DEC Datasystem 320 and 350 Series

MANAGEMENT SUMMARY

DEC has been increasingly attentive to the Datasystem line over the past two years in an effort to improve its competitive position in the packaged small business computer market, and the Datasystem 320 and 350 series have received their share of this attention. The latest changes to these systems have been in the form of price reductions for the entire Datasystem 320 series and the addition of higher-performance disk units for all models in both the 320 and 350 series. Concurrently, DEC has incremented all four of the earlier model numbers by one to indicate their improved mass storage capabilities.

The Datasystem 350 series models, currently consisting of the 355 and 358, use the PDP-11/34A processor. The 320 series, currently consisting of models 323 and 325, is based on the LSI-11 microprocessor. Rather than maintaining strict hardware compatibility, DEC modified its COBOL-like DIBOL-11 programming language to provide source-code compatibility for the LSI processor.

The LSI-11 technology enables Digital to put an N-channel MOS processor, 4096-word random-access memory, vectored automatic priority interrupt logic, real-time clock input, power failure/auto-restart logic, and buffered parallel 16-bit I/O port on one 8.5-by-10-inch circuit board. The PDP-11/34A offers more power by allowing users to address up to 253,952 bytes of MOS memory, and, with the CTS-300 operating system, to support up to eight terminals. $\triangleright$

The Datasystem 320 and 350 systems support up to four or eight terminals in a time-sharing environment, bridging the gap between the single-user D308/310's and the larger D500 family in Digital's Datasystem product line. These packaged configurations are attractive to users who want to develop their own application programs using Digital's DIBOL-11 language, or to obtain software through sources other than DEC.

CHARACTERISTICS

MANUFACTURER: Digital Equipment Corporation, Commercial Products Group, Continental Boulevard, Merrimack, New Hampshire 03054. Telephone (603) 884-5111.

VENDORS: Manufacturer and OEM suppliers. Contact DEC's Commercial Products Group to find the OEM supplier in your locale.

MODELS: DEC Datasystems 323, 325, 355, and 358. The Datasystems 323 and 325 are LSI-11-based, while the Datasystems 355 and 358 are PDP-11/34A-based.

DATA FORMATS

BASIC UNIT: 16-bit word plus 2 parity bits. The processor can also handle 8-bit bytes, and is capable of bit manipulation.

FIXED-POINT OPERANDS: 16-bit words or 8-bit bytes are used as operands in both single- and double-operand instructions. Bit manipulation is provided through Boolean AND/OR instructions. ►
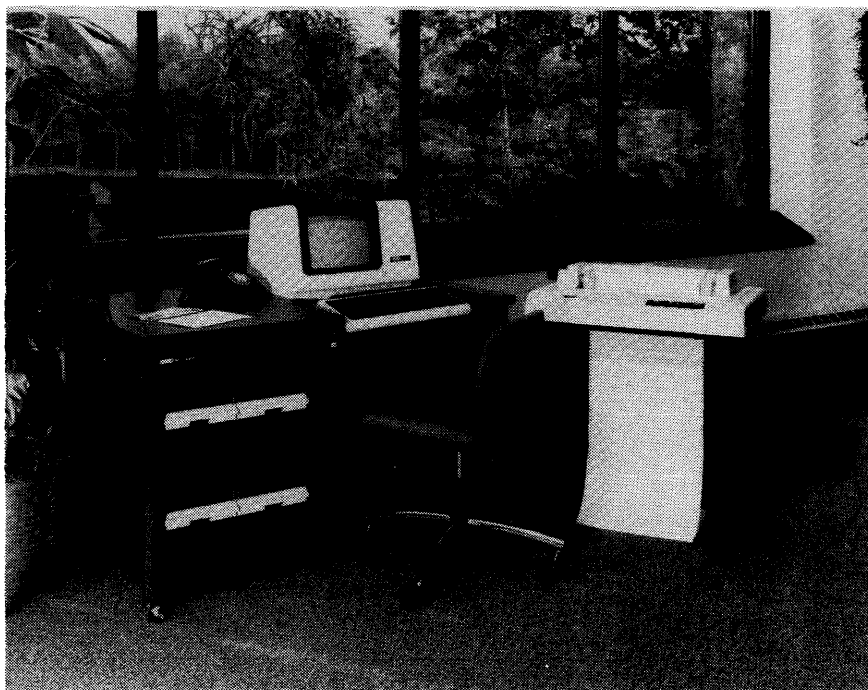
The DEC Datasystem 323 is a floppy-disk-oriented member of the Datasystem family. Shown here is an LSI-11 processor housed in a desk along with four floppy disk drives, a VT100 terminal, and an LA180 printer rated at 180 cps. Prices start as low as $17,250 for a configuration that includes 56K bytes of memory, two floppy disk drives, one VT100, and full software support. Printer speeds can range from 180 cps to 300 lpm. A 2780 communications package permits data communications with other Datasystems and larger host computers.

