

Cincinnati Milacron GEORGE Family

MANAGEMENT SUMMARY

Cincinnati Milacron began manufacturing minicomputers in the early 1970's in response to the rapid trend toward computer-controlled automation of large lathes, turning centers, profiling and milling machines, etc. A leading producer of machine tools and process controls since 1884, Cincinnati Milacron decided to produce its own minicomputer and make it available for direct purchase as well as build it into finished end-user machine tool systems to replace earlier hard-wired (direct) controllers. This approach differed from that of the company's competitors, who incorporated off-the-shelf OEM minicomputers into their machine tool systems. The result was the CIP/2000 Series—and, as can well be imagined, the CIP systems are designed to function well in a factory automation environment.

Surprisingly, the earliest uses of the CIP/2000's were in a variety of special applications (e.g., the "Compacct" point-of-sale terminal for McDonald fast food stores, the Mergenthaler typesetting system, the Asyst Insurance proposal service, and the Hardy concrete mixing control system), although it was always intended that the CIP's be amenable to incorporation in numerical control systems produced by Cincinnati Milacron.

The CIP/2200, announced in January 1972, differs from the earlier CIP/2100 primarily in having a more sophisticated instruction set that is better suited to more generalized applications (list/word/data processing). The CIP/2200B, announced in January 1974, is a further enhancement of the CIP/2200, adding better throughput and three instructions to the set. The CIP/4400, an- ➤

The GEORGE family of small business systems is based on Cincinnati Milacron's CIP/2200B and CIP/4400 minicomputers. The systems range from the floppy disk-based GEORGE system, priced at \$16,100, to the top-of-the-line, multi-user GEORGE E, at a minimum price of \$58,500. Software for general business applications, written in RPG II to attract first-time users, is available separately.

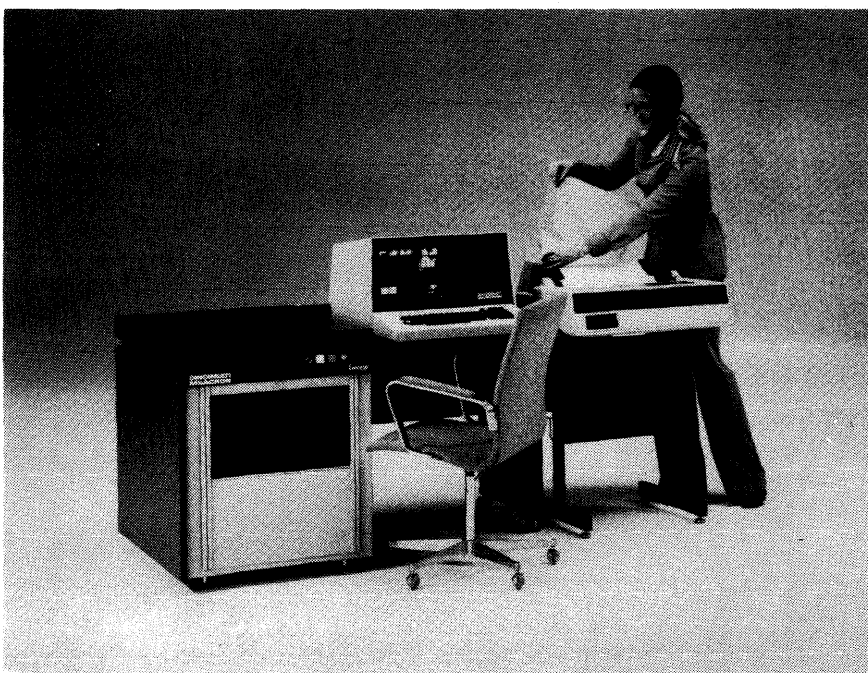
CHARACTERISTICS

MANUFACTURER: Cincinnati Milacron, Electronic Systems Division, Mason/Morrow Rd., Lebanon, Ohio 45036. Telephone (513) 494-1200.

Cincinnati Milacron is a 93-year-old manufacturer of machine tools, process controls, computers, semiconductor materials, specialty chemicals, plastics machinery, and abrasives. The company has 32 manufacturing plants, half of which are located overseas. Marketing facilities are located in over 60 countries around the world. The company is divided into six major divisions, one of which, the Electronic Systems Division, manufactures minicomputer systems and machine control systems.

