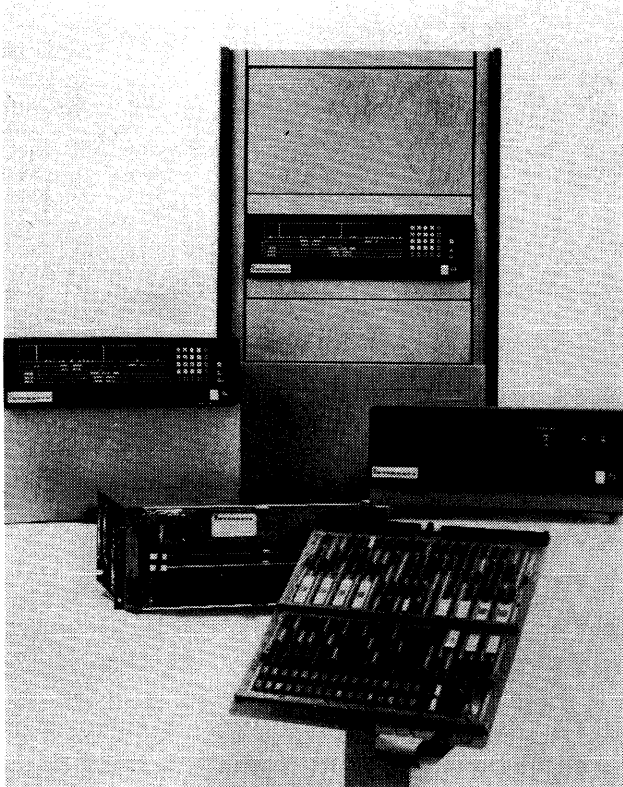# Interdata 5/16, 6/16, and 8/16

The Interdata 16-bit series processors span a range from the low-end 5/16 processor on a board to the high-end 8/16. They offer upward compatibility and a common line of peripherals. Each features 16 general purpose-registers, 255 hardware vectored interrupt levels, and up to 64K bytes of memory.

The current Interdata 16-bit models retain compatibility with earlier members of the line, yet offer improved performance at lower prices. They can be employed effectively in such applications as distributed processing and measurement and control, and programmed in such languages as FORTRAN IV, FORTRAN V, and BASIC Level II. Sold to a large extent in the OEM market, they can be purchased for as little as $868 (for the 5/16 in quantities of 100).

MANAGEMENT SUMMARY

The introduction of two new 16-bit processors in 1976 is evidence that Interdata is still strongly committed to its 16-bit computer line. The currently marketed 16-bit line now consists of the 6/16, which replaces the previously offered 7/16, and the newer 5/16 and 8/16 processors.

The 5/16, introduced in July 1976, is the new low end of Interdata's 16-bit line. Housing for the 5/16 is a single printed-circuit board. It can be purchased in a 5-slot chassis with 25-amp power supply and 8K bytes of MOS memory for $2,000, or the board itself with 8K bytes of memory is available for $1,400. The processor and up to 16K bytes of NMOS dynamic RAM memory share the same board.

The circuit board of the 5/16 houses the 16-bit processor with 16 general-purpose registers, direct memory addressing for up to 64K bytes, and 114 instructions; line-frequency clock input; and built-in self-test feature. The 114-member instruction set includes list processing and multiply/divide instructions. The 5/16 ▷

CHARACTERISTICS

MANUFACTURER: Interdata Incorporated, a unit of Perkin-Elmer Data Systems, Two Crescent Place, Oceanport, New Jersey 07757. Telephone (201) 229-4040.

Interdata is a 1300-employee company specializing in minicomputer hardware, software, and systems for manufacturers and end users in business, scientific computation, simulation, and all OEM markets. Products are also produced for data communications, discrete manufacturing, industrial process control, and laboratory automation. The parent company, Perkin-Elmer, is an international corporation employing 9,500, with interests in instrumentation, optical and electro-optical systems, flame spray equipment, control systems, and navigational instruments, in addition to Interdata's marketing areas.

MODELS: 5/16, 6/16, and 8/16.

DATE ANNOUNCED: 5/16, July 1976; 6/16, November 1975; 8/16, July 1976.

DATE OF FIRST DELIVERY: 5/16, second quarter 1977; 6/16, first quarter 1976; 8/16, first quarter 1977.

NUMBER INSTALLED TO DATE: Since 1967 Interdata has installed over 5000 16-bit machines, including 180 of the Model 6/16.

DATA FORMATS

BASIC UNIT: 16-bit halfword.

FIXED-POINT OPERANDS: The basic unit for fixed-point arithmetic operations is a 16-bit halfword. If the Multiply/Divide feature is installed, 32-bit fullwords constitute the fixed-point product length. Two's complement arithmetic is used. The Multiply/Divide feature is standard on the 5/16 and optional on the 6/16 and 8/16.

FLOATING-POINT OPERANDS: Not available in the 5/16 and 6/16; optional in the 8/16. Single-precision floating-point numbers are represented by a 24-bit fraction and an 8-bit exponent which includes the sign. A 64-bit doubleword represents a double-precision floating-point number, with the fraction being 56 bits and the exponent 8 bits including the sign.

INSTRUCTIONS: The 16-bit processors have instructions which are either 16 or 32 bits long in 4 separate formats: Register-to-Register (RR), Short Form (SF), Register and ▶

Interdata 5/16, 6/16, and 8/16

▷ utilizes a dual-bus structure consisting of the standard Interdata multiplexer and an industry-standard microbus. The microbus is a micro I/O bus compatible with the Intel 8080 and Motorola 6800 microprocessors, permitting the use of micro-controlled devices. The 5/16 can accommodate up to 64K bytes of RAM, or, as an option, up to 48K bytes of user-supplied ROM.

The 6/16, introduced in November 1975, is the oldest member of the 16-bit computer series now being actively marketed. It differs from its immediate predecessor, the 7/16, in that: 1) the processor is mounted on one board rather than two; 2) the ROM is larger; 3) it uses a separately priced display controller and autoload feature; 4) the optional multiply/divide facility is hardwired rather than microprogrammed; 5) it is available with MOS memory; and 6) it is 30 percent faster than the 7/16.

The 6/16 is a 16-bit parallel processor with 16 general-purpose registers (15 of which may be used for indexing purposes), a basic set of 104 instructions, four high-speed DMA channels, 255 hardware vectored interrupt levels, optionally available parity checking and power fail/auto restart, and the facility to handle up to 4 selector channels, each capable of handling 16 I/O devices.

The 8/16 is a comparatively high-performance machine, the next logical step up from the 6/16. Its processor includes 16 general-purpose registers, direct memory addressing, and support for up to 64K bytes of 750-nanosecond core memory. The access time of the core memory is 250 nanoseconds, a speed which makes it faster than any other memory in the Interdata 16-bit line.

Options for the 8/16 include fixed-point hardware multiply/divide, single- and double-precision floating point hardware, power fail/auto restart, and an OS/16-MT2 bootstrap loader. The floating-point hardware is new to 16-bit machines from Interdata; previously, this feature was available only in firmware implementation.

A 32K-byte 8/16 in a 16-slot chassis with 50-amp power supply, hexadecimal display panel, 60-Hz clock, power fail/auto restart, OS/16-MT2 bootstrap loader, single- and double-precision floating-point hardware, and disk and teletypewriter interfaces has a purchase price of $16,761.

The Interdata 5/16 has a price/performance range between the DEC LSI-11, Data General microNova, and microprocessors such as the Intel 8080 and Motorola 6800. The 6/16 is comparable to DEC's PDP 11/04 and 11/05, and to Data General's Nova 3 Series. The 8/16 is aimed at the upper end of the Data General Nova 3 line and the DEC PDP-11/35. All of current Interdata 16-bit series processors are upward-compatible with other Interdata 16- and 32-bit minicomputers from both a software ▷

▶ Indexed Storage (RX), and Register and Immediate Storage (RS).

All instruction formats have a one-byte operation code contained in bits 0 to 7. The RR format instructions are all two bytes in length. Bits 8 to 15 allocate four bits to each of the two registers involved in a given operation. The SF format instructions are two bytes in length, with bits 8 to 11 allocated to a register designation and bits 12 to 15 allocated for immediate data; the SF format, besides being used for short-field immediate instructions, is utilized for short shifts, where bits 12 to 15 give a shift count, and short branches, where bits 12 to 15 specify a halfword displacment from the current instruction address.

In the 32-bit RX instruction format, bits 8 to 11 designate a register, bits 12 to 15 an index register, and bits 16 to 31 a memory address. The RS format is similar to the RX format except that bits 16 to 31 represent an immediate operand, which may be modified by the contents of the index register. All instruction types have representation among the four formats.

INTERNAL CODE: ASCII.

MAIN STORAGE

STORAGE TYPE: Core or NMOS RAM.

CYCLE TIME: In the following chart, the cycle times are expressed in nanoseconds for a 16-bit (halfword) fetch.

Model	Core	NMOS
5/16	—	600
6/16	1000	600
8/16	750	—

Core access times for the 1000- and 750-nanosecond memories are 500 and 275 nanoseconds, respectively; NMOS access time is 400 nanoseconds.

CAPACITY: The 5/16 memory is expandable from 8,192 bytes to 65,536 bytes in 8,192-byte increments. The first two increments (16,384 bytes) are contained on the processor board. All other increments are contained on one separate interchangable board.

The 6/16 is available with 8,192, 16,384, 32,768, or 65,536 bytes of memory. Each of these modules is mounted on a single board. Only one memory board per system is allowed.

The 8/16 can have either 32,768 or 65,536 bytes of memory. Each memory board contains 32,768 bytes.

CHECKING: Parity is available as an option on the 6/16 and 8/16, but is not offered on the 5/16. If installed, one parity bit is associated with each 16-bit halfword. The parity bit is added by the parity controller to each 16-bit halfword written into memory and checked when read by the same controller.

STORAGE PROTECTION: None.

RESERVED STORAGE: Approximately the first 800 memory locations are reserved for interrupt pointers, program status words, and system constants.