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CHARACTERISTICS OF THE DEC DATASYSTEM 320 AND 350 FAMILY

MODEL	323	325	355	358
Processor	LSI-11	LSI-11	PDP-11/34A	PDP-11/34A
Maximum number of terminals	4	4	8	8
Recommended number of terminals	1 to 3	1 to 3	2 to 6	2 to 6
Standard disk model	RX02 floppy	RL01	RL01	RK07
Standard disk capacity	512K bytes	10 million bytes	10 million bytes	56 million bytes
MOS memory capacity, bytes:				
Minimum	56K	56K	64K	64K
Maximum	56K	56K	256K	248K

NOTE: All models include one VT100 DECscope console, CTS-300 Operating System, DIBOL-11, and DECform software. Printers are optional and range from 180 cps to 300 lpm.

▷ Here's a quick look at the current Datasystem 300 family members (other than the single-user Datasystems 308 and 310, which are separately covered in Report M11-385-101):

● Model 323—supports up to 4 terminals, using the LSI-11 processor with 56K bytes of MOS memory. Up to 4 floppy disk drives or up to 8 disk cartridge drives can be added to provide a maximum of 20 million bytes of disk cartridge storage. One dual floppy disk drive is standard.

● Model 325—supports up to 4 terminals, using the LSI-11 processor with up to 56K bytes of MOS memory. Although 10 million bytes of disk storage are standard, the system can have up to 4 floppy disk drives and a maximum of 20 million bytes of disk cartridge storage.

● Model 355—supports up to 8 terminals, using the PDP-11/34A processor with a maximum of 256K bytes of MOS memory. Up to 4 disk drives can be configured for a total of 20 million bytes, although 10 million bytes are standard.

● Model 358—supports up to 8 terminals, using the PDP-11/34A processor with a maximum of 248K bytes of MOS memory. Up to 4 disk drives can be configured for a total of 224 million bytes, although 2 RK07 drives are standard for a total of 56 million bytes.

The older D354 and 357 models have been around since July 1975, and more than 1200 have been installed to date. Deliveries of the other two superseded models, the D322 and 324, started in mid-March of 1977, and there are 750 installed, according to DEC. The first deliveries of the new D325, 355, and 358 were scheduled for September 1978, with D323 deliveries beginning in November 1978.

Growth has been cited as the main advantage in the DEC Datasystem product line. These computers are directed toward "Fortune 1000" companies that can effectively utilize small, multi-user computer systems at multiple remote installations to implement distributed ▷

▶ FLOATING POINT OPERANDS: None provided.

INSTRUCTIONS: The programmer sees the system in terms of the DIBOL language syntax, which is a COBOL-like programming language. The internal arrangement of the system is the PDP-11/34 (Datasystems 355 and 358) or LSI-11 (Datasystems 323 and 325) instruction set and architecture.

INTERNAL CODE: ASCII.

MAIN STORAGE

TYPE: MOS (metal oxide semiconductor).

CYCLE TIME: 1200 nanoseconds per word on the Datasystems 323 and 325, and 725 nanoseconds per word on the Datasystems 355 and 358. The optional 2K cache memory, available on the D350 series, has a cycle time of 150 nanoseconds.