MODELS: GEORGE, GEORGE B, GEORGE C, GEORGE D, GEORGE E.

DATE ANNOUNCED: August 1976. The CIP/2200B processor used in models GEORGE, GEORGE B, and GEORGE C was introduced in January 1974. The CIP/4400 processor used in models GEORGE D and GEORGE E was introduced in January 1976. ➤



The entry-level GEORGE system, packaged in a built-in desk-style cabinet, consists of a CIP/2200B CPU with 32K bytes of memory, two double-density floppy disk drives, a 960-character video display terminal, and a 60-cps printer. Purchase price is \$16,100.

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➤ nounced in January 1976, provides about 4 times the computing power of the CIP/2200B and a memory addressing capability that has been extended from 64K to 256K bytes.

In August 1976, Cincinnati Milacron augmented its packaged configurations of the CIP/2200B minicomputer with new peripheral and storage devices and application software, and introduced two new packaged systems based on the CIP/4400. The company named these refurbished and new offerings the GEORGE family of small business systems. Although the five systems still retain model number designations, Cincinnati Milacron hopes to have them popularly known as GEORGE, GEORGE B, GEORGE C, GEORGE D, and GEORGE E.

The CIP/2200B processor is the heart of the first three models: GEORGE (Series 40), GEORGE B (Series 60), and GEORGE C (Series 70). GEORGE is a floppy disk-based entry-level system that can support a maximum of four video display terminals. GEORGE B can support up to two 5- or 10-megabyte cartridge disk drives and up to eight CRT terminals. GEORGE C is functionally identical to GEORGE B but packaged differently; the latter is housed in a desk-style cabinet, while GEORGE C is housed in a standard 60-inch cabinet. Each of these three models can have up to 64K bytes of main memory.

GEORGE D (Series 80) and GEORGE E (Series 90) feature the more powerful CIP/4400 processor and the new Simultaneous Applications Manager operating system, which can support multiple independent interactive applications. Memory on the two largest GEORGE systems can be expanded to 256K bytes. GEORGE D can support up to 24 CRT terminals, and GEORGE E can support up to 32.

All of the GEORGE models support line printers with speeds up to 600 lpm, video display terminals with 960 or 1920 characters, remote printers, keyboard printers, and card readers. The disk-based systems also support floppy disk drives and magnetic tape. Software for general business applications, written in RPG II to attract first-time users, is available separately.

To complement the GEORGE family, an off-line Data Entry Work Station was announced in July 1977. It consists of a microprocessor, up to 32K bytes of memory, a CRT terminal, and up to two dual-density floppy disk drives.

The comprehensive CiMOS operating system was introduced in 1973 for the CIP/2200B and enhanced in 1976 for use with the GEORGE systems. CiMOS is a general-purpose, disk-based operating system with good sort capability and file handlers.

The operating system used with the CIP/4400-based GEORGE D and E is the Simultaneous Applications Manager, designed to extend the capabilities of the two largest GEORGE systems. It will be available in the first half of 1978. ➤

➤ **DATE OF FIRST DELIVERY:** June 1974 for the CIP/2200B; July 1976 for the CIP/4400.

NUMBER INSTALLED: Over 3500 minicomputers (all models) as of December 1977, including over 600 small business systems since 1973.

DATA FORMATS

BASIC UNIT: 8-bit byte (half word).

FIXED-POINT OPERANDS: 8-bit (half word), 16-bit (full word), 24-bit (extended word), and 32-bit (double-word) lengths. Byte-string manipulation up to 256 bytes is also available. Decimal numbers appear in memory as byte strings up to 16 digits in length.

FLOATING-POINT OPERANDS: None.

INSTRUCTIONS: One to eight bytes in length, depending on the number of memory addresses specified, the addressing mode used, and other pertinent information required. Control and register instructions can be as short as one byte, while memory-to-memory instructions are up to eight bytes long.

INTERNAL CODE: ASCII.

MAIN STORAGE

STORAGE TYPE: MOS.

CYCLE TIME: 1.1 microseconds/byte on the CIP/2200B, 0.8 microseconds/byte on the CIP/4400.