CENTRAL PROCESSOR

GENERAL: The computers in this series are 16-bit, parallel, microprogrammed processors employing T²L-MSI and LSI low-powered Schottky logic (5/16), T²L-MSI and LSI (6/16), and T²L-MSI (8/16) technology. Included with each ▶

Interdata 5/16, 6/16, and 8/16

PERIPHERALS/TERMINALS

| DEVICE	DESCRIPTION & SPEED	MANUFACTURER
MAGNETIC TAPE EQUIPMENT		
M46-400	Intertape Cassette System; 500K bytes per cassette, 2 tracks, 800 bpi, PE, read after write, 10 ips, longitudinal redundancy read check, dual transports and interface; 480 bps to 1K bps in read continuous mode with record size of 80 bytes	Perkin-Elmer Data Systems
M46-506, M46-507	7-track; 200 bpi, 45 ips, NRZI drive; 10.5-inch reels, dual gap recording, read after write; 9K bps	Perkin-Elmer
M46-508, M46-509	7-track; 556/800 bpi, 45 ips, NRZI drive; 10.5-inch reels, dual gap recording, read after write; 25K/36K bps	Perkin-Elmer
M46-501, M46-502	9-track; 800 bpi, 45 ips, NRZI drive; 10.5-inch reels, dual gap recording, read after write; 36K bps	Perkin-Elmer
M46-51X	9-track; 1600 bpi, 45 ips, PE drive; 10.5-inch reels, dual gap recording, read after write; M46-513 and 514 are master drives, M46-515 and 516 are add-on drives; 72K bps	Perkin-Elmer
M46-49X	9-track; 800 bpi, 75 ips, NRZI drive; 10.5-inch reels, dual gap recording, read after write; M46-490 and 492 are master drives, M46-491 and 493 are add-on drives; 60K bps	Perkin-Elmer
M46-49Y	9-track; 800/1600 bpi, 75 ips, NRZI/PE drive; 10.5-inch reels, dual gap recording, read after write; M46-494 and 496 are master drives, M46-495 and 497 are add-on drives; 60K/120K bps	Perkin-Elmer
PRINTERS		
M46-204, M46-205	Serial printer; 132 positions, 64-character set, 10 characters per inch, 6 lines per inch, 4 to 14.8-inch paper, 5 x 7 dot matrix, 2-channel VFU; 165 cps	Centronics
M46-207, M46-208	Line printer; drum, 132 positions, 64-character set, 10 characters per inch, 6 lines per inch, 3.5 to 19.5-inch paper, 8-channel VFU, 27.5 inch slew rate; 300 lpm	Data Printer
M46-209, M46-210	Line Printer; specifications of M46-208; 600 lpm	Data Printer
PUNCHED CARD EQUIPMENT		
M46-238, M46-239	Reader; 80-column, 1500-card hopper, 500-card stacker; 400 cm	True Data
M46-244, M46-245	Reader; 80-column, 1500-card hopper, 1500-card stacker; 1000 cpm	True Data
PUNCHED TAPE EQUIPMENT		
M46-240, M46-241	Reader; 5, 6, 7, or 8-level code, fanfold tank for oiled or unoiled paper or mylar tape; 300 cps	Remex
M46-242, M46-243	Reader/Punch; 5, 6, 7 or 8-level code, fanfold tank for 200 feet (reader) and 1000 feet (punch), oiled or unoiled paper or mylar tape; 300/75 cps	Remex
TERMINALS		
M46-010, M46-011	Carousel 30 Keyboard Printer Terminal; 80 positions (132 opt.), 64-character ASCII subset, opt. pinfeed tractor; 30 cps	Perkin-Elmer
M46-015, M46-016	Carousel 35 Keyboard Printer Terminal; 80 positions (132 opt.), 64-character ASCII subset (96 opt.), opt. pinfeed tractor, opt. 120-cps paper tape reader; 30 cps	Perkin-Elmer
M46-803, M46-804	Carousel 300 Keyboard Printer Terminal; 132 positions, 64-character ASCII subset (96 opt.), opt. pinfeed tractor, opt. electronic format control, standard keyboard and numeric tab, 128-character line buffer, RS-232 interface, local or remote; 30 cps	Perkin-Elmer
M46-030, M46-031	1100 Alphanumeric Display Terminal, 1920 characters, 24 lines x 80 characters, 9 x 12 dot matrix, typamatric repeat key feature, transparent mode for program debugging, 128 ASCII character set, opt. numeric keypad, opt. buffered printer port; up to 9600 bps	Perkin-Elmer
M46-041, M46-042	1200 Alphanumeric Display Terminal; features of Model 1100 plus optional X-4 coordinate line drawing capability; includes controls for inverse video, half intensity, blink, protected, numeric only, nondisplay, and modified field definitions; editing features include insert/delete character or line, clear screen, clear unprotected and clear line/field; programmable send keys for all or part of screen data; up to 9600 bps	Perkin-Elmer
M46-108	Graphic Display Terminal; point addressing on a 1024 x 1024 matrix, also 35 lines x 75 characters alphanumeric display, local interface; operates at 150, 300, 600, 1200, 2400, 4800, or 9600 bps	Tektronix
M46-000, M46-002	ASR 33 Teletypewriter, friction feed; 10 cps	Teletype
M46-004, M46-005	ASR 33 Teletypewriter, sprocket feed; 10 cps	Teletype
M46-001, M46-003	ASR 33 Teletypewriter, sprocket feed; 10 cps	Teletype

▷ and hardware standpoint. All of the processors operate under the OS/16-MT2 operating system and can utilize the entire range of Interdata peripherals and language processors currently available.

A packaged version of the 6/16 was released by Interdata in February 1976. Called IPAC/16, the package includes a Model 6/16 with 64K bytes of memory, a 10-megabyte disc drive, a card reader, a line printer, and a Carousel 30 ▷

▶ processor are 16 general-purpose registers, a buffered multiplexer I/O channel, four external DMA channels (in the 6/16 and 8/16 only), and 255 hardware interrupt levels as standard. The 5/16 features an industry-standard micro I/O bus, which is compatible with the I/O buses of the Intel 8080 and Motorola 6800, in addition to the standard Interdata multiplexer I/O bus. The Interdata CPU architecture is generally similar to that of IBM's System/360 and 370 line.

Options available for the 6/16 and 8/16 include memory parity, binary display panel, hexadecimal display panel, dis- ▶

Interdata 5/16, 6/16, and 8/16
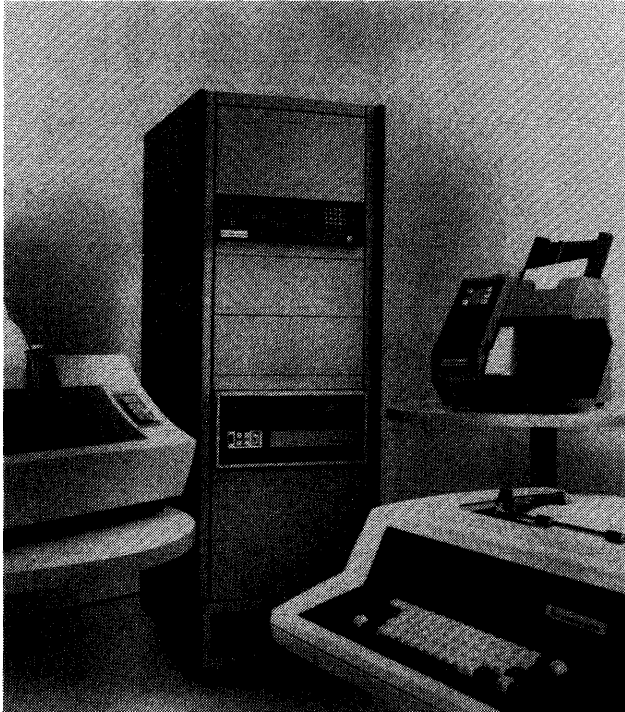
A typical 16-bit Interdata system might include a serial printer by Centronics (left), a card reader by True Data, and a cartridge disc drive and Carousel keyboard printer, both by Perkin-Elmer Data Systems. The heart of the system would, of course, be the processor, which might be a 5/16, 6/16, or 8/16.

▷ terminal in addition to the OS/16-MT2 Operating System and FORTRAN IV. Installation and a 90-day warranty are included in the basic price of the system, which is quoted as $33,500. The 6/16 is supplied with features which include hexadecimal display panel, power fail/auto restart, selector channel, universal clock, multimedia diagnostic package, system cabinet, power supplies, and necessary interfaces.

Sales of the 16-bit processor line now account for about 45 percent of Interdata's revenues. About 60 percent of the sales in the 16-bit area are OEM, and a large number of these are to systems OEM's.

The 6/16 announcement was accompanied by the release of a new operating system for the Interdata 16-bit minicomputers. The OS/16 Real-Time MultiTasking Operating System (OS/16-MT2), is a compatible subset of the OS/32-MT 32-bit operating system, which is described in Report M11-530-301. OS/16-MT2 adds a roll-in/roll-out capability, but has one less supervisor call than OS/32-MT. OS/16 MT2 supports two file structures (indexed and contiguous), while OS/32-MT supports three (indexed, contiguous, and chained).

The other supported operating system, BOSS-PLUS (Basic Operating System), is a carry-over from the no longer actively marketed Model 7/16. BOSS-PLUS is an entry-level, batch operating system employing a non-interrupt control mode for I/O. ▷

▶ play interface, signed multiply/divide, selector channel, power-fail detection and auto restart, auto loader, and turnkey console.

Options for the 5/16 include a bootstrap loader, OS/16-MT2 Bootstrap ROM, serial I/O port, turnkey console, and ROM module board. The bootstrap loader accommodates 1K bytes of PROM or 2K bytes of ROM for program loading or unattended restarts. The OS/16-MT2 Bootstrap ROM is preprogrammed to provide operating system loading from a mass storage device. The serial I/O port provides a 20-ma current loop interface to ASCII terminals such as the Carousel, a CRT, or a teletypewriter employed as a programmer's console, operating system command device, or I/O terminal.

CONTROL STORAGE: 512 24-bit words of bipolar ROM (read-only memory) with a 60-nanosecond access time. This ROM is not user-accessible. In addition to the standard ROM employed for control storage, the 5/16 may have up to 49,152 bytes of user-supplied ROM as a direct replacement for the same amount of RAM storage. This additional ROM is for applications requiring program security.

REGISTERS: The 16 general-purpose hardware registers, numbered 0 through 15, are each one halfword (16 bits) long. All except register 0 can be utilized as index registers. The single-precision or single/double-precision floating-point option for the 8/16 adds eight 32-bit registers to the standard complement.

ADDRESSING: Three addressing modes are available in the 16-bit processors: direct, indexed, and relative. For indexing, 15 of the 16 general-purpose registers can be used. Indirect addressing is not available. Memory is addressed by byte.

INSTRUCTION REPERTOIRE: The 5/16, 6/16, and 8/16 have 114, 104, and 108 basic instructions, respectively, divided into 8 classes. There are 8 load/store, 16 fixed-point arithmetic, 13 logical, 12 shift and rotate, 6 byte processing, 26 conditional branch, 3 system control, and 20 I/O instructions.

The 5/16 instruction set also includes 6 multiply/divide instructions and 4 list processing instructions as standard. The 6/16 with optional multiply/divide has 110 instructions, with 6 multiply/divide instructions added to the basic set. Like the 5/16, the 8/16 includes 4 list processing instructions as standard members of its instruction set. Addition of the multiple/divide option increases the 8/16 repertoire by 6 instructions for a total complement of 114. The 8/16 optional floating-point instruction set includes load, store, add, subtract, multiple, divide, compare, fix, and floating instructions. This feature installed in an 8/16 increases the instruction complement by 34, making a total of 148 instructions available.

INSTRUCTION TIMINGS: All times in the following table are for halfword fixed-point operations, in microseconds.

