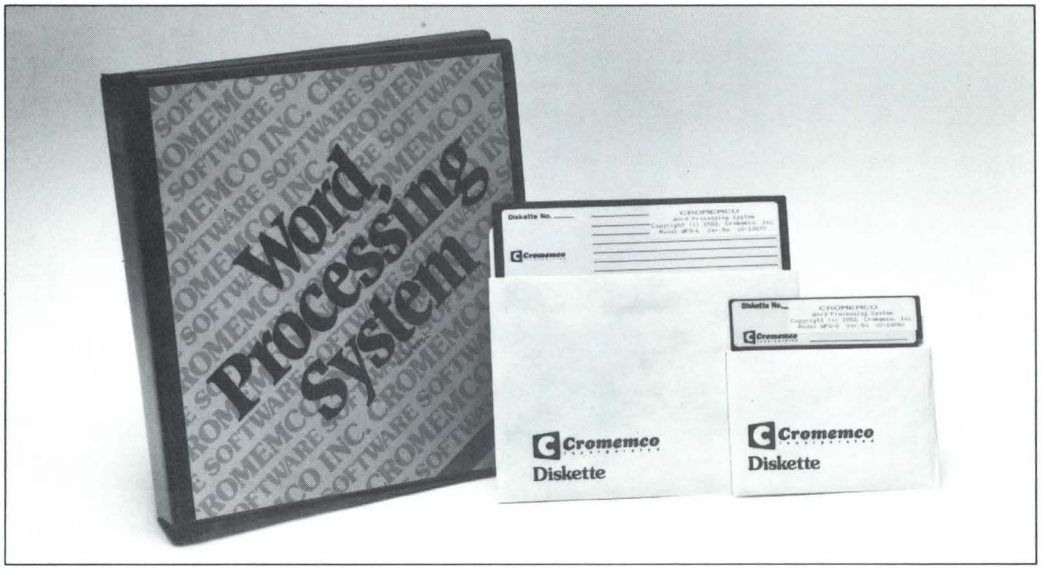
Existing RPG II source programs may be ported to Cromemco machines (in particular, those written for IBM System/3), but may require some editing before being recompiled with the Cromemco RPI II compiler. Some RPG II files may require format changes for compatibility with Cromemco RPG II formats. A utility program is provided with RPG to move files from IBM 3740 format (single-sided, single-density) 8″ diskettes to Cromemco format disks of all types, or vice versa. This utility can also translate EBCDIC files into ASCII files during the transfer process.

Cromemco RPG running under the CROMIX operating system may also use ISAM (Indexed Sequential Access Method) files accessed through Cromemco CROMIX KSAM. These files may be created by other Cromemco languages such as FORTRAN, COBOL, C, or Assembler. Similarly, these other languages may use KSAM files created by RPG II. The RPG software package contains the software necessary to use Cromemco KSAM. Additional KSAM software (supplied with the KSAM software package) is necessary to use Cromemco KSAM with other languages.

A position-oriented screen editor program which displays the current line and column number to ease RPG source file editing is also included in the Cromemco RPG II software package.

The Cromemco Z-80-based RPG II software package (with the exception of the ISAM file access portion of RPG) is designed for use on Cromemco computer systems using either the CDOS or CROMIX operating systems. Those users of the ISAM file access portion must use RPG with the CROMIX operating system.

MODEL WPS
Word Processing System (Formatter II)



The Cromemco Word Processing System is a combination Screen Editor and Formatter for the preparation of documents. Documents are prepared as a two-step process. First the text is entered as a file using the SCREEN Editor and then this file is formatted according to simple yet comprehensive commands using the FORMATTER II program.