CAPACITY: Datasystems 323 and 325: available only with 56K bytes. Datasystems 355 and 358: minimum of 32K bytes, with a maximum of 248K bytes in 32K-byte increments.

CHECKING: Parity checking is standard on the Datasystems 355 and 358. None on the Datasystems 323 and 325.

STORAGE PROTECTION: None.

RESERVED STORAGE: Uppermost 8K bytes of memory reserved for I/O registers.

CENTRAL PROCESSORS

Please refer to Report M11-384-301, *DEC PDP-11 Family*, for details on the LSI-11 and PDP-11/34A processors.

INPUT/OUTPUT CONTROL

Please refer to Report M11-384-301 for a discussion of the LSI-11 and PDP-11/34A I/O architecture.

MASS STORAGE

RX02 FLOPPY DISK DRIVES: A Datasystem 323 floppy disk subsystem consists of a controller and two drives; one additional subsystem is permitted for a total of four disk drives, or a capacity of 1 million characters of on-line storage. Data is recorded in 77 tracks on one side of the diskette. Each track is formatted into 26 sectors of 128 bytes each. Head movement time is 10 milliseconds per track plus 20 milliseconds head settling time. Rotational speed is 360 rpm, giving an average rotational delay of 83 milliseconds. Average access time is 357 milliseconds. The data ▶

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PERIPHERALS/TERMINALS

DEVICE	DESCRIPTION & SPEED	MANUFACTURER
MAGNETIC TAPE	(D355 or D358 only)	
TS03	Industry-compatible; 12.5-ips, 9-track, 800 bpi; 10,000 cps transfer rate, 7-inch reel	DEC
TU16	Industry-compatible; 45-ips, 9-track, 800/1600 bpi; 72,000 cps transfer rate, 12-inch reel	DEC
PRINTERS		
LA180	132 positions, 96 characters, 7 × 7 matrix; 180 cps	DEC
LP11-WA	132 positions, 96 characters, drum; 240 lpm	Dataproducts
LP11-VA	132 positions, 64 characters, drum; 300 lpm	Dataproducts
CARD UNITS	(DS-357 or 354 only)	
CR11	Card reader, 80-column; 300 cpm	Documation
TERMINALS*		
VT100	DECscope; CRT/keyboard, 1848 characters (132 characters by 14 lines—24 lines optional), or 1920 characters (80 characters by 24 lines), alphanumeric keyboard, direct cursor addressing, 64 character set; 19,200 bps	DEC
LA36	DECwriter II; printer/keyboard, 132 positions, 96 characters, 7 × 7 dot matrix; 300 bps; asynchronous; 30 cps print speed, 50 cps positioning speed	DEC

*Terminals can be intermixed since each one transmits a self-identifying code so that the software can identify the features of each model.

▷ data processing, as well as toward "turnkey" operations that might be looking for packaged configurations.

DIBOL-11, DEC's own COBOL-like programming language, provides the compatibility throughout the Datasystem product line. A DIBOL-11 program running on a D323 could be run on a 325 without recompiling, and on a D355 or 358 with recompilation. DEC can now boast of DIBOL-11 compatibility from the D310 through the D570 through the use of DITRAN, which translates DIBOL-8 (used on the D308 and D310) to DIBOL-11.

CTS-300 is the operating system for all members of the Datasystem 300 family. This updated version of COS-350 is able to address 248K bytes of memory. CTS-300 supports up to 16 concurrent jobs and 8 terminals, printer spooling, 3 methods of file access, numerous utilities, a DIBOL-11 compiler, and DECFORM, a new utility for data entry, file maintenance, and inquiry.

"Big block send and receive" is available on all Datasystems in the 300 family. This novel feature allows information to be passed between programs, thus enabling the sharing of programming resources. Although six jobs might be running simultaneously, they can all share the same screen formatting program or disk accessing programs, thereby saving memory and programming efforts.