	5/16, 600-ns. NMOS	6/16, 600-ns. NMOS	6/16, 1000-ns. Core	8/16, 750-ns. Core
Load/Store	1.2/3.0	2.4/2.7	3/3.8	0.75/2.75
Add/Subtract	1.2	0.9	1	0.75
Multiply/Divide	24.9/31.5	6.6/12	6/10	9.25/12.5
Compare & Branch	2.1/1.5	1.2/1.5	1.3/1	1.25/1.25

Typical instruction timings for the 8/16 optional floating-point feature are given below, in microseconds. ▶

Interdata 5/16, 6/16, and 8/16

Supported languages include two assemblers, the Common Assembly Language (CAL) and a macro assembler called MACROCAL; two versions of FORTRAN, Extended FORTRAN IV and FORTRAN V Level 1; and BASIC Level II. All software is unbundled.

In November 1975, Interdata introduced peripheral systems for analog and digital input/output, called Mini I/O. Support is provided for both the 16-bit and 32-bit computers through the OS/16-MT2 and OS/32-MT operating systems. Mini I/O is designed for use in such areas as laboratory automation and materials handling. Programming can be handled through Interdata supervisory calls or via ISA real-time extensions to FORTRAN IV and V.

Interdata sales offices are located in 28 U.S. cities in 19 states, while service centers are located in 30 U.S. cities in 24 states. Depot repair capabilities are located in five of these cities. Internationally, Interdata has subsidiaries in the United Kingdom, West Germany, Canada, and Australia. Distributors handle the rest of the world. They are located in Tokyo for the Far East market, Mexico for the South American market, Turkey for the Asian market, South Africa, and France. Service facilities for the international market are located in 13 cities. Five of these cities have depot repair capabilities.

Maintenance is available on a contract basis for one, two, or three shifts, as well as on-call/on-site service and depot repair service. Training is provided at Oceanport, New Jersey; Los Angeles, California; and London, England. Up to four man-weeks of training are offered for a purchased system. Further training is available at $300 per student week. On-site training is also available. Both hardware and software subscription services are offered to users of Interdata systems at $200 per day for each.

Interdata's move into the low-end OEM market is partly defensive and partly offensive. At least six other minicomputer manufacturers have followed this path during the past year. The move will help keep Interdata competitive with these manufacturers and will also establish a basis for competition if processor chip manufacturers decide to market comparable systems.

USER REACTION

Detailed below are the results of Datapro's 1976 survey of Interdata users with 16-bit systems. Included in the survey were 11 users with 37 installed systems. Individual users varied in the total number of systems installed from 1 to 14, with the average being 3 systems. The average system was a 64K-byte machine, had been installed for two years, was executing application programs written in-house, and had been purchased from Interdata. Applications were almost equally divided between scientific/engineering, real-time control, and data communications. ▷

	Single-Precision Floating-Point	Double-Precision Floating-Point
Load/Store	2.5/4.75	2.5/6.75
Add/Subtract	3.75	3.75
Multiply/Divide	10.25/10.5	17.25/17.75
Compare	2.75	2.75

INTERRUPTS: 255 vectored hardware interrupts for peripheral devices are available on the 16-bit series processors. In addition, there are four internal fault interrupts: machine malfunction, SVC (Supervisor Call), illegal instruction, and fixed-point divide fault. Software vectoring of interrupts is provided for compatibility with previous Interdata processor models. This mode is enabled when bit 4 of the current program status word is reset and bit 1 is set.

PHYSICAL SPECIFICATIONS: The 16-bit processors will operate in an environment having a temperature range of 32 to 120 degrees F. and a relative humidity of 5 to 90 percent, noncondensing. The primary power requirement is 115 or 230 VAC +10 percent, 47 to 63 Hertz, single-phase; 3.6 amperes minimum, 6 amperes maximum at 115 VAC or 1.5 amperes minimum, 3.5 amperes maximum at 230 VAC. The 16-bit processors dissipate approximately 1400 to 2360 BTUs of heat per hour. No special air conditioning above normal office levels is required. Anti-static flooring material is recommended.

The 5/16 processor chassis and power supply weighs 40 pounds. The chassis is 7 inches high, 19 inches wide, and 20 inches deep. The 6/16 processor chassis is available in three sizes: the 5-slot chassis is 7 inches high, 19 inches wide, and 20 inches deep; the 8-slot chassis is 7 inches high, 19 inches wide, and 28 inches deep; and the 16-slot chassis is 14 inches high, 19 inches wide, and 28 inches deep. Both of the 7-inch-high chassis weigh 40 pounds, while the 14-inch chassis weighs 60 pounds. The size and weight of the 8/16 8- and 16-slot chassis are the same as the 6/16 and 8- and 16-slot chassis.

INPUT/OUTPUT CONTROL

I/O CHANNELS: The 6/16 and 8/16 both come with four direct memory access (DMA) channels as standard. Also standard is a buffered multiplexer channel for medium- and low-speed devices. A selector channel which can operate at up to 2 megabytes (6/16) or 2.666 megabytes (8/16) per second is optional. The selector channel can accommodate up to 16 controllers, but only one can be active at any one time. Block transfer of data on the selector channel is accomplished through the use of two registers in the channel, one for the current memory address and the other for the final memory address. Operation over the multiplexer and selector channels may be in 8- or 16-bit parallel modes. Both channels operate on a request/response basis. All device controllers are connected on a party-line basis. The device controller closest to the CPU has the highest priority. This priority may be altered under program control.

The 5/16 is supplied with a micro I/O bus which permits interfacing with I/O devices for the Intel 8080 and Motorola 6800 microprocessors. This interfacing permits the use of the many micro-controlled devices. A DMA port is standard on the micro I/O bus, while a serial I/O port is optional. The micro I/O bus allows data transfers at rates up to 900K bytes per second. The 5/16 is also equipped with the standard buffered multiplexer channel for medium- and low-speed devices. This channel can handle data transfers at speeds up to 227K bytes per second. Operation of the 5/16 multiplexer channel is the same as on the other 16-bit processors.

The multiplexer bus buffer is used to expand the drive capability of the standard Interdata multiplexer bus. In the standard 8K-based processor, the multiplexer bus can drive ▶

Interdata 5/16, 6/16, and 8/16

▷ Tabulated below are the ratings assigned by these users. The weighted average ratings from Datapro's 1975 survey are also shown for comparison.

	Excel-lent	Good	Fair	Poor	1976 WA*	1975 WA*
Ease of operation	4	6	1	0	3.3	3.1
Reliability of mainframe	6	4	1	0	3.5	3.1
Reliability of peripherals	0	9	0	0	3.0	2.9
Maintenance service:						
Responsiveness	1	4	2	3	2.3	2.6
Effectiveness	1	5	2	2	2.5	2.6
Technical support	1	2	3	4	2.0	2.8
Manufacturer's software:						
Operating system	3	5	1	1	3.0	2.5
Compilers and assemblers	2	5	1	1	2.9	2.8
Ease of programming	2	5	4	0	2.8	3.3
Ease of conversion	1	3	3	1	2.5	3.0
Overall satisfaction	3	3	4	0	2.9	3.0

*Weighted average on a scale of 4.0 for Excellent.

As you can see, the users were significantly happier with the hardware reliability and the operating system than they had been the previous year. Conversely, they were distinctly less pleased with Interdata's technical support and with the ease of programming, ease of conversion, and maintenance service.

Specific user comments, both positive and negative, included: "Flexible and easy in use," "Hardware quite reliable," "Excellent instruction set and reliable hardware," "Very poor documentation and customer support," "Communications facilities are broad, good, and reasonably priced," and "Software in general, I/O in particular, is deficient."

As a manufacturing company in the process of doubling its field engineering force, Interdata has faced and will continue to face problems in hardware support. Training and field experience for all service personnel cannot be accomplished overnight. The positive element, however, is that Interdata is making a strong effort at improvement.

To help prevent and solve some of the software problems faced in the past (and, as indicated by the ratings, still in evidence today), Interdata has established a post-sales software organization. This organization is currently being developed on the regional level, with expansion to the district level planned for the near future. More comprehensive software testing prior to release is also in Interdata's plans. The implementation of both of these programs should go a long way toward improving the quality of new software and providing the user with more effective technical support in the field.□

► up to nine device controllers before a multiplexer bus buffer is required. The 16KB-based twin-chassis multiplexer bus can drive up to 16 loads without the addition of a multiplexer bus buffer. The multiplexer bus buffer can also be used to extend the multiplexer bus to a "remote" chassis, up to 36 inches away. Multiple multiplexer bus configurations are permitted, with each Multiplexer bus buffer having a drive capability of nine additional device controllers.

The I/O bus switch provides multiple-processor access to a common I/O bus or provides an extension medium to a remotely located bus chassis. Non-interfering multiport access to the common bus allows only one processor to have unqualified control at any one time, thus preventing simultaneous access. When the switch is employed as a bus extender, all operation is performed in a transparent mode, with programmable features inhibited. When used as a bus extender, total load capability of the I/O bus switch common bus is 9 controllers. The addition of I/O bus switch (MBS-B) cards constitutes one controller load for each switch card interfaced to the common bus.

SIMULTANEOUS OPERATIONS: Both the DMA and selector channels operate on a cycle-stealing basis, competing with the processor for memory cycles.

CONFIGURATION RULES

The 16-bit processors can address up to 225 I/O devices. A 6/16 or 8/16 processor has four DMA channels; up to four selector channels (16-slot chassis) or three selector channels (8-slot chassis) or two selector channels (5-slot chassis), each capable of sustaining 16 I/O controllers; and a multiplexer channel capable of handling 16 devices. Only multiplexer or selector channel buses can be extended to an expansion chassis.

The 5/16 processor has a multiplexer channel capable of handling 16 devices and a micro I/O bus capable of supporting 16 device addresses. An optional serial I/O port provides a 20-milliampere current loop interface to an ASCII terminal.

The 5/16, 6/16, and 8/16 are all single-board processors. The 5/16 is available in a 5-slot chassis with a 25-amp power supply. The type of chassis offered with the 6/16 is dependent on the memory installed. If NMOS memory is desired, the 6/16 can be purchased only in a 5-slot chassis with a 25-amp power supply. The 6/16 with core memory can be housed in either an 8-slot chassis with a 25-amp power supply or a 16-slot chassis with a 50-amp power supply. The housing configurations usable with the 8/16 include an 8-slot chassis with 25- or 50-amp power supply and a 16-slot chassis with 50-amp power supply.

The first 16K bytes of memory for the 5/16 are mounted on the processor board. The remaining memory, up to the limit of 64K bytes, is mounted on a single board requiring 1 slot. Memory for the 6/16, whether 8K, 16K, 32K, or 64K bytes, can be obtained on a single board requiring one slot. Each 32K-byte increment of memory for the 8/16 requires one slot.

Processor options, including display controller, auto-load, display controller/auto-load combination, and multiply/divide, each require one-half slot. A selector channel occupies one slot. The single-precision or single/double-precision hardware floating-point options each require two slots. Other processor options do not utilize additional chassis slots.