CAPACITY: 32K to 64K bytes of main memory in increments of 16K bytes for the CIP/2200B-based systems (GEORGE, GEORGE B, GEORGE C); 64K to 256K bytes of main memory in increments of 32K bytes for the CIP/4400-based systems (GEORGE D, GEORGE E).

CHECKING: Optional, 1 bit per byte.

STORAGE PROTECTION: User programs may not utilize the up to 32K bytes of storage assigned to the supervisor and its related programs; a check is made by firmware for violations.

RESERVED STORAGE: Between 16K and 32K bytes of memory are reserved for the operating system, depending on the system features selected.

CENTRAL PROCESSOR

GENERAL: The CIP/2200B and CIP/4400 processors are general-purpose, byte-oriented minicomputers. A push-down control stack is standard for automatic state switching. Also included are power fail/automatic restart, facilities for up to two DMA channels, interrupt, enable/disable, and an interval timer. Memory parity is optional.

CONTROL STORAGE: The CIP/2200B includes 2K 16-bit words of ROM, and the CIP/4400 includes 2K 24-bit words of ROM. Standard features implemented by micro-programming include serial I/O controller, disk IPL, and a high-speed Direct Memory Channel block feature.

REGISTERS: There are three 16-bit hardware registers: Accumulator (A), Accumulator Extension (B), and Index register (X). The A register is the operand source for all binary arithmetic and logical instructions. The B register extends the accumulator for variable-length binary arithmetic and logical operations. Byte-mode I/O operations can transfer data to or from the low-order eight bits of the A or B register. The X register is used for address modification and base relative addressing; several specialized instructions are provided for index value modification. ➤

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PERIPHERALS/TERMINALS

| DEVICE | DESCRIPTION AND SPEED | MANUFACTURER |
|---|---|---|
| MAGNETIC TAPE EQUIPMENT 2063-X 3121 | 9-track, 800 bpi, 25 ips, 10.5" reels; 20 KBS 9-track, 800 bpi, 18.75 ips, 7" reels; 15 KBS | Pertec Pertec |
| LINE PRINTERS 3070 3071 | Impact, 60 lpm; 132 positions, 64 char., 5 x 7 dot matrix, 6 lines/inch Impact, 125-lpm; 132 positions, 64 char., 5 x 7 dot matrix, 6 lines/inch, 2 print heads | Centronics Centronics |
| 3072 3074 3075 | Drum, 300 lpm; 132 positions, 64 char., buffered, 6 or 8 lines/inch Drum, 600 lpm; 132 positions, 64 char., buffered, 6 or 8 lines/inch Serial, 60 cps; 132 positions, 64 char., 5 x 7 dot matrix, 6 lines/inch | Dataproducts Dataproducts Centronics |
| PUNCHED CARD EQUIPMENT 3040 | Card Reader; 80-column, hopper and stacker—1000 cards each; 600 cpm | Documation |
| 3050 | Mark Sense Card Reader; 80-column, hopper and stacker—1000 cards each; 600 cpm | Documation |
| TERMINALS 7301 7302 7307 | Video display terminal, 960 characters Video display terminal, 1920 characters, 10-key numeric pad, upper case Video display terminal, 1920 characters, 10-key numeric pad, upper and lower case | Cincinnati Milacron Cincinnati Milacron Cincinnati Milacron |
| 3087 | Remote printer, 60 cps, 132 positions, 64-character set | Centronics |

➤ The Cincinnati Milacron systems are sold through distributors who supply additional business application packages and provide customizing of Cincinnati Milacron's general application packages.

Maintenance is provided by the company from 23 service centers located across the U.S. Standard one-year contracts are available, along with coverage for up to 24 hours, 7 days a week, if desired.

USER REACTION

Two of the five users whose ratings are reported below responded to Datapro's 1977 mail survey of computer users. Three additional users were selected for telephone interviews from a list provided by the vendor. Combined, the five users represented seven installed systems, all built around Cincinnati Milacron's CIP/2200B central processor. The configurations included two GEORGE systems, one GEORGE B, and four GEORGE C's.