DEC does not offer any application programs for the DECsystems at the present time, but numerous systems houses offer turnkey systems that are based upon the DECsystem hardware and oriented toward specific applications.

Disk drives and processor types determine the differences among the Datasystem models. The standard D323 comes ▷

▶ transfer rate is 61,000 bytes per second. Track capacity is 3328 bytes, and the total capacity of one diskette is 256,256 bytes. The subsystem is manufactured by DEC.

RL01 CARTRIDGE DISK DRIVES: The standard D325 and D355 systems include a single cabinet with two RL01 disk drives for a total of 10 million bytes. From there, the user can add drives up to a maximum of eight. The RL01 5.2-megabyte cartridge disk drive is a top-loading drive employing a removable cartridge. Features provided in the RL01 include an embedded servo, allowing control information to be dispersed on each data track for data integrity. Disk rotational speed is 2400 rpm, and average rotational delay is 12.5 milliseconds. Average head positioning time is 55 milliseconds. Data transfer rate is 512K bytes per second.

RK07 CARTRIDGE DISK DRIVES: The basic D358 system includes a disk controller and two RK07 drives; up to six drives can be added for a total of eight. Data is recorded on a disk contained in an IBM 5440-style, top-loading cartridge. There are 200 tracks per inch, with 22 sectors/track and 512 bytes/sector. Each drive has a capacity of 28 million bytes, with expansion capabilities ranging to a maximum of 224 million bytes for an 8-drive subsystem. Average head positioning time is 38 milliseconds, with average rotational delay taking 12.5 milliseconds. The data transfer rate is 538,000 bytes per second. The RK07 subsystem is manufactured by DEC.

INPUT/OUTPUT UNITS

See PERIPHERALS/TERMINALS table.

DATA COMMUNICATIONS

Please refer to Report M11-384-301 for a discussion of the DL11 and DUP-11 interfaces and the DZ11 and DH11 multiplexers.

COMMUNICATIONS CONTROL

The CTS-300 2780 communications package is a hardware/software combination that permits telephone trans- ▶

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▷ with 2 RX02 floppy disk drives with a capacity of 512,512 bytes each. A maximum of four drives is allowed, for just over two million bytes of on-line storage.

Although not standard equipment, RL01 disk cartridge drives can be added to the D323. The RL01 is a removable-cartridge drive with a capacity of 5 million bytes per drive, offering a total of 20 million bytes with four drives.

The standard D325 has two RL01's for a total of 10 million bytes of storage.

Although the operating system will support up to four jobs on the D323 and D325, DEC recommends a limit of three terminals, or even two, in situations where unusually complex tasks are being performed. Furthermore, although the D355 and 358 can support up to eight terminals, DEC recommends a practical limit of six in certain situations.

All Datasystems include one VT100 DECscope terminal as an operator console and data entry device. The VT100 is an improved version of the VT52, offering a 132-character-line display.

An alternate terminal is the LA36 DECwriter, which provides hard-copy printing at 30 cps, using a 7-by-7 dot matrix printer. The LA36 features 96 upper and lower case letters, numbers, and symbols, and a paper adjustment that allows up to six-part forms.

Users can intermix terminal types, since each one transmits a self-identifying code that tells the software the individual characteristics of that terminal.

Four printers are offered as optional equipment: the 180-cps LA180 and the 240-lpm LP11-WA, both of which utilize the full 96-character set, and the 300-lpm LP11-VA and the 900-lpm LP11-CA, which use 64-character sets.

D355 and 358 users have a choice of two 9-track magnetic tape units. The TS03 drive uses a 7-inch reel and records 800 bits per inch at 12.5 inches per second. The TE16 drive uses a 12-inch reel and records 800 or 1600 bits per inch at 45 inches per second. D355 and 358 users can also add the CR11 80-column card reader, which is rated at 300 cards per minute.