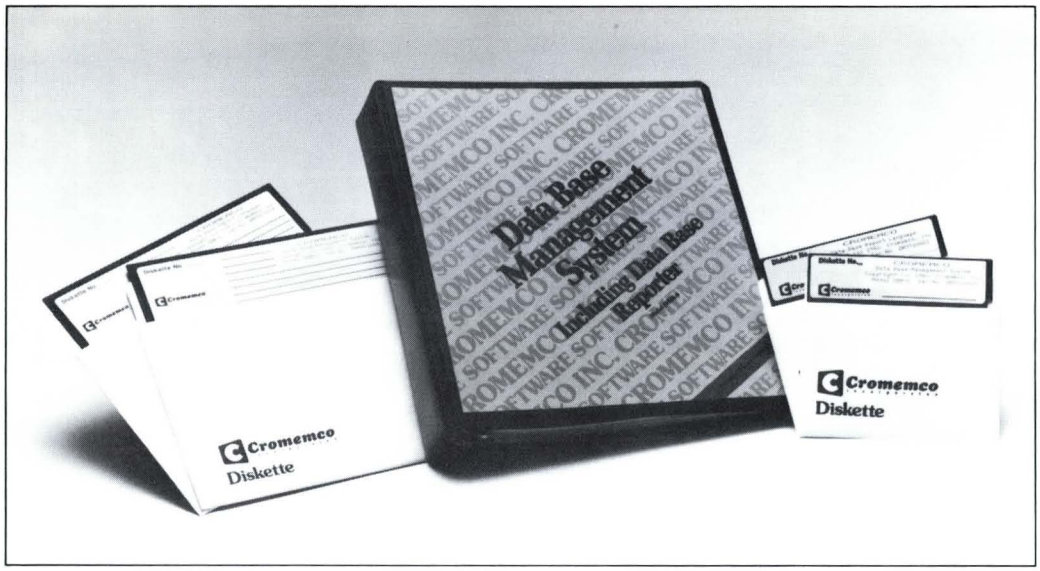
The Cromemco Screen Editor displays an entire screen of information during the editing process. A cursor in the display can be readily moved around the screen to add, delete, or change information. Special features of Cromemco CRT terminals such as cursor positioning, blinking fields, and clear to end of line/screen are used to simplify operation to the fullest. The Screen Editor prompts the user automatically by using the top line of the screen display as a menu of command choices.

With formatting commands inserted in the text, lines of text may be left- or right-justified or centered. Key words can be noted and included in an alphabetized index which is automatically prepared. Page numbers can go as high as 9999 for long documents.

Text may also be underlined, superscripted, subscripted, or displayed in boldface when the output is printed on a letter quality printer such as the Cromemco 3355B. The Cromemco Formatter II also has commands controlling line spacing, page titles and subtitles, top, bottom, left and right margins, figure spacing, tab settings, and page length.

The Cromemco Word Processing System is designed for use on Cromemco computer systems using either the CDOS or CROMIX operating systems.

MODEL DBM
Data Base Management System



Cromemco's Data Base Management System (DBMS) is an advanced software package which can be used for a variety of applications such as creating mailing lists, phone lists, customer lists, etc. The DBMS uses a powerful multi-keyed, indexed sequential access method of organizing the data base so that information can be retrieved quickly and easily.

The Cromemco DBMS is a modular, uncomplicated system that was especially designed for ease of use. The DBMS does not require user programming and includes operator-oriented prompts from the screen.

To create a data base, an operator simply specifies the field attributes and then specifies the methods by which the data can be retrieved (e.g., by state, by name, by state by city by name, etc.).

The system overcomes the limitations of key-access methods in that multiple keys to the data base can be defined and redefined at any time. Storage space for the key files can also be deleted as desired and recreated at a later time.

Cromemco DBMS also includes a Data Base Reporter (DBR) package that can be used to create special reports from the data base in a variety of user-specified formats. Some of the powerful features of the package include the ability to produce mailing label programs; the ability to perform calculations such as subtotals, averages, counts and percentages on numeric data items; the ability to print report headers and trailers automatically; the ability to sort records in the body of a report by one or more fields; the ability to keep track of page numbers in a report so that they may be printed out any time in the header or trailer; and the ability to sort on subscripted portions of a field.

MODEL SGS
SDI Graphics Software

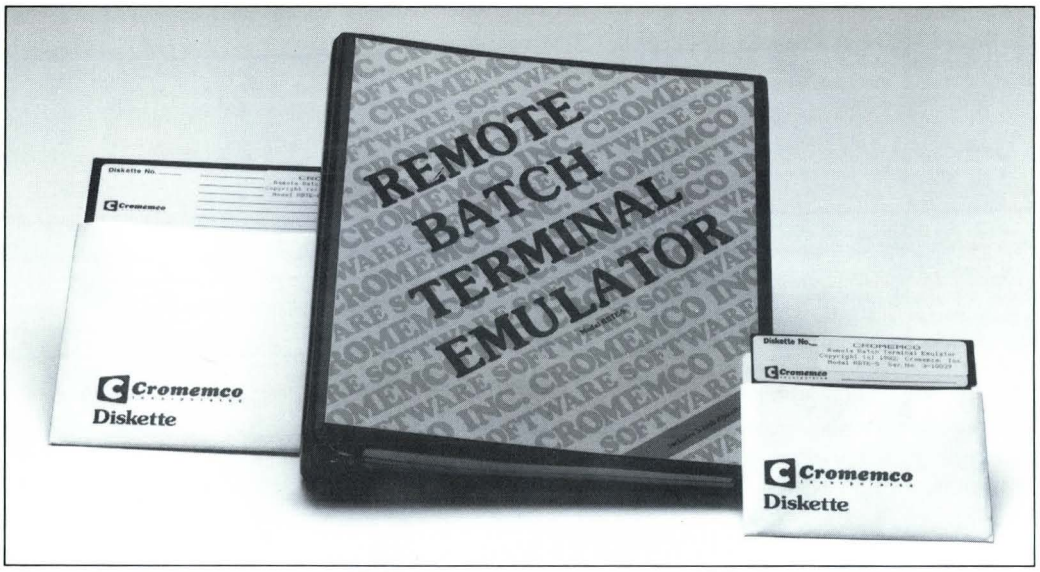
Cromemco's SDI Graphics Software is a development package for the high-resolution graphics system which includes a full range of powerful, human-oriented commands that operate from such high-level languages as BASIC, FORTRAN, RATFOR, and C. Consequently, the Cromemco graphics software package significantly decreases programming time and thus facilitates the development of graphics applications.