The seven installed systems had an average of 64K bytes of main memory and from 1.26 to 10 megabytes of on-line disk storage. The number of CRT's ranged from one to six per system, averaging three, and every system had at least one attached printer. All of the systems had been purchased outright. Five of them had been operating for about one year, and the other two were only about five months old. Among the rival systems that the GEORGE models had replaced were an IBM System/3 Model 15, IBM System/32, one completely manual system, a service bureau, and computers from Honeywell and NCR. Applications included general business, manufacturing accounting and production, inventory, sales analysis, and marketing.

➤ In addition, there are two other registers: P and S. The 16-bit P Register (Program Counter) contains the address of the next machine instruction to be executed. The S Register (Status) is an eight-bit register containing the CPU internal status indicators; these include word length indicators for variable-length binary operations, overflow, interrupt system disable, arithmetic and logical result status, and user supervisor state. The contents of all registers can be stored in the control stack.

INDIRECT ADDRESSING: One level.

ADDRESSING: There are nine addressing techniques available to the programmer. *Direct to Page 0* allows direct addressing of the first 256 locations in memory; this technique is useful for sharing data such as system parameters between programs. *Direct Relative* addressing permits addressing from 127 bytes ahead to 128 bytes behind the first byte of the next instruction. *Indirect Page Zero* addressing uses the eight-bit absolute address from the instruction's second byte to access a two-byte word in page zero which is the effective address; indexing may be used. In *Indirect Relative* addressing, the Direct Relative address yields the address of a word which contains the effective address; this method provides a means of returning from a subroutine by an indirect jump, and indexing may be used. For processing a table or string of data, *Base addressing* is provided; the effective address is provided by the contents of the index register. In the *Base Plus Displacement addressing* mode, the effective address is given by the sum of the contents of the X register and the eight-bit unsigned displacement obtained from byte two of the instruction. *Extended addressing* develops the effective address from bytes two and three of the instruction plus the X register, if indexing is requested; this mode can address up to 65K bytes in supervisor mode or 32K bytes in user mode. The *Literal addressing* mode provides up to four bytes of immediate data coded directly following the first byte of the instruction.

➤ Finally, there is the *Extended Indirect addressing* mode, in which an address constructed in the fashion of the Extended

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▷ One of the GEORGE users is an OEM who reported that he distributes IBM products on a world-wide basis. When it became necessary to automate his own accounting and sales procedures, he chose a Cincinnati Milacron system over "the millions of dollars worth of IBM equipment in the warehouse." He wanted a system with a "strong CRT-support capability within a certain price range," and Cincinnati Milacron's GEORGE C fit the bill. His system now supports six CRT's and he likes it so much that he bought another one to sell.

The following table summarizes the ratings given by these users.

| | Excellent | Good | Fair | Poor | WA* |
|----------------------------|-----------|------|------|------|-----|
| Ease of operation | 3 | 2 | 0 | 0 | 3.6 |
| Reliability of mainframe | 2 | 2 | 0 | 0 | 3.5 |
| Reliability of peripherals | 1 | 2 | 1 | 0 | 3.0 |
| Maintenance service: | | | | | |
| Responsiveness | 2 | 2 | 1 | 0 | 3.2 |
| Effectiveness | 2 | 2 | 1 | 0 | 3.2 |
| Technical support | 2 | 2 | 1 | 0 | 3.2 |
| Operating systems | 1 | 3 | 1 | 0 | 3.0 |
| Compilers and assemblers | 1 | 2 | 1 | 0 | 3.0 |
| Applications programs | 0 | 4 | 0 | 0 | 3.0 |
| Ease of programming | 1 | 3 | 0 | 0 | 3.3 |
| Ease of conversion | 1 | 3 | 0 | 0 | 3.3 |
| Overall satisfaction | 1 | 4 | 0 | 0 | 3.2 |

*Weighted Average on a scale of 4.0 for Excellent.

All of the users commented favorably on the price/performance ratio of the Cincinnati Milacron systems and praised the hardware reliability and ease of operation. Four of the users did some of their own programming with few problems, and the four users who commented on their old systems reported that they experienced little difficulty in converting to their GEORGE systems.

The users' ratings for maintenance and technical support showed considerable variations. Some of the users were enthusiastic about the vendor's maintenance and support efforts, and some felt they were just adequate. One user who had trouble adapting Cincinnati Milacron's applications programs to his needs was mollified by the vendor's attention to his problems. The OEM, who assigned average ratings in the maintenance and support categories, pointed out that he dealt almost exclusively with IBM, which is "hard to compete with," in these areas.