USER REACTION

Datapro contacted eight Datasystem 320 and 350 users with a total of nine installed systems, including four D320 models and five D350 models. The average length of time these systems had been installed was 29 months, with a range from 17 to 39 months. Main memory capacity ranged from 32K bytes to 64K bytes and averaged 60K bytes. The minimum on-line disk storage capacity was 5 megabytes, and the maximum was 80 megabytes. Three users had two interactive terminals on-line, three had three terminals, and one had four. ▷

▶ mission of data to remote systems using a protocol similar to that of the IBM 2780. The remote systems can include all Datasystems, PDP-8's, PDP-11's, DECsystem-10's and 20's, or certain IBM 360's and 370's. Transmission rates can range up to 4800 bits per second, with conversion of file formats to EBCDIC for transmission. DICAM (Datasystem Interactive Communication Access Method) is available for interactive communications with IBM 360 or 370 host computers. The 2780 communications package is available for all DS-300 series computers.

SOFTWARE

OPERATING SYSTEM: *CTS-300 (Commercial Transaction System)* supports up to 16 jobs on a D350 and up to 4 jobs on a D320 series system. This disk-resident operating system is an enhanced version of COS-300, which was available on the DS-340. Included with CTS-300 is a DIBOL (Digital's version of COBOL) compiler, utilities that include sort/merge, and DECFORM. CTS-300 supports either interactive or batch processing, and offers sequential, indexed sequential, or random file access. According to DEC, CTS-300 supports multiple terminals running independent tasks on unique or shared files.

CTS-300 includes the following features: text editor, printer spooling, DIBOL debugging techniques, cross references, sorting and merging utilities, Peripheral Interchange Program (PIP) for file maintenance, SYSGEN, and PATCH for updating the operating system. CTS-300 requires 20K bytes of memory in a multi-user environment.

"Big block send and receive" is a noteworthy feature of CTS-300. A maximum of 252 bytes of information can be transferred between various programs. This feature allows various jobs to share specialized programs that might handle one specific function, such as screen I/O or disk I/O. By sharing resources, six jobs would use the same disk accessing program, etc., thereby eliminating repetitious programming and saving memory at the same time.

LANGUAGE: *DIBOL-11* is an enhanced version of the DIBOL language that was available for use on the Datasystem 340 and other DEC computers. DIBOL-11 provides software compatibility throughout the Datasystem family from the 323 through the 570. The Datasystem 308 and 310 can be included in this compatible family through the use of DITRAN, which translates DIBOL-8 into DIBIOL-11 and provides multi-user programming elements that allow several application programs to run simultaneously.

DIBOL-11 is a compatible extension of the language first used on the PDP-8. The language was designed to permit writing business-oriented programs, for a minicomputer. It is structured into data definition and procedures sections, similar to COBOL.

Records and numeric integer or alphanumeric fields are defined in the data definition section. Variable names of up to six characters are supported. Files are associated with record/file definition through OPEN statements in the procedures section. Printed output formatting is accomplished through an edit mask facility much like that of COBOL. In arithmetic operations, a precision of 18 digits is maintained. The language includes complete facilities for handling the display during program execution and for calling external subroutines.

DIBOL programs can be written interactively using the EDIT program. The source module is stored on disk and submitted to the DICOMP language translator when translation is desired. DIBOL programs are executed through a run-time interpreter. A dynamic snapshot facility, called DDT for DIBOL Debugging Technique, permits stopping a program with display of variable values; the values can be modified and a new checkpoint established. ▶