For those using the graphics software package, the subroutine calls provided are sufficient to fully utilize all the capabilities of the Cromemco SDI high-resolution graphics board. These subroutines allow the user a number of powerful capabilities, including: fast line generation; fast generation of regular shapes such as circles, rectangles, and polygons; area fill of these shapes in a designated color at video rates; text generation and rotation; the ability to CLIP which eliminates problems which might arise from trying to plot outside the screen area; and the ability to scale the display area of the work page.

The programmer can generate and display an image in high resolution (756 × 484) points as well as in 16 color medium resolution (378 × 242) points using the same system. The software and hardware permit the user to select 16 colors for the color map from a palette of 4096 colors. The contents of any color in the color map can be modified by the user with a simple define color command. In addition, when programming in FORTRAN or Assembly language, the programmer has the option of creating color maps using the command CMAPGEN.

This development package is written for both ease of use and to take full advantage of the SDI hardware — consequently, it is extremely fast and very efficient.

MODEL RBTE
Remote Batch Terminal Emulator



Cromemco's Remote Batch Terminal Emulator (RBTE) package enables Cromemco computers to functionally emulate IBM 3780, 2780 and 2770 data terminals using the IBM Binary Synchronous (BISYNC) protocol.

Besides allowing communication with mainframes, the RBTE package allows Cromemco computers to send files to each other or to other computer systems over dial-up, leased, or private phone lines. The BISYNC protocol assures error-free transmission and reception of data even over noisy phone lines.

Data rates from 1200 to 9600 baud are supported with this package. Data may be transferred transparently or non-transparently. Complete and fully automatic conversion of data from ASCII to EBCDIC or vice versa is provided as required.

Determining which type of terminal the RBTE will emulate is done by specifying configuration parameters. These may be specified manually by the RBTE operator or edited into a text file. The file may then be specified in the command line to RBTE and will automatically be read when the program is started.

The RBTE system utilizes the Cromemco I/O Processor board (IOP), which provides multi-processor capability for the S-100 system, and the Cromemco QUADART serial communications interface board which supports asynchronous, bisynchronous, and SDLC mode protocols.

RBTE has an online diagnostic trace. This allows the user to trace internal commands given to the Communications Manager which runs in the IOP board and handles all of the primitive I/O functions. The diagnostic trace also traces the status returned from the Communications Manager and the BISYNC data link control characters. This feature virtually eliminates any need for a datascope to verify proper communication performance.

Once RBTE has been initialized and configured, it enters either the unattended or attended mode. No operator interaction is necessary when the unattended mode has been selected. After the telephone connection has been established, RBTE automatically begins a transmit/receive cycle. The file(s) are transmitted one at a time until all files have been sent. After the transmission of each file, RBTE allows one file to be received. If no file has been received after a selected time interval, RBTE will begin transmitting any next queued file. This cycle continues until all specified files have been transmitted and received or until the line is disconnected. Status messages indicating the progress of the communication are displayed in the status window.

The RBTE software operates under both Cromemco single-user, CDOS and multi-user CROMIX operating systems. Under CROMIX, redirected input may be used to automatically control all aspects of RBTE operation. This can provide a totally self-controlled communications facility.

An offline diagnostic test is provided with RBTE to verify correct operation of the IOP, QUADART, modem cables and the modem itself. All relevant modem lines are tested.

MODEL IDS
IOP Development Software

The IOP Development Software package is designed to support the I/O Processor (IOP) and QUADART interface boards. The I/O Processor board allows the Cromemco user to have multiprocessor capability in a Cromemco system.

The QUADART board permits serial communications in four independent channels, each with complete handshaking for modems.

The IOP Development Software package offers everything needed to interface the QUADART to asynchronous modems. In addition, the software contains a set of software tools to permit the user to develop IOP-resident software.

The development package also has software to upload and download programs between the IOP and its host Cromemco computer. A sophisticated DEBUG program is included with facilities to TRACE, set breakpoints, and examine and modify registers.