System modules requiring one-half slot each include the line frequency derived clock, the universal clock module, the 8-line interrupt module, the loader storage unit controller, and the I/O bus switch (which also requires one-half slot in the switched bus chassis). Modules requiring one slot each include the general-purpose interface board, the universal logic interface, and the multiplexer bus buffer. Terminals, card readers, paper tape units, and printers require one-half slot. The 1600-bpi magnetic tape units require one-half slot, while all other magnetic tape and disc subsystems require one slot. ►

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▶ For Mini I/O subsystems, analog input requires one slot, analog output requires one-half slot, and digital I/O requires one-half slot.

The display controller, multiple/divide, selector channels, processor, and memory all require dedicated positions.

MASS STORAGE

FMD-1 FLOPPY DISC SYSTEM: Uses standard 8-inch diskette media. Formatted capacity is 256,256 bytes. Average head positioning time is 325 milliseconds, track-to-track time is 6 milliseconds, and maximum positioning time is 655 milliseconds. Average rotational delay is 83 milliseconds. Rotational speed is 360 rpm, and the data transfer rate is 31,250 bytes per second. Track density is 48 tracks per inch. IBM format compatibility is provided through 77 tracks with 26 sectors per track, each sector containing 128 bytes.

The FMD-1 system utilizes microprocessor LSI technology to control all functions for up to four disc drives. The basic subsystem is available in four versions: M46-630 is a single-drive system for use with multiplexer bus processors; M46-631 is a dual-drive system for use with multiplexer bus processors; M46-632 is a single-drive system for use with a microprocessor bus; and M46-633 is a dual-drive system for use with a microprocessor bus. Each system is expandable to a maximum of four disc drives for a total of 1,025,024 bytes of on-line storage. The 230-VAC, 50-Hz equivalents are M46-636, M46-637 (single and dual for multiplexer), M46-638, and M46-639 (single and dual for microbus). The manufacturer is Perkin-Elmer Data Systems.

M46-611 2.5-MEGABYTE REMOVABLE CARTRIDGE DISC SYSTEM: Uses IBM 2315-equivalent cartridge disc packs. Actual formatted drive capacity is 2,506,752 bytes. Basic system includes controller, disk drive, power supply, and formatted disc cartridge. Add-on drives are Model M46-613 (60 Hertz) and Model M46-614 (50 Hertz). The 230-volt version of the M46-611 is the M46-612. Average head-positioning time for this front-loading, 100-tpi drive is 33 milliseconds. Track to track head movement time is 10 milliseconds, and movement time across all tracks is 60 milliseconds. Average rotational delay is 12.5 milliseconds. There are 204 tracks per surface. Unformatted track capacity is 7812 bytes. Formatted track capacity is 6144 bytes divided into 24 sectors of 256 bytes each. Bit density is 2200 bpi. Rotational speed is 1500 rpm, and the data transfer rate is 195,000 bytes per second. The manufacturer is Perkin-Elmer Data Systems.

M46-616 10-MEGABYTE REMOVABLE CARTRIDGE DISC SYSTEM: Uses a 5-megabyte fixed disc and a removable IBM 5440-equivalent, 5-megabyte disc cartridge. Actual formatted drive capacity is 10,027,008 bytes. Average head positioning time for this toploading, 200-tpi drive is 33 milliseconds. Track to track head movement time is 10 milliseconds, and movement time across all tracks is 60 milliseconds. Average rotational delay is 12.5 milliseconds. There are 408 tracks per surface with 4 tracks per cylinder. Unformatted track capacity is 7812 bytes. Formatted track capacity is 6144 bytes divided into 24 sectors of 256 bytes each. Bit density is 2200 bpi. Rotational speed is 2400 rpm, and the data transfer rate is 312,500 bytes per second.

The basic system includes a single drive, controller, and disc cartridge. Up to three additional drives with built-in power supplies (M46-619) can be added to the basic controller. The M46-618 and M46-620 are the 230-volt versions of the M46-617 and M46-619, respectively. The M46-61X drives have hardware write protection as a standard feature. The manufacturer is Perkin-Elmer Data Systems.

M46-004 MSM300 256-MEGABYTE REMOVABLE MEDIA MASS STORAGE MODULE SUBSYSTEM:

Uses a 3330-technology 12-platter disc pack. Ten of the 12 platters are used as recording surfaces, with 19 surfaces for data and the remaining surface for servo use. The other two platters are for protection, with one being located on top of the pack and the other on the bottom.

Each of the disk pack's 19 usable surfaces contains 808 data tracks plus 15 spares. Each cylinder is composed of 19 tracks. Track density is 384 tpi, while bit density is 6000 bpi. Unformatted track capacity is 20,160 bytes. Formatted track capacity is 16,384 bytes divided among 64 sectors of 256 bytes each. Unformatted drive capacity is 300 million bytes, but Interdata's formatting limits the total drive capacity to 256 million bytes.

The basic system includes one MSM300 drive, a controller for up to four drives, and a removable disc pack. The add-on drive is the M46-605 Model MSM300E. The equivalent master and add-on 220-VAC, 50-Hertz drives are the M46-606 and M46-607, respectively.

The drives have a rotational speed of 3600 rpm, resulting in an average rotational delay of 8.3 milliseconds. Head positioning times are 10, 30, and 55 milliseconds for the track to track, average, and maximum head movements, respectively. The data transfer rate is 1.2 million bytes per second. The data security techniques described for the M46-600 below also apply to this subsystem. The drives are manufactured by Control Data (Model 9766).

M46-600 MSM80 67-MEGABYTE REMOVABLE MEDIA MASS STORAGE MODULE SUBSYSTEM: Uses a 3330-technology five-platter disc pack. Three of the five platters are employed for recording, with five surfaces for data and the sixth for servo use. As in the MSM300, the remaining two platters provide protection. The basic system includes one MSM80 drive, a controller for up to four drives, and a removable disc pack. The add-on drive is the M46-601 Model MSM80E. The 220-VAC, 50-Hertz versions of the master and add-on drives are the M46-602 and M46-603, respectively.

Bit density for the storage module is 6000 bpi, while track density is 384 tpi. There are 808 data tracks plus 15 spares per surface. Each cylinder contains five tracks. Unformatted track capacity is 20,160 bytes. Formatted track capacity is 16,384 bytes divided among 64 sectors of 256 bytes each. Drive capacity, based on formatted data, is 67,200,000 bytes; the unformatted capacity is 80 megabytes.

Track to track, average, and maximum head movement times are 6, 30, and 55 milliseconds, respectively. Average rotational delay is 8.3 milliseconds, based on a rotational speed of 3600 rpm. The data transfer rate is 1.2 million bytes per second.

Data security is provided by a write protect feature with positive manual control, electronically inhibiting write functions upon detection of seek errors, track position error, loss of rotational speed, or loss of voltage. The last two malfunctions also cause head retraction. The drives are manufactured by Control Data (Model 9762).

INPUT/OUTPUT UNITS

See Peripherals/Terminals table.

In addition to the conventional devices listed in the Peripherals/Terminals table, Interdata offers a new line of interface devices particularly useful in measurement and control applications. These devices are called Mini I/O.

A Mini I/O analog input subsystem includes up to 32 single-ended or 16 differential inputs operating at up to 20, 33, 40, or 75 kilohertz with a resolution of 10 or 12 bits. Options in- ▶

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clude four programmable system gain levels and an instrumentation amplifier, which enables the user to interface two low-level channels in addition to the high-level signals normally supported. All models include a sample and hold analog-to-digital converter.

An analog output subsystem provides two or four output channels with any of five preselected output voltage ranges up to +10.24 volts. Resolution is 12 bits. One model includes control signals for an oscilloscope.

A digital I/O subsystem provides 16 latched outputs (up to 50 volts) and interfaces 16 TTL, contact or voltage sense, digital inputs (4 to 50 volts).

Programming of the Mini I/O subsystems via Interdata supervisory calls or ISA real-time extensions to FORTRAN IV and V is supported under OS/16-MT2.

COMMUNICATIONS CONTROL

The Interdata 16-bit processors support two types of single-line-per-card synchronous communications adapters, programmable single- and multiple-line asynchronous communications adapters, and a programmable asynchronous multiple-line adapter with auto-call. Also, direct communication to an IBM System/360 or 370 processor, simulating a device attached as a 360/370 peripheral, is possible.

SYNCHRONOUS COMMUNICATIONS: The M47-000 Bell 201-type Data Set Adapter supports half- or full-duplex operation at speeds of up to 9600 bits per second. The M47-001 Bell 301-type Data Set Adapter is used for half- or full-duplex operation at speeds up to 50,000 bytes per second. Both adapters provide full data set control and double-character buffering. Speeds are set by straps. Parity checking (strappable odd or even) and automatic modem status checks (line ready, etc.) are standard. Transmission is serial synchronous by character and bit; any six-, seven-, or eight-bit character code may be used. The set interface is RS-232 compatible.

The QUAD Synchronous Adapter (QSA) is designed to interface a variety of data sets with either the processor I/O multiplexer bus or a selector channel. The QSA is mounted on a 15-inch board. Four communications line interfaces are provided; each can handle full- or half-duplex service. All modem control parameters are under program control. These include sync character and character length selection, enable zero bit insertion/detection, flag insertion/deletion, and loopback capability. Strappable features include full or half duplex service for each line, deletion of all leading sync characters, automatic resynchronization of SDLC frame, and odd/even parity. Bell System 200 and 300 series data sets can be accommodated. The Interdata part number for the QSA is M47-002, or M47-003 with the addition of the capability of zero bit insertion/detection to support IBM's Synchronous Data Link Control (SDLC) line protocol.

Line Conditioning Modules (LCM's) provide the actual interface with the communications lines. There are two types. The M47-004 accommodates CCITT interfaces and future announcements. The M47-005 interfaces four RS-232C lines through two cable assemblies. Each LCM is mounted on a 7-by-15-inch board.

ASYNCHRONOUS COMMUNICATIONS: The M47-102 provides single-line asynchronous communications at speeds (one of two) that are program-selectable. Also program-selectable are the character length, stop bits, and parity. Respectively, these may be 5, 6, 7, or 8 bits; 1 or 2; and odd, even, or none; additionally, an echoplex check and line break are programmable. This Programmable Asynchronous Single Line Adapter (PASLA) handles switched or private lines and connects Bell 103 or 202 data sets or local RS-232

standard terminals. Operation is half or full duplex at speeds from 75 to 9600 bits per second, depending on the data set or terminal type attached.

For multi-line asynchronous communications without auto dial, Interdata offers the M47-100 Asynchronous Line Module Controller (actually a multiplexer), which handles any four binary multiples of speeds (strapped in) from among the standard top speeds of 49, 75, 110, 134, 150, 300, 600, 1200, and 1800 bps, and which provides control and bussing for up to 23 M47-101 Programmable Asynchronous Line Modules. The M47-101's each provide four Bell 103 or 202-type data set interfaces, each of which is program-selectable to one of the four speeds as well as having the other programmable features mentioned for the M47-102 Single Line Adapter described above. These modules fit within an M47-021 Chassis. This system is known as the Programmable Asynchronous Line System (PALS).