Four users had bought Cincinnati Milacron's applications software, and all of them rated it "good," including the user who had experienced problems with it. He had bought the company's smallest available configuration and felt that his problems arose in scaling down software written for larger systems.

All of these installations were fairly new, and on the basis of their early experience, all of the users were basically pleased with the hardware and software combinations and the services offered by Cincinnati Milacron. □

► addressing mode points to a word containing the effective address. This mode is used for Jump and Return Jump instructions only and offers a means for utilizing jump tables outside of page zero; indexing is permitted.

INSTRUCTION REPERTOIRE: The CIP/2200B has 122 instructions. Of these, 40 are arithmetic and logical, 15 are variable word-length, 12 are shifts, 14 are memory reference, 23 are transfer of control, 10 are control, and 8 are input/output. Sixteen instructions are privileged. Decimal instructions are standard.

The CIP/4400 also has 122 instructions, of which 40 are arithmetic and logical, 15 are variable word-length, 12 are shifts, 14 are memory reference, 23 are transfer of control, 12 are control, and 6 are input/output. Fourteen instructions are privileged. Decimal instructions are standard.

INSTRUCTION TIMING: All times are for full-word, fixed-point operands, in microseconds.

| | CIP/2200B | CIP/4400 |
|--------------|-------------|----------|
| Load | 11.00/12.54 | 2.9 |
| Store | 10.56/12.10 | 4.3 |
| Add/Subtract | 11.66/13.20 | 2.9 |
| Multiply | 81.4/82.72 | 21.4 |
| Divide | 80.6/81.48 | 23.4 |
| Compare | 14.52/15.40 | 5.0 |
| Branch | 11.44/12.32 | 1.8 |

INTERRUPTS: Internal interrupts include console, interval timer, memory parity failure, control stack under/overflow, power failure, and illegal instruction interrupts. There are 32 vectored external interrupts, which are maskable by the interrupt enable/disable feature.

PHYSICAL SPECIFICATIONS: The GEORGE family of small business systems is available in two types of packaging. The GEORGE and GEORGE B are packaged in desk-style cabinets, while the GEORGE C, GEORGE D, and GEORGE E use standard 60-inch cabinets.

Power requirements are 100 or 220 Volts AC + 15% at 50 or 60 Hertz. No special air conditioning above normal office levels is required. Operating temperature ranges from 60° F. (15° C.) to 80° F. (27° C.) at a relative humidity of 40 to 60 percent with no condensation.

INPUT/CONTROL

INPUT/OUTPUT CHANNELS: A Direct Memory Channel (DMC) allows for data transfer rates of up to 73K bytes per second on the CIP/2200B and up to 130K bytes per second on the CIP/4400.

A Direct Memory Access (DMA) channel allows for data transfer rates of up to 909K bytes on the CIP/2200B and up to 1.2 megabytes per second on the CIP/4400.

In Serial Byte I/O mode, programmable data transfer rates from 110 to 9600 bits per second are supported.

SIMULTANEOUS OPERATIONS: DMA data transfers take precedence over the CPU for memory operations. DMC data transfers also have a higher priority than instruction execution. The DMC and DMA operate essentially on a memory cycle basis, but may force short breaks in the execution of long instructions.

CONFIGURATION RULES

The basic GEORGE system can be expanded to 64K bytes of memory. The system can support up to four 960- or 1920-character video display terminals, up to four double-►

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The central processing unit for the GEORGE D and E systems is Cincinnati Milacron's CIP/4400 (upper left) which provides about four times the computing power of the CIP/2200B used in the smaller GEORGEs. Shown here with a magnetic tape unit, three video display terminals and a sampling of printers and card equipment, the basic GEORGE D has 64K bytes of memory, a 10-megabyte cartridge disk drive, a 60-lpm printer, and a 960-character video display terminal. The basic GEORGE D configuration costs \$45,900.

► density floppy disk drives, a card reader, and up to two remote printers. A higher-performance printer (125, 300, or 600 lpm) can be substituted for the standard 60-cps printer.

GEORGE B and GEORGE C can each be expanded to 64K bytes of memory and can support up to eight 960- or 1920-character video display terminals or remote printers, up to two 600-lpm printers, up to four 5- or 10-megabyte cartridge disk drives, a card reader, and up to four magnetic tape drives.