Once the IOP software is debugged on the host machine, it can be transferred into the IOP RAM using the download program.

The asynchronous drivers provided with the package are designed to be used with standard Bell 113C, 103J, or 212A modems or equivalent.

MODEL COLL
Overlay Linker Software Package

Cromemco's Z-80 Overlay Linker permits construction and execution of programs that are too large to fit into available memory. To do this, the programmer first writes the large program in modules. The Overlay Linker program is then used to build a tree-like structure of overlays with the modules.

The result is a program that executes by loading into memory only those modules that are necessary at any given time. As overlays become inactive, their memory is reclaimed for use by subsequent overlays.

The Overlay Linker is designed to link the standard relocatable files produced by the Cromemco Macro Assembler and the language compilers, including C, COBOL, and FORTRAN, to produce executable object files.

The Overlay Linker can load any standard Cromemco file that does not include absolute loading. It can also manage an arbitrary number of common blocks and it can create an arbitrary number of overlays, each in a separate file on disk.

Commands can be given to the Overlay Linker as a part of the command line, from the console in response to prompts, from a file, or any combination of the above.

The linker also generates an extensive load map which may be written to a file. Parts of the map may be displayed on the console at any time.

A relocatable library file manager in the Linker program can be used to build libraries of common user routines. It can also be used to convert run-time libraries supplied with the various languages to random access format for faster linking.

MODEL KSAM
KSAM File Access System

Cromemco's KSAM (Keyed Sequential Access Method) software package is a fast, powerful file access system for Cromemco's Z-80 CROMIX multi-user multi-tasking operating system. With KSAM, a programmer can create files where data is accessed by content rather than by location. This is especially useful in applications where it is important to keep track of and have easy access to large data bases of information such as customers names, addresses, phone numbers, etc.

Up to seven keys (such as name and address) can be defined by the user. KSAM will automatically maintain all the indices and data files. Keys can be specified to be either unique or non-unique, depending on the application. To assure extremely fast record access time, KSAM uses a self-balancing B-TREE index file structure.

Data can be added, changed or deleted dynamically. KSAM incorporates the CROMIX operating systems' record level locking facility which maintains data integrity even if two different users attempt to change the same record simultaneously.

The package includes the menu-driven KSTAT utility which facilitates KSAM file manipulation. With KSTAT the user can create, load, copy, erase, and unload files and enable/disable audit trails. This audit trail facility, which can be turned on and off under control of KSTAT, is a unique KSAM feature. It allows the user to record every transaction in a separate file. This capability is particularly useful if the user needs to reconstruct a KSAM file after a power failure or operator error.

The package also includes KSAM libraries and equate files for COBOL, FORTRAN, RATFOR, C, and Z-80 Assembler so that programmers can write programs in these languages which directly manipulate KSAM files.

MODEL WRMR
WriteMaster Word Processing System

Cromemco's WriteMaster software is a display-oriented, word processing program that is designed to be both easy to use and easy to learn. WriteMaster incorporates a command structure that approximates the flow of natural language and is easy for an operator to understand.

WriteMaster provides commands and single keystroke functions that make document creation simple. First, the program is display oriented so the text displayed on the screen appears exactly in the form it will have when printed. For ease in text formatting, the program has commands such as: alignment of left margin of all or any part of user-specified text; left or right justification of text with optional incremental spacing; automatic word wrap; automatic page boundary display; variable line spacing; page numbering and heading insertion; line centering; and single-key alignment and left-right justification using function keys.

Text editing features include extensive find and replace capability, including general category and user-specified category search; variable-speed file scanning; a complete set of jump to commands including jump to a specific page; temporary storage and movement of text insertion from disk files; and block storage of text subsections to disk.

Additional features included in this package are a complete menu system available in context by a single keystroke, a single keystroke user HELP command, automatic command input spelling correction, complete file maintenance from within the program, and an emphasis on simplicity of operation at all levels.

The WriteMaster Word Processing System is designed for use on Cromemco computer systems using either the CDOS or CROMIX operating systems.

MODEL SPMR
SpellMaster Proofreading System

Cromemco's SpellMaster is an interactive spelling correction program. The SpellMaster program will examine any text file and compare each word in the file to a comprehensive set of spelling dictionaries. When a spelling that is not in one of the dictionaries is located, the program displays the questionable word, its context, and usually an educated guess as to the proper spelling. The user may then accept the original spelling, use the guess, edit the word and/or context, or request the program to make another guess.