For asynchronous communications with auto dialing, the M10-022 Automatic Dial Unit Controller is used to buffer, interface, and provide program control for a Bell 801 Auto Call Data Auxiliary Set. This unit permits dialing any number in the switched public network. It is a 4-line unit.

LOCAL (PARALLEL) COMMUNICATIONS: An IBM channel interface permits direct connection of a 16-bit Interdata processor as an IBM System/360 or 370 peripheral device attached to a multiplexer (burst-mode device), selector, or block multiplexer channel on the 360 or 370. Model M47-202 responds to one System/360 or 370 address, while Model M47-203 responds to 256. Data transfer rates of up to 500,000 bytes per second are possible. Interdata provides test software and IBM-type cable terminals, if required, and driver software. These interfaces do not support the IBM bus extension feature.

COMMUNICATIONS SOFTWARE: *The Interdata Tele-communications Access Method (ITAM/16)* runs under OS/16 MT2 and, according to the vendor, makes access to remote computers and terminals as easy as access to local peripherals.

A minimum system to support ITAM consists of a 16-bit series processor with 32K bytes, operator console panel, power-fail/auto restart option, real-time clock, console device, system load device, and appropriate communication line adapters. For synchronous lines, a Bell 201-type Data Set Adapter or Quad Synchronous Adapter is supported. Bell 103-type modems are supported at up to 300 bps. For asynchronous lines, either single or multiline controllers are supported. Bell 201, 208, and 209-type modems are supported at 2400, 4800, and 9600 bps, respectively. Dataphone Digital Service (DDS) Data Service Units (DSU's) are supported to 9600 bps. Typically, OS/16 MT2 requires 16K bytes, with an additional 2K bytes for asynchronous support, 10K bytes for synchronous support, 5K bytes for an RJE emulator task, 200 bytes per device, and user-specified buffer areas.

ITAM supports device-dependent communications levels for sophisticated users who wish to develop their own terminal protocols, as well as a device-independent level that accesses remotely attached devices as if they were local peripherals. The latter level supports asynchronous ASCII devices, such as CRT's and teletypewriters, and also RJE (remote job entry) terminals to allow users to emulate IBM 2780 or 3780 remote terminals. The device-dependent level, meanwhile, includes asynchronous and binary synchronous modules that can be tailored by users to accommodate various networks, facilities, and protocols. Coding is re-entrant for multi-task environments. ▶

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SOFTWARE

OPERATING SYSTEMS: Two operating systems are currently supported for the Interdata 16-bit processors. The Basic Operating System was originally developed for the earlier Models 50, 60, 70, 74, 80, and 85 but has been adapted with appropriate levels of language and utility program support to the current 16-bit series processors. The OS/16 Real-Time Multi-Task Operating System (OS/16-MT2) was originally developed for the earlier Model 7/16.

The Basic Operating System (BOSS-PLUS) requires an 8K-byte 16-bit series processor (24K bytes for system generation) with operator console panel and operator command console device. The console device may be either a teletypewriter or CRT on a current loop interface. BOSS-PLUS supports a 9-track magnetic tape, cassette, paper tape equipment, PASLA video displays, ASR teletypewriter interfaces, 2.5-megabyte disc, and 10-megabyte disc subsystems along with card and printing devices. It is an entry-level, batch operating system in which I/O is controlled in a non-interrupt mode. BOSS-PLUS has capabilities for device-independent program development and a file management subsystem. The subsystem supports creation of file names, automatic file expansion, and variable-length records. The BOSS-PLUS package includes loaders, a text editor, an on-line debugger, and an assembler. BASIC and FORTRAN are supported.

The OS/16 Real-Time Multi-Task Operating System (OS/16 MT2), released in January 1976, requires a 64K-byte Model 6/16 for system generation. In normal operations, OS/16 MT2 resides in 16K bytes and can operate adequately in a system with a 32K-byte memory. The system must have a console turnkey panel, console device, and binary input device. Disc facilities are optional. OS/16 MT2 is a real-time, multiprogramming, multi-tasking operating system that is a fully compatible subset of the 32-bit series operating system, OS/32-MT, which is described in Report M11-530-301. Features include multiple operations from one command, multiple shared libraries, and ISA standard file protection. The task management system is capable of handling up to 256 task priorities, task-handled traps, and intertask communications. Memory management facilities can handle up to 128 tasks in memory with roll-in/roll-out, overlay facilities, and a task establisher utility. Software support is provided for the CAL Assembler, BASIC and FORTRAN languages, OS EDIT and OS AIDS utilities, and ITAM/16 for data communications.

LANGUAGES: Interdata offers two assemblers, two levels of FORTRAN, and BASIC.

The Common Assembly Language (CAL) is a cross-assembler. It can be run on either a 16-bit or 32-bit Interdata processor and can produce object code that can in turn be executed directly on either a 16- or 32-bit machine. The minimum configuration for running CAL is an Interdata 16-bit series processor with adequate storage for the operating system and symbol tables plus 24K additional bytes for the assembler, an operator's console panel, and a teletypewriter. A disc, magnetic tape, or Intertape cassette unit is highly desirable with CAL, however.

CAL is a two-pass assembler that incorporates a multi-pass machine-code optimizer which is invoked by the SQUEZ (squeeze) command. CAL has a facility to process "common code," which is essentially similar to machine code but not specific to the processor architecture (16 or 32 bits). It provides an annotated cross-reference listing of symbolic references to aid in debugging programs.

CAL permits eight-character alphanumeric symbols, provides common block definition and initialization that is FORTRAN-compatible, and allows conditional assembly pseudo-operations. A companion program, the *CAL Macro Processor (MACROCAL)* establishes and processes a library of macros. These may be positional or keyword prototypes, nested macros, variable operation codes, operand sublists, and conditional macro expansions.

OS Assembler is supplied with the BOSS-PLUS operating system. It incorporates standard error detection, multipass options, and conditional listings. It is an IBM System/360-like assembly language, but it does not permit the use of macros.

Extended FORTRAN IV conforms to the ANSI FORTRAN Standard X3.9-1966. It can be utilized with either of the 16-bit operating systems. Interdata extensions included mixed-mode arithmetic statements, implied DO loops, array initializations and hexadecimal constants in DATA statements, multiple entry into user-written subroutines, Hollerith string declarations, implicit type declarations, and error and end-of-file returns from read/write operations. In addition, real-time processing is supported according to the Purdue-ISA standards. A run-time library containing over 135 re-entrant, relocatable programs is supplied with the compiler. The compiler runs on a 6/16 or 8/16 and requires 16K bytes above the operating system, an operator console panel, and a teletypewriter.

FORTRAN V Level 1 is a superset of Extended FORTRAN IV. In addition to the language extensions of extended FORTRAN IV, FORTRAN V provides in-line assembly code, address variables, and enhanced debugging facilities. FORTRAN V Level 1 runs under any Interdata operating system. The compiler is a cross-compiler, capable of running on a 16- or 32-bit machine and producing CAL output code that can be targeted for either a 16- or 32-bit processor. The compiler requires 24K bytes on 16-bit systems. All common Interdata peripheral units are supported. Minimum requirements include an operator console panel, a teletypewriter, and one high-speed I/O device.

The FORTRAN V language also has such refinements as conditional compilation and run-time trace capability. It accepts in-line assembly coding (in CAL).

BASIC Level II conforms to the conventions of Dartmouth's BASIC and operates on the 16-bit series processors under OS/16-MT2. It is a superset of Dartmouth BASIC that includes enhanced I/O facilities, string and matrix extensions, and user-defined arithmetic functions. Enhancements to the I/O facilities include file manipulation completely from within the BASIC program. String and matrix extensions include matrix arithmetic performed within the BASIC program, subscripting either end of a variable-length string, and substring deletion.

Both single- and double-precision arithmetic operations can be handled. Single precision to six digits of significance and double precision to 14 significant digits are standard.

BASIC Level II requires 19K bytes of memory beyond the operating system plus a minimum of 1K bytes per user. Also required are an operator console panel, which may be either a binary or hex display, an operator command console, and a magnetic medium. The command console may be either a Carousel terminal, teletypewriter, or display terminal. The magnetic medium may be a cassette tape, 9-track magnetic tape, 2.5-megabyte cartridge disc, or 10-megabyte cartridge disc drive.

UTILITIES: Two major OS utilities are available, OS Edit and OS AIDS.

OS Edit is a fairly flexible editor for ASCII and/or binary characters that runs under BOSS and OS/16 MT2. It is basically line-oriented, but it also has facilities for character ▶

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and column manipulation. A string search and replacement capability is also provided. OS Edit can be used for interactive editing or batch-stream job editing, and it has file manipulation capabilities. Text is read into an edit buffer in memory that is at least 1K bytes in size; it can be made larger by operator request. OS Edit is included at no charge with each operating system.

OS AIDS (Automatic Interactive Debugging System) has breakpoint, snapshot, and trace facilities, and also a memory cell or register monitor feature. It operates in interactive or batch mode. It is included at no charge with each operating system.

APPLICATION PROGRAMS: Application programs for Interdata systems are generally available through the Interdata users' group, Interchange. Programs from Interchange are nominal in cost. For information, write Interdata's headquarters. There are similar groups outside the U.S. as well.

In addition to the packages listed in the Software Price section, Interdata offers about 39 diagnostic/test programs at $25 to $50 each. Also available are 13 software routines at $25 to $55 each plus media costs of up to $75.

PRICING

POLICY: Interdata provides its systems on a purchase-only basis, with customer service provided. Field installation costs include a one-time travel charge depending on the distance from the Interdata field service center. From 0 to 20 miles, there is no charge; for 21 to 100 miles, the charge is $50, for 101 to 300 miles, the charge is $150; and for 301 to 500 miles, the charge is $250. A minimum installation charge of $200 is applicable to all purchases. A full on-site service warranty applies for 90 days from installation date. The buyer must reimburse Interdata for all travel beyond 200 miles. See the Purchase Agreement Provisions table for services rendered on purchased systems.

Maintenance service can be obtained: 1) on a contract basis, with fixed monthly charges for one-, two-, or three-shift coverage; 2) via resident personnel on-site full-time, or 3) by depot, where defective circuit boards are returned to the nearest Interdata service depot. The cost for depot service will be handled on the basis of a fixed price per board for repair or a fixed price per board plus $200 for an exchange board. Per-call service is also available, and is charged for at $36 per hour from 9 AM to 5 PM Monday through Friday, except holidays, or $48 per hour at other times. Additionally, travel expenses are 20 cents per mile or commercial carrier cost plus parts, food, and lodging. Per-call service has

lowest priority. Parts and material are charged at the rates listed in the then-current Interdata price list.

National hardware and software support engineering specialists are available at a minimum labor charge of $200 per call. Rates are $50 per man-hour plus travel expenses of 20 cents per mile or commercial carrier costs. Food and lodging costs incurred by the specialist are also the responsibility of the customer.