GEORGE D can be expanded to 256K bytes of memory. The system can support up to 24 960- or 1920-character video display terminals or remote printers, up to four 10-megabyte cartridge disk drives, up to four double-density floppy disk drives, up to four 600-lpm printers, a card reader, and up to two magnetic tape drives.

GEORGE E can be expanded to 256K bytes of memory. The system can support up to 32 960- or 1920-character video display terminals or remote printers, up to four 40- or 80-megabyte disk pack drives, up to four 10-megabyte cartridge disk drives, up to four double-density floppy disk drives, up to four 600-lpm printers, a card reader, and up to two magnetic tape drives.

MASS STORAGE

3068 FLOPPY DISK DRIVE SYSTEM: Consists of a 4-drive controller and from 1 to 4 double-density floppy disk drives. Each floppy disk stores up to 630K bytes on 77 tracks. The maximum storage capacity is 2.52 million bytes on a four-drive system. Average head positioning time is 260 milliseconds, and the average rotational delay is 83 milliseconds. The rotational speed is 360 rpm. The data transfer rate is 62K bytes/second. The bit density is 6536 bpi, and the track density is 48 tpi. Each track is divided into 32 sectors with 256 bytes per sector for a track capacity of 8192 bytes. The manufacturer is Control Data.

3037 FIVE-MEGABYTE CARTRIDGE DISK DRIVE: A front-loading drive with one fixed and one removable disk cartridge of the IBM 2315 type. Average head positioning time is 55 milliseconds, and average rotational delay is 20 milliseconds. Rotational speed is 1500 rpm. The data trans-

fer rate is 195K bytes/second. There are 200 tracks per surface plus 6 spares. Bit density is 2200 bpi, and track density is 100 tpi. Each track is divided into 24 sectors with 256 bytes per sector for a track capacity of 6144 bytes. The manufacturer is Iomec.

3038 TEN-MEGABYTE CARTRIDGE DISK DRIVE: This is a double-density version of the 3037 drive. All specifications are the same except that the track density is increased to 200 tpi for 400 tracks per surface. The manufacturer is Iomec.

3107 FORTY-MEGABYTE DISK PACK DRIVE: A top-loading drive with one 40-megabyte disk pack. Average head positioning time is 30 milliseconds, and the average rotational delay is 8.3 milliseconds. Rotational speed is 3600 rpm. The data transfer rate is 1.2 megabytes/second. There are 6 surfaces with 404 tracks per surface plus 7 spares. The bit density is 6083 bpi, and the track density is 192 tpi. Each track is divided into 32 sectors with 512 bytes per sector for a track capacity of 16384 bytes. The manufacturer is Control Data.

3105 EIGHTY-MEGABYTE DISK PACK DRIVE: This is a double-density version of the 3107 drive. All specifications are the same except that the track density is increased to 384 tpi for 808 tracks per surface. The manufacturer is Control Data.

INPUT/OUTPUT UNITS

See Peripherals/Terminals table.

COMMUNICATIONS CONTROL

ASYNCHRONOUS COMMUNICATIONS CONTROLLER: Provides an interface for eight RS-232 full-duplex lines with odd or even parity at 14 different rates from 75 to 9600 bps. Character length is selectable at 5, 6, 7, or 8 bits. Either one or two stop bits are selectable. A one-bit output buffer is optional.

BISYNCHRONOUS COMMUNICATIONS CONTROLLER: Provides an interface for one half- or full-duplex, leased or switched telephone line at 1200 to 9600 bps. Complete error-checking capabilities are standard. Both the

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► transmit and receive sections have buffer storage for up to 65 characters. The controller operates in both DMC and interrupt modes.

COMMUNICATIONS SOFTWARE: *Remote Job Entry (RJE)* is a flexible communications package that emulates the IBM 2780 for communication with any mainframe that supports the 2780 line protocol and for communication between different GEORGE systems.

SOFTWARE

OPERATING SYSTEMS: Cincinnati Milacron provides two operating systems for its GEORGE family of small business systems: CiMOS for the CIP/2200B-based GEORGE, GEORGE B, and GEORGE C, and the new Simultaneous Applications Manager for the CIP/4400-based GEORGE D and GEORGE E.