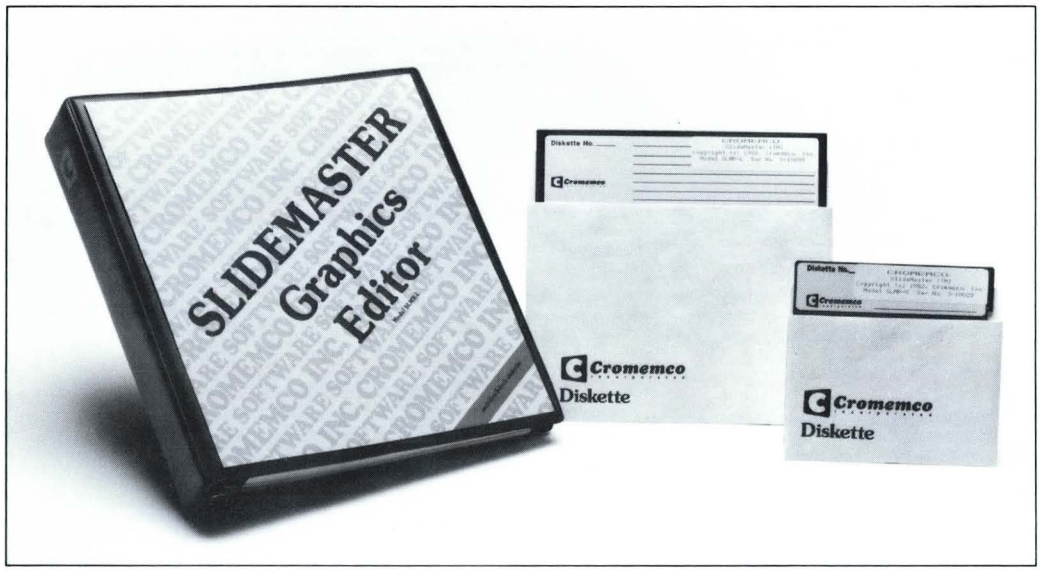
The SpellMaster program is very comprehensive. The program's disk-resident master dictionary contains over 100,000 words. All words are checked against the dictionary, including possessive forms. A hyphen at the end of a word is also distinguished from one in the middle of a hyphenated word and handled correctly.

The SpellMaster program is both fast and efficient. Each word is checked in the sequence in which it appears in the source document. Originally, this would require a disk access for each word. SpellMaster, however, keeps a 15,000-word subset of the master dictionary in the computer's RAM memory. This internal dictionary, which can be accessed very rapidly, contains the most commonly used English words. Through repeated use, those words that are unique to the user's profession can be automatically added to the internal dictionary. Thus, over time, SpellMaster "learns" the spelling patterns and word usage of the person operating the program.

The SpellMaster program is exceptionally easy to use. All commands are single keystrokes selected from a one-line menu displayed across the top of the terminal's screen. The overall set of menus is organized in a tree structure such that a new menu is displayed in response to each command the user enters. Most menus include a HELP facility.

The SpellMaster Proofreading System is designed for use on Cromemco computer systems using either the CDOS or CROMIX operating systems.

MODEL SLMR
SlideMaster Graphics Editor



Cromemco's SlideMaster Graphics Editor is an extremely useful tool for creating graphics and text displays. The package greatly facilitates the development of graphics for business statistics and charts, art and illustration applications, and a wide range of applications such as medical imaging, circuit design, and architectural drawings.

The package is designed to be used with the Cromemco SDI graphics system which can be used to display color or black-and-white images with up to 756 x 484-point resolution on our high-quality RGB-13 monitor.

The SlideMaster software allows a user at a workstation consisting of any Cromemco microcomputer with graphics capability and a digitizing tablet and pen to create images interactively. The user need not have any prior knowledge of computer programming languages. To create images, the user may choose from over 75 powerful design functions from a menu on the digitizing tablet. The picture being created appears on the RGB monitor. These images may then be stored on or retrieved from disk at the press of a pen. In fact, with just the press of a pen, the graphics and text being generated can be erased, changed, moved, enlarged or manipulated in a variety of ways. The menu provides various pen and brush selections; a color pallet; the capability to generate circles, ellipses, lines, and text; zoom and pan functions; and a wide range of additional capabilities.

Once the images created have been stored on disk, they can be displayed "slideshow" fashion, moving forward and backward through a sequence of images, at the touch of a key.

SlideMaster also provides a host of housekeeping functions. Depending on the hardware configuration, the user can build up to six full 48Kb images at once, moving parts of any one image to another image. Backup buffers greatly reduce the possibility of unrecoverable errors. The user can thus have from one to six images in RAM memory for instant recall and hundreds more stored on disk.

Sophisticated compression/decompression software allows 48Kb images to be stored on disk in extremely compact form — sometimes taking only 4Kb of disk space. This compressed storage format is also universal between other Cromemco SDI software packages such as SGS and FontMaster software. Thus images generated in a program created with one of these packages can be edited using SlideMaster.