Service centers are located in 30 U.S. cities in 24 states, with depot repair service in 5 of these cities. For the international market, service facilities are located in 13 cities, 5 of which have depot repair service.

Training is offered by Interdata at facilities in Oceanport, New Jersey; London, England; or Los Angeles, California. See the Purchase Agreement Provisions table for free training allotments. On-site education can be given at the customer location for $2,500 per week for 10 students taking standard courses. Each additional student is charged $200 per week. Special courses presented on-site are priced at $2,500 per week or $500 per day, with a three-day minimum for short courses. All special courses presented on-site also include an additional charge for preparation. Courses currently being offered are in both hardware maintenance training and software. All training center courses are charged at the rate of $300 per student week. Purchased system credits may be employed in lieu of payment for a period of 120 days after a system is installed. Software courses include Introduction to Assembly Language, 16-Bit Programming, 16-Bit Operating Systems, OS/16-MT2 User Course, and OS/16-MT2 Internals. Hardware maintenance courses include Model 6/16 Maintenance, Communications Interfaces, Multiplexer Bus Interfaces, Magnetic Tape Interfaces, Disc Interfaces, 16-Bit Systems Error Analysis, and Carousel Maintenance.

Both hardware and software subscription services are offered by Interdata at $200 per year. The hardware service entitles an Interdata user to receive product improvement notices, general information bulletins, and preventive maintenance procedures. The software service brings the user regular software bulletins describing new Interdata software, software defects, and the patches or alternatives associated with such defects. Revisions to previously purchased software are available at reduced rates.

Operating system installation is billed at $2000. Installation includes system generation and three days of on-site support. Travel and living expenses for Interdata personnel are also the responsibility of the user.

PURCHASE AGREEMENT PROVISIONS

Agreement		Full Service Warranty	Factory Warranty	Training	Documentation for each system purchased
Standard Purchase and Volume Agreements	Systems	Included for price over $10K	Included for price under $10K	4 man-weeks if over $10K; otherwise 2	All standard
	Expansions	NA	90 days	None	All maintenance
OEM Purchase	Initial system	Mandatory for 1st unit of each model	NA	2 man-weeks	All standard
	Additional systems	Optional	30 days	None	All maintenance
	Expansions	NA	30 days	None	All maintenance

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▶ Software is generally separately priced.

Quantity discounts of 10 to 38 percent are provided on 16-bit systems in quantities up to 100 systems; additional discounts are available for larger orders.

EQUIPMENT: The following typical purchase prices include controllers, adapters, and basic software.

SMALL-SCALE OEM MODEL 6/16 SYSTEM: Includes 8K-byte 6/16 processor in an 8-slot chassis, memory parity, automatic loader, and power fail/restart. Purchase price is $4,000.

LARGE-SCALE, HIGH-SPEED OEM MODEL 6/16 SYSTEM: Includes 6/16 processor with 64K bytes of 600-nanosecond memory with parity, binary display panel, hexadecimal display, automatic loader, power fail/restart, and two selector channels. Purchase price is $9,900.■

EQUIPMENT PRICES

PROCESSORS AND MEMORY

		Purchase Price	Monthly Maint.*	Field Instal.

All 5/16 processors include 16 general-purpose registers, buffered multiplexer bus, micro I/O bus, list and multiply/divide instructions, ROM support for ASCII programmer console, and real-time clock input; M51-104 Processor Chassis and power supply must be included to obtain maintenance and installation.

		Purchase Price	Monthly Maint.*	Field Instal.
M51-000	5/16 with 8K bytes of MOS memory; for chassis see M51-104	$1,400	$30	$200
M51-001	5/16 with 16K bytes of MOS memory; for chassis see M51-104	2,000	35	200
M51-002	5/16 with 24K bytes of MOS memory; for chassis see M51-104	2,800	45	200
M51-003	5/16 with 32K bytes of MOS memory; for chassis see M51-104	3,400	50	200
M51-004	5/16 with 40K bytes of MOS memory; for chassis see M51-104	4,000	55	200
M51-005	5/16 with 49K bytes of MOS memory; for chassis see M51-104	4,600	60	200
M51-006	5/16 with 57K bytes of MOS memory; for chassis see M51-104	5,200	70	200
M51-007	5/16 with 65K bytes of MOS memory; for chassis see M51-104	5,800	75	100

All 6/16 processors include 16 general-purpose registers, buffered multiplexer bus, four DMA channels, 255 hardware vectored interrupt levels, auto-load bootstrap instruction, and power on/off switch if ordered without a display controller or display panel.

		Purchase Price	Monthly Maint.*	Field Instal.
	6/16 Processor with 8-slot chassis, 25-amp. power supply, and:			
M61-011	8K bytes of 1000-nsec. core memory	2,800	40	200
M61-012	16K bytes of 1000-nsec. core memory	3,300	60	200
M61-013	32K bytes of 1000-nsec. core memory	4,800	60	200
M61-014	64K bytes of 1000-nsec. core memory	8,200	80	200
	6/16 Processor with 8-slot chassis, 50-amp. power supply, and:			
M61-015	8K bytes of 1000-nsec. core memory	3,700	45	200
M61-016	16K bytes of 1000-nsec. core memory	3,900	55	200
M61-017	32K bytes of 1000-nsec. core memory	5,500	65	200
M61-018	64K bytes of 1000-nsec. core memory	8,900	80	200
	6/16 Processor with 16-slot chassis, 50-amp. power supply, and:			
M61-019	8K bytes of 1000-nsec. core memory	4,100	45	200
M61-020	16K bytes of 1000-nsec. core memory	4,300	55	200
M61-021	32K bytes of 1000-nsec. core memory	5,800	65	200
M61-022	64K bytes of 1000-nsec. core memory	9,200	80	200
	6/16 Processor with 5-slot chassis, 25-amp. power supply, and:			
M61-023	8K bytes of 600-nsec. MOS memory	2,200	40	200
M61-024	16K bytes of 600-nsec. MOS memory	2,800	50	200
M61-026	32K bytes of 600-nsec. MOS memory	4,000	60	200
M61-030	64K bytes of 600-nsec. MOS memory	7,700	80	200
M61-100	6/16 IPAC System; includes M61-018 Model 6/16 Processor with 64K bytes of memory, M61-110 Hexadecimal Display Panel, M61-104 Combination Display/Automatic Loader, M61-105 OS/16-MT2 Auto Load Program, M61-107 Hardware Multiply/Divide Option, M61-101 Power Fail/Auto Restart, M70-103 Selector Channel, M48-012 Line Frequency Clock, M46-010 Carousel 30, M46-024 Carousel 30 Interface, M46-617 10-Megabyte Cartridge Disc Subsystem, M46-238 400-cpm Card Reader, M46-235 Card Reader Interface, M46-204 Serial Line printer, M46-202 Line Printer Interface, M61-113 6/16 Processor Mounting kit, M49-030 System Cabinet, S90-010-66 OS/16-MT2 10-megabyte Source and Object Disc Cartridge and Documentation Package, S90-200-66 FORTRAN IV, S90-404-66 Multi-Media Diagnostic Package, and M61-112 6/16 Processor Maintenance and Documentation kit; includes field installation	33,500	392	—
M61-106	6/16 IPAC System, 50-Hertz version; replaces certain peripherals with their 50-Hertz functional equivalents; the equivalents include the M46-011 Carousel 30, the M46-618 10-Megabyte Cartridge Disc Subsystem, the M46-205 Serial Line Printer, and the M46-239 400 cpm Card Reader; includes field installation	34,000	392	—

All 8/16 processors include 16 general-purpose registers, buffered multiplexer bus, four DMA channels, 255 hardware vectored interrupt levels, and single/double-precision floating-point hardware options

		Purchase Price	Monthly Maint.*	Field Instal.
	8/16 with 8-slot chassis and:			
M81-000	32K bytes of 750-nsec. core memory and 25-amp power supply	5,800	65	200
M81-001	32K bytes of 750-nsec. core memory and 50-amp power supply	6,500	70	200
M81-003	64K bytes of 750-nsec. core memory and 25-amp power supply	9,200	90	200
M81-004	64K bytes of 750-nsec. core memory and 50-amp power supply	9,900	95	200
	8/16 with 16-slot chassis and:			
M81-002	32K bytes of 750-nsec. core memory and 50-amp power supply	6,900	70	200
M81-005	64K bytes of 750-nsec. core memory and 50-amp power supply	10,300	95	200

*Single-shift maintenance; 2-shift rates are 50 percent higher, and 3-shift rates are 100 percent higher.

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EQUIPMENT PRICES

PROCESSOR OPTIONS		Purchase Price	Monthly Maint.*	Field Instal.
For 5/16 Processor:				
M51-101	Bootstrap Loader; accommodates 1024- or 2048-byte ROM or OS/16 MT2 Bootstrap ROM	75	—	—
M51-102	OS/16 MT2 Bootstrap ROM; loads operating system from mass storage device	100	—	—
M51-103	Turnkey Console; includes initialize, on/off, execute switches	100	—	50
M51-104	Model 5/16 5-Slot Processor Chassis and Power Supply	600	—	—
M51-105	ROM Module Board; holds up to 48K bytes of customer-supplied ROM for replacement of main memory	300	—	—
M51-106	Model 5/16 Processor Chassis Mount kit; includes retaining bars and rails for mounting 19-inch Retma enclosure	60	—	—
M51-107	Maintenance and Documentation kit; includes processor and memory test program packages and 5/16 maintenance and reference manual	60	—	—
For 6/16 Processor				
M61-101	Power Fail Detection/Auto Restart	400	2	25
M61-102	Display Controller; for Hexadecimal, Binary or Turnkey Console	100	5	50
M61-103	Automatic Load Option; provides up to 4096 bytes of read-only memory for automatic program load	300	10	50
M61-104	Combination Display Controller and 6/16 Automatic Load Options	350	10	50
M61-105	OS/16 MT-2 Automatic Load Program	100	—	—
M61-107	Hardware Signed, Fixed-Point Multiply/Divide	950	10	50
M61-108	Turnkey Console; includes key-operated on/off switch, as well as initialize and execute switches	100	—	50
M61-109	Binary Display Panel; includes light-emitting diode (LED) binary readout and Hexadecimal Input Keyboard	300	2	50
M61-110	Hexadecimal Display Panel; includes an advanced hexadecimal light-emitting diode (LED) readout and Hexadecimal Input Keyboard	600	5	50
M61-115	Battery Pack for 6/16 Processor with MOS memory; provides 2 hours back-up for MOS memory system	500	—	—
M61-116	Processor Parity Control	500	5	50
M61-304	1024 Bytes of Read-Only Memory for use with 6/16 Automatic Load Option	200	—	—
M70-103	Selector Channel; includes all addressing, word count, and byte assembly/disassembly hardware	1,000	10	150