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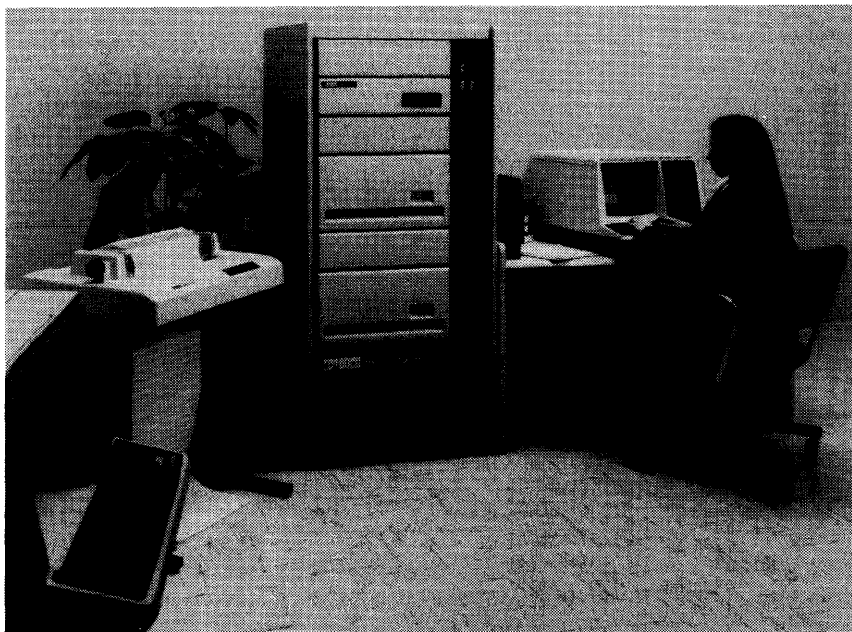
This Datasystem 325 configuration consists of an LSI-11 processor with 56K bytes of MOS memory, a cabinet holding dual RL01 removable disk drives with a total of 20 megabytes of on-line storage, two VT52 DECscope consoles, and an LA180 printer rated at 180 cps. The price is $32,670, including the CTS-300 operating system and DIBOL compiler.

▷ Here are the ratings assigned by these Datasystem 320 and 350 users in 11 specific categories:

	Excellent	Good	Fair	Poor	WA*
Ease of operation	4	4	0	0	3.5
Reliability of mainframe	6	2	0	0	3.8
Reliability of peripherals	5	3	0	0	3.6
Maintenance service:					
Responsiveness	4	2	1	1	3.1
Effectiveness	4	4	0	0	3.5
Technical support	2	4	1	1	2.9
Manufacturer's software:					
Operating system	3	4	1	0	3.3
Compilers and assemblers	4	3	1	0	3.4
Ease of programming	5	3	0	0	3.6
Ease of conversion	4	2	2	0	3.3
Overall satisfaction	3	5	0	0	3.4

*Weighted Average on a scale of 4.0 for Excellent.

The users seemed to agree on the principal strengths of the DEC Datasystems; "low cost" and "high throughput" were typical advantages they cited. The fact that over half of the respondents were involved in program development was consistent with the other advantages cited, namely, ease of programming and system development.

The ratings are largely self-explanatory. DEC has enjoyed a good reputation for reliable equipment throughout its product line, and is clearly maintaining that reputation in the Datasystems.

Fewer than half of the Datasystems now being manufactured are delivered directly to end users to do their own programming, although DEC feels that, in a few years, the majority of its Datasystems will be sold to end users. At present, more than half of the systems are sold on an OEM basis to firms that customize software and resell the DEC equipment with packaged programs. Thus, overall user satisfaction (or lack thereof) with a particular system will tend to reflect both the hardware and the application software, whatever its source.□

▶ The principal differences between DIBOL-8 and DIBOL-11 are cosmetic changes, to make DIBOL-11 look a little more like COBOL, and differences in the handling of file devices. DIBOL-11 makes use of a directory structure. DEC provides a translator that accounts for the cosmetic changes and flags the I/O syntax changes required.

DECFORM is a new generative programming aid that allows a customer to tailor screen formatting and editing procedures. According to DEC, DECFORM is capable of screen formatting, checking, prompting, and inquiring; is easy to use; and is compatible with both CTS-300 and CTS-500, thereby making DECFORM available on all Datasystems except the 308 and 310.

Five basic tasks can be performed: 1) Add—for basic data entry; 2) Inquiry—for examination without change; 3) Change—for file maintenance; 4) Verify—for re-keying pre-selected fields; and 5) Delete (not available for sequential files).