CiMOS is a two-partition operating system for batch and interactive applications that provides sequential, indexed, and random file access methods. Depending on the configuration, CiMOS requires from 16K to 32K bytes of memory.

The *Simultaneous Applications Manager* is a multi-user operating system that can support up to 28 independent interactive applications on GEORGE E. The Simultaneous Applications Manager is written in Cincinnati Milacron's Systems Programming Language and will be available in the first half of 1978.

LANGUAGES: All GEORGE Systems Support RPG II, a Relocating Assembler, and a Macro Assembler. In addition, Cincinnati Milacron's Systems Programming Language is available for application development under the Simultaneous Applications Manager on GEORGE D and GEORGE E.

RPG II: Features array handling; look-ahead fields; communication with external subroutines; a sort processor; sequential, random, and indexed sequential files; bit setting and testing; and fetch overflow.

The *Relocating Assembler* provides conditional assembly capabilities in addition to the standard assembly-type pseudo-operations. Output is in relocatable format acceptable either to the Library Maintenance Program or the Linkage Editor. No cross-assembler is available.

The *Macro Assembler* provides all of the standard capabilities of the Relocating Assembler plus the capability of expanding in-line source code with a series of macros. The user's source code and the generated in-line macro statements are assembled as a whole into a single object module by the Macro Assembler. A utility program, the Macro Library Maintenance Program (MLM), is also provided for creating and maintaining libraries of macro definitions.

UTILITIES: Available on all GEORGE systems, the utilities include a sort program, linkage editor, text editor, library maintenance program, disk initializer program, disk reorganization program, volume/catalog list program, and copy utilities.

APPLICATION PROGRAMS: Cincinnati Milacron provides a set of general accounting packages including Accounts Receivable, Payroll, Accounts Payable, and General Ledger. In addition, a Wholesale Distribution System including receivables, inventory, and inquiry is available.

Cincinnati Milacron's application packages are sold by an international distributor network. Customizing of specialized application packages is available through the distributors.

PRICING

POLICY: Cincinnati Milacron provides its GEORGE family of small business systems on a purchase basis through distributors. Prices are FOB point of origin and are net 30 days from date of invoice. A 30-day warranty is provided on all equipment; system installation is performed at no additional charge. Cincinnati Milacron will help to arrange a third-party lease if requested.

System software is bundled with all GEORGE systems. All applications software is priced separately by distributors.

SUPPORT: Standard yearly maintenance agreements are available. Prime maintenance hours are between 8 am and 5 pm Monday through Friday, except holidays. Additional charges for optional maintenance periods are available on request.

Cincinnati Milacron maintains service centers in: Los Angeles, San Francisco, San Diego, and Newport Beach, CA; Denver; Tampa; Atlanta; Chicago; Flint/Detroit; Jackson, MS; New York City; Charlotte, NC; Cincinnati; Cleveland; Philadelphia; Greenville, SC; Memphis, Nashville, Knoxville, and Chattanooga, TN; and Houston/Beaumont, San Antonio, and Dallas/Ft. Worth, TX.

EQUIPMENT: The following typical system purchase prices include all necessary controllers and cables.

GEORGE: Consists of a CIP/2200B CPU with 32K bytes of memory, two double-density floppy disk drives, 1920-character VDT, and 60-cps bidirectional printer. Purchase price is \$17,000.

GEORGE B: Consists of a CIP/2200B CPU with 32K bytes of memory, 5-megabyte cartridge disk drive, 1920-character VDT, and 125-lpm printer. Purchase price is \$32,300.

GEORGE C: Consists of a CIP/2200B CPU with 64K bytes of memory, 10-megabyte cartridge disk drive, two 1920-character VDT's, and a 300-lpm printer. Purchase price is \$43,385.

GEORGE D: Consists of a CIP/4400 CPU with 96K bytes of memory, two 10-megabyte cartridge disk drives, four 1920-character VDT's, and a 300-lpm printer. Purchase price is \$72,655.

GEORGE E: Consists of a CIP/4400 CPU with 128K bytes of memory, two 40-megabyte disk pack drives, eight 1920-character VDT's, and a 300-lpm printer. Purchase price is \$105,695.