SYSTEM MODULES

M48-000	Universal Clock Module; includes a programmable precision interval clock with both frequency and internal count under hardware control and an AC line frequency derived clock	750	5	50
M48-001	8-line Interrupt Module; to interface customer interrupt lines to the built-in processor interrupt system	900	5	50
M48-002	General-Purpose Interface Board; mounts up to 117 14- or 16-pin dual in-line package IC's for custom design	550	—	—
M48-005	Multiplexer Bus Buffer; up to 16 additional device controllers	900	5	100
M48-012	Line Frequency Derived Clock; automatic interrupt each 8.33 (60 Hertz) or 10 (50 Hertz) milliseconds	250	5	50
M48-013	Universal Logic Interface; mounts up to 74 14- or 16-pin dual in-line package IC's for custom design. Includes fully buffered logic for 8- and 16-bit transfers on multiplexer bus or selector channel	700	—	—
M48-014	I/O Bus Switch	1,700	20	200
M48-018	Manual Control Panel for I/O Bus Switch; manual override control for up to six processors sharing a single common switched bus	200	—	50
M48-019	Manual Control Panel for I/O Bus Switch; manual override control for up to three separate common switched busses each shared by two processors	200	—	50
M70-104	Loader Storage Unit LSU Controller with watchdog timer and I/C sockets for up to 16 128-byte storage modules	600	10	100
M70-105	128-byte Storage Module	100	—	—
M70-106	16-bit LSU Bootstrap Loader for BOSS-PLUS from mass storage device	250	—	—
M70-108	For OS/16-MT2	250	—	—
M73-110	Subchannel Controller; allows I/O address range to be extended beyond 255 devices in a 256-address block	900	10	100
For 8/16 Processor:				
M81-100	Single-precision hardware floating-point option	2,800	30	200
M81-101	Single/double-precision hardware floating-point option	3,800	40	300
M81-102	Power Fail Detection/Auto Restart	400	2	25
M81-103	Turnkey Console; includes initialize, on/off, execute switches	100	—	50
M81-104	Display Controller; for binary or hexadecimal console	100	5	50
M81-105	Binary Display Panel; includes light-emitting diode (LED) binary readout and hexadecimal input keyboard	350	2	50
M81-106	Hexadecimal Display Panel; includes an advanced hexadecimal light-emitting diode (LED) readout and hexadecimal input keyboard	600	5	50
M81-107	Automatic load option; provides up to 4K bytes of ROM	300	10	50
M81-108	Combination Display Controller and Automatic Load Options	350	10	50
M81-109	OS/16-MT2 Automatic Load program; loads operating system from mass storage device	100	—	—
M81-110	1024 bytes of ROM for use with Automatic Load option	200	—	—
M81-111	Processor Parity Control	500	5	50
M81-112	Hardware Signed Fixed-Point Multiply/Divide	950	10	50
M81-113	Selector Channel; includes all addressing, word count, and byte assembly/disassembly hardware	1,000	10	150

MEMORY

M81-300	32K-byte Memory Expansion Module for 8/16	4,500	45	200
M81-301	32K-byte Parity Memory Expansion Module for 8/16	5,000	45	200

MASS STORAGE

M46-630	FMD-1 Floppy Disc System; includes a 256K-byte disc drive, controller for up to four drives, power supply, and chassis; for use with multiplexer bus of any 16 bit Interdata computer	2,900	29	200
M46-632	For use with microprocessor bus connection	2,900	29	200
M46-636	50-Hertz version for multiplexer bus	2,900	29	200
M46-638	50-Hertz version for microprocessor bus connection	2,900	29	200
M46-631	FMD-1 Floppy Disc System; includes dual 256K-byte disc drives, controller for up to four drives, power supply, and chassis; for use with multiplexer bus of any 16-bit Interdata computer	3,900	39	200
M46-633	For use with microprocessor bus connection	3,900	39	200

*Single-shift maintenance; 2-shift rates are 50 percent higher, and 3-shift rates are 100 percent higher.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Field Install.
MASS STORAGE (Continued)				
M46-637	50-Hertz version for microprocessor bus	3,900	39	200
M46-639	50-Hertz version for microprocessor bus connection	3,900	39	200
M46-634	FMD-1 Floppy Disc Expansion Drive; single 256K-byte disc drive for use as a second or fourth drive	1,000	10	200
M46-640	50-Hertz version	1,000	10	200
M46-635	FMD-1 Floppy Disc Expansion Drive; includes a 256K-byte disc drive, power supply for up to two drives, chassis and table; for use as a third drive	2,400	24	200
M46-641	50-Hertz version	2,400	24	200
M46-611	2.5-Megabyte Removable Cartridge Disc System; includes drive, controller for up to four drives, power supply, and disc cartridge	10,000	100	500
M46-612	50-Hertz version	10,100	100	500
M46-613	2.5-Megabyte Add-On Removable Cartridge Disc Drive	5,500	60	400
M46-614	50-Hertz version	5,600	60	400
M46-420	Cartridge Disc Drive Interface for up to four drives	4,000	30	100
27-039	IBM 2315-type 2.5-megabyte Disc Cartridge	200	—	—
M46-617	10-Megabyte Fixed/Removable Cartridge Disc System; includes drive, controller for up to four drives, power supply, and disc cartridge	13,000	120	800
M46-618	50-Hertz version	13,100	120	800
M46-619	10-Megabyte Add-On Fixed/Removable Cartridge Disc Drive	8,500	90	700
M46-620	50-Hertz version	8,600	90	700
M46-421	Cartridge Disc Drive Interface for up to four drives	4,500	30	100
27-056	IBM 5440-type 5-megabyte Disc Cartridge	270	—	—
M46-600	MSM80 67-Megabyte Removable Media Mass Storage Module System; includes a drive, controller and interface for up to four drives, power supply and disk pack	25,000	250	600
M46-602	50-Hertz version	25,000	250	600
M46-601	MSM80E 67-Megabyte Add-On Removable Media Mass Storage Module Drive	18,000	200	500
M46-603	50-Hertz version	18,000	200	500
M46-609	67-megabyte 5-platter Disc Pack	1,500	—	—
M46-604	MSM300 256-Megabyte Removable Media Mass Storage Module System; includes a drive, controller and interface for up to four drives, power supply, and disc pack	52,000	450	800
M46-606	50-Hertz version	52,000	450	800
M46-605	MSM300E 256-Megabyte Add-On Removable Media Mass Storage Module Drive	42,000	350	700
M46-607	50-Hertz version	42,000	350	700
M46-610	256-megabyte 12-platter Disc Pack	3,500	—	—
MAGNETIC TAPE EQUIPMENT				
M46-400	Intertape Cassette System; includes dual tranports and interface/controller	4,200	40	200
M46-501	9-track, 800 bpi, 45-ips drive	6,000	90	400
M46-502	50-Hertz version	6,100	90	400
M46-500	Interface/Controller for up to four 9-track, 800-bpi drives	2,950	20	100
M46-506	7-track, 200/800-bpi, 45-ips drive	6,000	90	400
M46-507	50-Hertz version	6,100	90	400
M46-508	7-track, 556/800-bpi, 45-ips drive	6,000	90	400
M46-509	50-Hertz version	6,100	90	400
M46-503	Interface/Controller for up to four 7-track, 200/800-bpi drives	2,950	20	100
M46-504	Interface/Controller for up to four 7-track, 556/800-bpi drives	2,950	20	100
M46-505	Interface/Controller for up to four 7-track, 200/800 or 556/800-bpi drives	2,950	20	100
M46-513	9-track, 1600-bpi, 45-ips master drive with PE formatter for up to four drives	12,000	120	500
M46-514	50-Hertz version	12,100	120	500
M46-515	9-track, 1600-bpi, 45-ips add-on drive	6,800	100	500
M46-516	50-Hertz version	6,900	100	500
M46-512	Interface/Controller for up to four 9-track, 1600-bpi drives	1,500	10	100
M46-490	9-track, 800-bpi, 75-ips, Magnetic Tape System; includes master drive and controller for up to four drives	14,500	135	600
M46-492	50-Hertz version	14,500	135	600
M46-491	9-track, 800-bpi, 75-ips add-on drive	9,800	100	500
M46-493	50-Hertz version	9,800	100	500
M46-494	9-track, 800/1600 bpi, 75 ips Magnetic Tape System; includes master drive, NRZI/PE formatter, and controller for up to four drives	24,000	220	700
M46-496	50-Hertz version	24,000	220	700
M46-495	9-track, 800/1600-bpi, 75-ips add-on drive	15,000	140	600
M46-497	50-Hertz version	15,000	140	600
PRINTERS				
M46-204	Serial printer; 132 positions, 64-character set, 165 cps	5,000	50	200
M46-205	50-Hertz version	5,200	50	200
M46-202	Interface/Controller for 165-cps printer	990	10	50
M46-207	Line printer; 132 positions, 64-character set, 300 lpm	11,950	90	300
M46-208	50-Hertz version	12,250	90	300
M46-209	Line printer; 132 positions, 64-character set, 600 lpm	17,150	110	400
M46-210	50-Hertz version	17,450	110	450
M46-206	Interface/Controller for 300 or 600-lpm printer	990	10	50
PUNCHED CARD EQUIPMENT				
M46-238	Reader; 400 cpm	3,060	40	200
M46-239	50-Hertz version	3,160	40	200