Screen formatting is simply a matter of building a table of field size, field name, horizontal position, and vertical position for each desired field on the screen. This table is passed over to the DECFORM compiler along with the name of the file to be accessed; the DECFORM compiler then generates a DIBOL-11 program. Formats may be divided into multiple screens to allow for more logical layouts and to eliminate crowding. Provisions are also made for passwords and other security procedures. Once the format is displayed, the operator may begin keying in data, and will receive prompting and error messages as they are needed.

The following edits are incorporated into DECFORM: display leading zeros; stop after every field is entered; retain previous screen when starting a new record; override checks through special characters; automatic duplication of fields; automatic incrementing of fields; establish initial values for fields; check digits; perform arithmetic functions (extensions, taxes, etc.); hide a field; and list running totals.

The following checks are available: alphanumeric, numeric, field required, field must be filled, constant insertion, range checks on numeric fields, table look-up, cross-field comparisons, field protection (unalterable), subfield checking to individual characters, and data retrieval from other files. ▶

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▶ According to DEC, it is possible to use the DECFORM procedures to extend, discount, and tax an invoice, while pulling alphabetic descriptions from a table.

DITRAN is a translator that converts DIBOL-8 into DIBOL-11. This enables Datasystem 308 and 310 users to convert to any other Datasystem with a minimum of effort. This actually entitles the Datasystem 308 and 310 to be included in the 300 and 500 family through DIBOL-11 compatibility. However, since DITRAN was developed through the Digital Equipment Computer Users Society (DECUS) rather than by DEC itself, the company offers no guarantees, and may not officially support DITRAN.

The memory requirements for DITRAN and DECFORM are dependent upon the configuration in use.

APPLICATION PROGRAMS: DEC does not furnish any application programs for the Datasystem 300 family at this time.

PRICING

POLICY: DEC generally provides the Datasystems on a purchase basis, with separately priced maintenance agreements. Leasing arrangements are available through DEC's joint venture with U.S. Leasing Corp. or through TEC Leasing Corp. of New York. Lease rates vary with the prime interest rate, the customer's volume of business with DEC, and the value of the equipment being leased.

Software maintenance is offered through several levels of optional service, ranging from a periodic software newsletter to automatic updates of software and manuals (software subscription service). In addition, software components, including documents and updates, can be purchased separately from Digital's Software Distribution Center.

The Digital Equipment Computer Users Society (DECUS) is a voluntary, non-profit users' group supported by DEC. DECUS provides an extensive program library, users' groups, special interest groups, and workshops/symposia. Technical symposia are sponsored twice a year in the United States and once a year in Europe, Canada, and Australia. In terms of documentation, the society has the responsibility of maintaining the DECUS program library and publishing a library catalog, the proceedings of symposia, and a periodic newsletter, *DECUSCOPE*.

Training credits are issued with the systems, allowing the customer to obtain free training in programming techniques and systems operation and applications. Each individual student week of instruction or fraction thereof requires one training credit. Training is offered in 17 DEC facilities found in Japan, Australia, Great Britain, Germany, France, The Netherlands, Sweden, Italy, Canada, and throughout the United States. At present, over 100 courses are offered. Digital also offers on-site instruction in both standard and customized courses and self-paced audio/visual (A/V) courses. A/V courses are presented through mixed media of audio/film-strip cartridges, video cassettes, and workbooks. DEC's Special Systems group offers training in both hardware and software areas on-site and in DEC training centers.

Field service is offered on several levels to meet varying customer needs. For customers with in-house troubleshooting and self-maintenance capabilities, DEC offers the off-site facilities of its Product Repair Center (PRC), with 17 locations throughout the world. Services provided by PRC include return-to-PRC agreements which cover all repairs (user performs troubleshooting) on a specific CPU, peripheral, or system for one year; exchange service providing teletypewriters, punches, and selected disk drive exchange at a flat rate; a fixed quote service, which provides a quote on equipment repair before any work is performed; and a loose piece module repair plan for modules and subassemblies. Under the repair plan, DEC estimates a typical turn-around repair time of 20 working days after receipt at the customer returns area (CRA). PRC also offers a module exchange service on a yearly contract basis, allowing a customer to replace a defective module within seven working days from the time it is received at the CRA. DEC supplies special mailers for both the loose piece module repair plan and the module exchange service. Also available for this class of customer is a customer spares program, which includes component and subassembly spares, engineer-designed spares kits, memory stack spares, maintenance test equipment, maintenance documentation service, and emergency parts service.