The SlideMaster Graphics Editor is designed for use on Cromemco systems using the CDOS operating system.

MODEL FOMR
FontMaster Graphics Text Image Generation Package

Cromemco's FontMaster software package is a powerful tool for creating graphics images consisting of text and charts. The package facilitates the development of business presentations such as marketing forecasts, training materials, sales charts, and the like. FontMaster allows complete control over the colors and fonts which are used, as well as allowing portions of the text to be highlighted in frames of contrasting color.

Images may be created using any mixture of ten standard fonts which are supplied with FontMaster. These include fonts for Helvetica, Cheltenham, Rondo, Radiant, and Bembo Italic. In addition, FontMaster may be used to generate special character sets for scientific work or international character sets for languages such as Chinese, Japanese, and Arabic. Once these fonts are developed, they may be used (and mixed) to produce presentation images as well.

The font character sets are interactively edited with an easy-to-use, menu-driven program which does not require prior programming knowledge. Once these character sets are created and saved, they may be used in one of two ways: they may either be compiled into picture images with the PIXMAKE image compiler, or they may be displayed by using standard write-text graphics calls with the SDI Graphics Software package.

The text editing of the images being produced, as well as the compiling using the PIXMAKE image compiler, can both be performed on a non-graphics system for later display on a system equipped with SDI graphics interface hardware. This means that it is possible to have a large group of workstations used for image editing and creation, with all workstations being served by a centrally-located SDI display system.

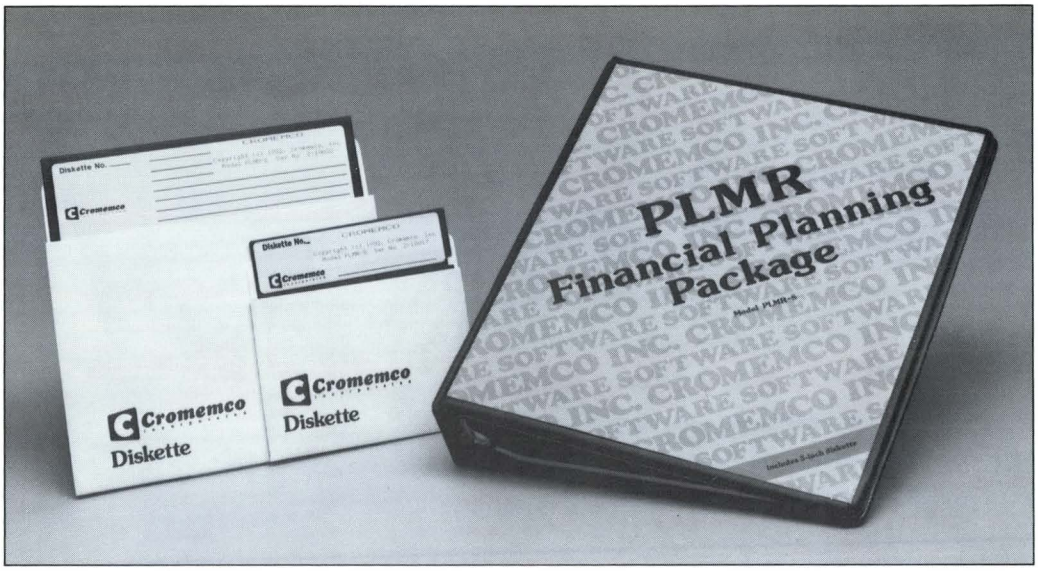
FontMaster also comes with a presentation program that allows images created with FontMaster, SlideMaster, or SDI Graphics Software packages to be displayed like slides, either manually or in a timed automatic sequence. The automatic sequence can be used for presentations by using the self-repeating mode of its operation. Manual presentations are easily and professionally done using the standard Kodak slide projection remote control switch supplied with FontMaster (which connects easily to a TUART in your system).

Sophisticated compression/decompression software supplied with FontMaster allows 48Kb images to be stored on disk in extremely compact form — taking as little as 4Kb of disk space. Not only does this mean that many more slides may be stored on a disk, but disk loading time is kept to a minimum.

The next slide is automatically loaded into the free-frame buffer (on two-buffer SDI systems) while the current slide is being viewed.

The FontMaster Graphics Text Image Generation software package is designed for use on Cromemco computer systems using either the CDOS or CROMIX operating systems.

MODEL PLMR
Financial Planning Package



Cromemco's PLMR is a financial planning and general-purpose numeric analysis package. PLMR provides automatic spread-sheet analysis for a variety of applications including financial planning, cost accounting, sales forecasting, production planning, cash flow analysis, and scientific data analysis.