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Field Instal.
PUNCHED CARD EQUIPMENT (Continued)				
M46-244	Reader; 1000 cpm	6,500	80	160
M46-245	50-Hertz version	6,700	80	160
M46-235	Interface/Controller for Card Readers	990	10	50
M46-234	Hollerith to ASCII Conversion Option	350	—	—
PUNCHED TAPE EQUIPMENT				
M46-240	Reader; uni-directional, 300 cps	1,300	20	100
M46-241	50-Hertz version	1,400	20	100
M46-242	Reader/Punch; 300/75 cps	3,300	40	300
M46-243	50-Hertz version	3,400	40	300
M46-250	Interface/Controller for punched tape equipment	900	10	50
TERMINALS				
M46-010	Carousel 30 Keyboard Printer Terminal; 80 positions, 64-character set, 30 cps	2,175	35	100
M46-011	50-Hertz version	2,275	35	100
M46-845	Pedestal Mount	195	—	—
M46-860	Pin-Feed Adjustable Tractor	150	—	—
M46-865	Acoustic Cover	50	—	—
M46-880	132-Character Print Line Option	300	—	—
M46-906	Supplies kit; six black fabric cartridges and three Carousel print cups	49	—	—
M48-024	20-ma Current Loop Interface	400	5	50
M46-015	Carousel 35 Keyboard Printer Terminal; 80 positions, 64-character set, 30 cps	2,295	35	100
M46-016	50-Hertz version	2,395	35	100
M46-821	120-cps Paper Tape Reader	695	10	100
M46-845	Pedestal Mount	195	—	—
M46-860	Pin-Feed Adjustable Tractor	150	—	—
M46-865	Acoustic Cover	50	—	—
M46-880	132-Character Print Line Option	300	—	—
M46-881	96-Character Set	300	—	—
M46-906	Supplies Kit; six black fabric cartridges and three Carousel print cups	49	—	—
M48-021	20-ma Current Loop Interface	400	5	50
M46-803	Carousel 300 Keyboard Printer Terminal; 132 positions, 64-character set, 30 cps	2,695	40	100
M46-804	50-Hertz version	2,795	—	—
M46-810	Cable connection to PASLA	60	—	—
M46-811	Cable connection to Bell 103 modem	60	—	—
M46-845	Pedestal Mount	195	—	—
M46-860	Pin-Feed Adjustable Tractor	150	—	—
M46-865	Acoustic Cover	50	—	—
M46-881	96-Character ASCII Character Set	300	—	—
M46-887	Electronic Format Control; addressable horizontal and vertical tab control, top of form/skip perforation	150	—	—
M46-906	Supplies kit; six black fabric cartridges and three Carousel print cups	49	—	—
M46-000	ASR 33 Teletypewriter; friction feed	1,750	50	100
M46-002	50-Hertz version	1,850	50	100
M46-004	ASR 33 Teletypewriter, sprocket feed	1,950	50	100
M46-005	50-Hertz version	2,050	50	100
M46-001	ASR 35 Teletypewriter; sprocket feed	4,850	60	200
M46-003	50-Hertz version	4,950	60	200
M48-024	Current Loop Interface for ASR 33 and 35	400	—	—
M46-030	1100 Alphanumeric Display Terminal; 1920 characters	1,295	—	—
M46-031	50-Hertz version	1,355	—	—
M46-033	Printer Port, RS-232C	95	—	—
M46-034	Printer Port, 20-ma current loop	125	—	—
M46-035	Numeric Keypad, 60-Hertz	1,390	—	—
M46-037	Numeric Keypad, 50-Hertz	1,450	—	—
M46-036	Antiglare Screen	25	—	—
M46-041	1200 Alphanumeric Display Terminal; 1920 characters, editing facilities	1,995	—	—
M46-042	50-Hertz version	2,055	—	—
M46-046	With function key set	2,090	—	—
M46-048	50-Hertz version	2,150	—	—
M46-044	Printer Port, RS-232C	95	—	—
M46-045	Printer Port, 20-ma current loop	125	—	—
M46-050	Line Drawing Set	95	—	—
M46-108	Graphic Display Terminal; PASLA interface	6,500	60	150
M46-109	50-Hertz version	6,500	60	150
M46-107	Current Loop Interface for Graphic Display Terminal	400	5	100
COMMUNICATIONS EQUIPMENT				
M47-000	Adapter for Bell 201-type data sets, synchronous	1,200	10	100
M47-001	Adapter for Bell 301-type data sets, synchronous	1,400	10	100
M47-102	Programmable Asynchronous Single Line (PALS) adapter (103/202 data sets of RS-232)	500	10	100
M47-100	Asynchronous Line Module Controller (for M47-101's)	500	10	100
M47-101	Programmable Asynchronous Line Module (4 lines)	1,200	10	100
M49-021	Chassis for M47-101's	550	—	50
M10-022	Automatic Dial Unit Controller (4 lines)	1,600	10	100
M47-202	Single address System/360 parallel interface	5,000	100	—
M47-203	Multiple address System/370 parallel interface	6,500	100	—

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Field Instal.
COMMUNICATIONS EQUIPMENT (Continued)				
M47-002	QUAD Synchronous Adapter (QSA)	1,600	30	100
M47-003	M47-002 with zero-bit insertion/deletion and support for SDLC	2,600	40	100
M47-004	Line Conditioning Module with interface for QSA and two CCITT modems	700	20	100
M47-005	Line Conditioning Module with interface for QSA and four RS-232C communications lines	400	10	100
CABINETS & CHASSIS				
M49-020	System Chassis; prewired for up to eight 15-line or sixteen 7-inch controllers without power; includes chassis signal cables	700	—	50
M49-030	System Cabinet; includes side skins, chassis support rails, exhaust fan and filter, filter panels or half door, casters, levelers, 30-amp AC distribution panel, and I/O panel; sold and assembled only at Interdata's plant for the housing of Interdata-based systems	925	—	—
M49-040	Same as M49-030 but requires AC Distribution Panel	925	—	—
M49-025	Switching regulated power supply for up to three Expansion Chassis (25 amp)	800	10	50
M49-050	Switching regulated bulk power supply for up to three Expansion Chassis (50 amp)	1,000	10	50
M49-033	VDE Approved Power Supply	1,500	10	50
M49-041	24-amp AC Distribution Panel	NC	—	—
M49-042	48-amp AC Distribution Panel	NC	—	—
M49-003	10 to 15-inch Adapter Card	150	—	—
M49-010	1.75-inch Filler Panel and Mounting Kit	40	—	—
M49-011	5.25-inch Filler Panel and Mounting Kit	50	—	—
M49-012	7-inch Filler Panel and Mounting Kit	50	—	—
M49-013	10.5-inch Filler Panel and Mounting Kit	50	—	—
MAINTENANCE EQUIPMENT				
M49-410	16-Bit Series Processor Testing Aid	350	—	—
M48-006	Extender Board for remote trouble-shooting of processor memory or I/O cards	300	—	—
M49-402	IBM 360/370 Interface Maintenance Panel	500	—	—

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SOFTWARE PRICES

	Documentation, Source Code, & Object Code	Documentation & Object Code	Documentation Only
Basic Operating System (BOSS-PLUS)—	—	—	$ 30
On paper tape, cassette, 9-track magnetic tape, or punched cards	$ 375	—	—
OS/16 Real-Time Multi-Task Operating System (OS/16-MT2)—	—	—	200
On cassette or 9-track tape	1,400	—	—
On punched cards	750	—	—
On 2.5-megabyte disc	1,750	—	—
On 10-megabyte disc	1,700	—	—
Interdata Telecommunications Access Method (ITAM/16)—	—	—	100
On cassette or 9-track tape	800	—	—
On punched cards	1,000	—	—
On 2.5-megabyte disc	1,000	—	—
On 10-megabyte disc	1,100	—	—
Extended Fortran IV—	—	—	25
On paper tape, cassette, or 9-track magnetic tape	—	250	—
On 2.5-megabyte disc	—	450	—
On 10-megabyte disc	—	500	—
Fortran V Level 1—	—	—	30
On paper tape, cassette, or 9-track magnetic tape	—	650	—
On 2.5-megabyte disc	—	850	—
On 10-megabyte disc	—	950	—
Basic Level II—	—	—	25
On paper tape, cassette, or 9-track magnetic tape	—	400	—
On 2.5-megabyte disc	—	400	—
On 10-megabyte disc	—	450	—
Source only on any medium	2,000	—	—
Common Assembler Language (CAL)—	—	—	25
Source only with documentation on cards, 9-track tape, or cassette	1,000	—	—
On cassette, 9-track magnetic tape, or punched cards	—	150	—
On 2.5-megabyte disc	—	350	—
On 10-megabyte disc	—	450	—
CAL Macro Processor and Library—			
On paper tape, cassette, or 9-track magnetic tape	—	450	—
On 2.5-megabyte disc	—	650	—
On 10-megabyte disc	—	750	—

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SOFTWARE PRICES

	Documentation, Source Code, & Object Code	Documentation & Object Code	Documentation Only
Multi-Media Diagnostic Package—	—	—	350
Object only on cassette or 9-track magnetic tape	—	100	—
Object only on 2.5-megabyte disc	—	300	—
Object only on 10-megabyte disc	—	400	—
Sort/Merge—	—	—	25
On cassette or 9-track magnetic tape	—	75	—
On 2.5-megabyte disc	—	275	—
On 10-megabyte disc	—	375	—
Loader Storage Unit Support Program	—	—	10
On paper tape	—	50	—

Interdata 5/16, 6/16, and 8/16

New Product Announcement: 8/16E

Interdata has introduced the 8/16E, and 8/16 processor enhanced with integral memory management (which allows memory expansion to 256K bytes) and four new instructions. Optional features for the new processor include a 16-bit extended selector channel and a memory protect controller.

The 8/16E can perform as fast as the 8/16, while supporting four times as much memory. This is possible through Interdata's addressing approach, which uses fixed mapping assignments at generation time so as to preclude consuming processor cycles during program execution, as is required in dynamic mapping schemes. This addressing approach enables the 8/16E to support memory addresses beyond 64K bytes.

Program mapping in the 8/16E's integral memory management hardware is performed by implementing additional bits in the Program Status Word. Logical program space is viewed as 64K-byte areas, regardless of physical location. Four new instructions (Load Program Status, Load Program Status Register, Set Map, and Set Map Register) control these additional bits. These instructions also minimize the associated overhead incurred by user programs. Mapping for DMA operations to extended addressing areas is handled by the optional 16-Bit Extended Selector Channel.

The 8/16E Memory Protect Controller (MPC) provides a means of allocating selected blocks of memory to be either write-protected, read/write-protected, or instruction execution-protected. Memory can be partitioned into a maximum of 64 blocks with individual protection for each block. Block sizes of 512 bytes, 1024 bytes, or 2048 bytes may be selected. The MPC also provides two loadable maps for data security and integrity: a write or read/write protect map and an execute protect map.

The Model 8/16E consists of a 19-inch-wide, 16-slot chassis that provides space for the processor board, one to four memory modules, and arithmetic and/or I/O device controllers. The 50-amp power supply is mounted externally. Standard with the 8/16E is power fail/auto restart, automatic bootstrap loader, binary display panel, and display panel interface. Each of the remaining slots can accommodate either one 15-inch board or two 7-inch boards.

A printed-circuit back panel provides all interboard connections. Individual logic boards are connected to the back panel with in-line connectors.

The 8/16E can be configured with standard Interdata peripherals, including magnetic tapes, disks, card and paper tape equipment, CRT displays, printers, analog and digital converters, data acquisition equipment, and communications hardware.

The newly enhanced software packages, the OS/16 MT2 operating system and Extended FORTRAN IV, are sold with the new 8/16E processor as an integrated system, although all three products can be purchased separately.

OS/16 MT2 is a real-time multi-tasking operating system which provides an event-driven environment for user applications. It can be completely memory-resident or disk-resident. The operating system manages all system resources, including processor access, which is provided on a strict user-defined priority basis. Up to 256 levels of task priority are available along with intertask control and communication facilities. A Command Substitution System (CSS) is embedded in the operating system. This feature allows users to create operational procedures on disk for later re-execution with a single command.

Extended FORTRAN IV with enhancements is considered by Interdata to be a superset of ANSI FORTRAN Standard X3.9-1966. It provides such industry-accepted extensions as mixed-mode arithmetic, ENCODE/DECODE, and INTEGER*2. The compiler typically requires 21K bytes of memory above the operating system and directly generates object code.

A typical 128K-byte 8/16E system with 10 megabytes of disk storage, an 1100 alphanumeric display terminal, OS/16 MT2, and FORTRAN IV costs $27,645.

A typical 96K-byte 8/16E with the above peripherals and software plus adapters for four bisync and two asynchronous communication lines, as well as the ITAM software, is priced at $34,140.

OS/16 MT2 with the 8/16E enhancements is priced at $1,700, while Extended FORTRAN IV costs $550.□