With PLMR, the user can easily modify the format to meet the requirements of any project. Since the program automatically recalculates all appropriate totals with each new entry, tedious hand calculations are eliminated. The PLMR program can produce a ledger and balance sheet, a chart, a bank statement, an expense account record, or any one of a variety of formats the user designs for specific business, engineering, and scientific applications.

A key feature of the program, and the basic calculating tool, is the plansheet. Under Cromemco's CROMIX operating system, a single plansheet can include up to 10 separate pages, over 1000 lines, or up to 130 columns, allowing the program to accomodate very large projects.

The terminal screen provides the user with a window for viewing and entering data on a portion of the plansheet. The user can move (scroll) the window up, down, left, or right, to access various portions of the plansheet when needed.

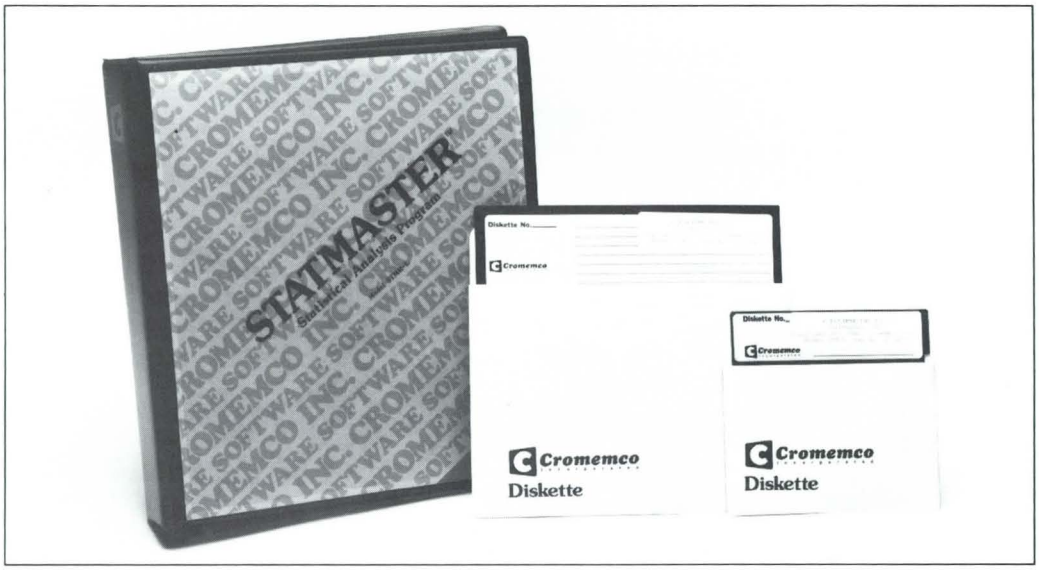
The plansheet is comprised of two separate and distinct sections, the matrix area and format area. The matrix area is a rectangular array of columns and lines which is reserved for numeric entries. With Cromemco's CROMIX operating system, the area available for numeric entries in each page is 13 columns across and up to 101 lines. In CDOS, each page is 13 columns and 31 lines.

The format area is reserved for descriptive information such as line and/or column captions and project titles. The program operates as a word processor in the format area, so the user can type in the appropriate labels for each line or column. The program guides input by preventing access to protected fields and limiting restricted field entry to the proper type of data. A terminal beep signals any entry error.

A powerful feature of the PLMR program is the DEFINE command which allows the user to easily produce simple arithmetic calculations or even the most complex calculations required for very sophisticated applications. Using the DEFINE command the mathematical relationships between line and column entires may be specified by the user. These specifications or equations may include line/column numbers or alphanumeric labels representing lines and columns, arithmetic and relational operators, and functions (such as SUM, REPEAT, IF-ELSE-ENDIF, ABS, EXP, MIN, MAX, AVG).

When entering or changing definitions through the DEFINE command, it becomes extremely important to check the accuracy of the data. PLMR can do this for the user with the VERIFY command. VERIFY will examine the define formula and recalculate all plansheet data to make sure that the plansheet is consistent with the definitions for every line and column.

MODEL STMR
StatMaster Statistical Analysis Package



Cromemco's StatMaster software package is an interactive statistical system that makes analysis of numerical data extremely easy. StatMaster supports the statistical analyses that are most frequently used in business and research, including: mean, standard deviation, median, histogram, t-test, analysis of variance, chi-square, linear correlation and regression, multiple linear correlation and regression, and non-linear (polynomial) correlation and regression.

With StatMaster, data can be entered into an analysis directly from the keyboard, or the analysis function can be instructed to read the data from a file. Data files can be created and maintained using either the Cromemco WriteMaster Word Processing System, Cromemco Screen Text Editor, Cromemco Data Base Report (DBR) generation system from Cromemco DBMS data base files, or user programs. StatMaster contains several utility functions that facilitate the use of data files.

The results of StatMaster analyses may be saved in files as well as being displayed on the screen. These result files may then be incorporated into either WriteMaster or Screen Editor text files.

StatMaster also contains a powerful statistical calculator that can be used to perform arithmetic calculations and simple analyses (e.g., mean and standard deviation). The calculator can be used to create data files of transformed scores that can be further analyzed during StatMaster's statistical analysis functions.

StatMaster's menu-oriented and conversational mode of operation is very easily mastered. In addition, HELP functions in every menu provide brief reminders of how to use the package.

The StatMaster Statistical Analysis package is designed for use on Cromemco systems using either the CDOS or CROMIX operating systems.

DEDICATED TO QUALITY

Cromemco, Incorporated, the world's largest and most successful S-100 based microcomputer manufacturer, is known for high-quality, high-reliability products.

Cromemco has, from the beginning, set a goal of building "tomorrow's computers today." We place tremendous importance on continuing R&D on system products, software, manufacturing and testing techniques, and support for our many customers. Cromemco products have achieved a world-wide reputation for high quality at a reasonable price.

The company operates its offices, laboratories, and manufacturing facilities in a modern complex in Mountain View, California. Every step in the manufacturing process is controlled in-house and considerable attention is paid to quality control and reliability engineering.

Every product, whether it's a single board or the most complex computer, is thoroughly tested and burned-in before leaving the factory.

More than 50,000 Cromemco computers are now at work around the world. Acceptance has been world-wide thanks largely to a strong network of experienced dealers and distributors.

Cromemco has been recognized by leading industry experts as one of the fastest growing corporations in the country and now ranks among the top 100 firms in the data processing industry. The advanced, high quality software available to our customers is one reason why Cromemco systems are often used in applications where maximum reliability is essential: business and finance, engineering and control, medicine, and scientific research.

And since we have always used extensive engineering to make our systems rugged, many of our customers choose Cromemco systems for applications in tough environments: industrial process control, offshore oil rigs, robotics, ship-board and in-flight systems.

Manufacturing: Quality builds reliability

Since 1976, when our first systems were introduced, we have recognized the value of close quality control over every step in manufacturing.

The value to our customer is consistent, reliable, repeatable performance—board to board, system to system.

The value to Cromemco has been in seeing our boards and systems accepted throughout the computer world as quality standards, as documented in a recent study done by Bunker Ramo for the U.S. Air Force.

The fact that our products are being widely used by the most demanding systems integrators of engineering and office systems is quiet testimony to the excellence of our manufacturing process and quality control.

It starts at incoming QC

All components are hot-rail tested against the manufacturer's toughest specs, then put through DC parametric tests for all device functions.

Bare boards are checked for shorts and opens and baked for 24 hours prior to assembly.

Complex LSI devices are pretested on specially-designed test systems.

We maintain constant vigilance over quality throughout the assembly process. We perform a variety of visual and computer-controlled electrical inspections on every assembled board to make sure every device is functioning properly. Every part of every system is thoroughly checked to ensure reliable operation of equipment.

By the time our S-100 boards or systems are packed for shipment, each has already run successfully in our own test area, has passed a complex series of performance tests and has gone through a sustained burn-in test. Quality controls, uniformly and consistently applied, are the only way to assure long-term reliability.

Service closes the loop

Finally, to close the quality loop, we give our customers the best possible documentation, training, and field support because we know that long-term profitable growth will come only from completely satisfied end users. We have worked hard to build and keep a reputation for concerned, capable, professional service after the sale. Third party on-site maintenance service is available nationwide to Cromemco customers from TRW Customer Service Division.

INTERNATIONAL ASSOCIATION OF CROMEMCO USERS

News on products and applications is available to the world-wide base of Cromemco users through the International Association of Cromemco Users (IACU), an independent users group formed in 1980. The purpose of the IACU is to act as an independent two-way communications center for Cromemco users. Through their publication, I/O NEWS, the Association serves as a clearinghouse for information about Cromemco products, applications, available software and services, and dealers.

PART NUMBER INDEX

SALES SUPPORT OFFICES

For additional information on Cromemco products and services, contact one of the sales support offices listed below.

World Headquarters

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280 Bernardo Avenue
P.O. Box 7400
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(415) 964-7400

Domestic Sales Support Offices

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Executive Place III
50 Mall Road, Suite 201
Burlington, MA 01803
(617) 229-2680

Cromemco, Inc.
5901-C Peachtree Dunwoody Rd.
Suite 375
Atlanta, GA 30328
(404) 391-9433

Cromemco, Inc.
1900 E. Golf Road, Suite 100
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(213) 346-6690

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