On-site field service is offered worldwide through a network of 300 offices, 190 of which are located in North America. These offices provide both field service and spare parts inventory. Over 4000 service representatives are assigned to these offices.

Per Call On Site Service is offered to customers for whom downtime may not be critical and who have sufficient expertise to perform first-line maintenance, or as a supplementary program for standard service agreement customers if remedial maintenance is required outside their normal hours of coverage. Labor rate charges are portal-to-portal; parts and travel expenses are rated separately. Labor rates from 8 a.m. to 5 p.m. Monday through Friday are $42 per hour; all other times, including Digital holidays, are priced at $48 per hour. A two-hour minimum is in effect for per call service. Travel charges are based on a portal-to-portal rate of 16 cents per mile plus any commercial travel expenses incurred. Normal response for per call service is one to two days. If unanswered in three working days, per call requests are placed in the same category as standard service agreement or warranty customers.

The basic field service agreement includes remedial maintenance; preventive maintenance; an assigned service representative; all parts, material, and labor; engineering modifications; and documentation. Hours of coverage are 8 a.m. to 5 p.m. Monday through Friday. (Preventive maintenance time is extended by 3 hours to 8 p.m. on weekdays.) Extensions are available to allow coverage up to 24 hours a day, 7 days a week.

The DECservice agreement is the same as the basic field service agreement except for these additions: response time of four hours or less if a call is made during coverage hours; continuous service until system level repairs are complete; and no extra charge for service continued after coverage hours.

EQUIPMENT: The prices for the following typical systems include all required controllers, adapters, cables, and software.

D323 including an LSI-11 processor, 56K bytes of MOS memory, 2 floppy disk drives, 1 VT100 console, and the CTS-300 operating system: $17,250.

D323 including an LSI-11 processor, 56K bytes of MOS memory, 2 floppy disk drives (512,000 characters), 1 VT100 console, 1 LA180 dot matrix printer, and the CTS-300 operating system: $18,850.

D325 including an LSI-11 processor, 56K bytes of MOS memory, 2 RK05 disks, 1 VT100 console, and the CTS-300 operating system: $27,000.

D325 including an LSI-11 processor, 32K bytes of MOS memory, 2 RL01 drives for 10 million bytes of disk storage, 1 VT100 console, 1 LA180 printer, and the CTS-300 operating system: $28,000. ▶

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▶ D355 including a PDP-11/34A processor, 64K bytes of MOS memory, 2 RKO5 disks, 1 VT52 console, and the CTS-300 operating system: $33,000.

D358 including a PDP-11/34A processor, 64K bytes of MOS memory, 2 RKO7 disk drives, 1 VT100 console, and the CTS-300 operating system: $52,000. ■

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.
BASIC SYSTEMS			
D323A	LSI-11 processor, 56K bytes of MOS memory, 2 RX02 floppy disk drives, VT100 console, CTS-300 operating system	$17,250	$148
D323B	Same as D323A except LA180 printer included	18,850	203
D325A	LSI-11 processor, 56K bytes of MOS memory, 2 RL01 disks (10 megabytes total), VT100 console, CTS-300 operating system	27,000	189
D325B	Same as D325A except LA180 printer included	28,000	239
D355A	PDP-11/34A processor, 64K bytes of MOS memory, 2 RC01 disks (10 megabytes total), VT100 console, CTS-300 operating system	33,000	224
D355H	Same as D355A except LP11-V included		
D358A	PDP-11/34A processor, 64K bytes of MOS memory, 2 RK07 disks (56 megabytes total), VT100 console, CTS-300 operating system	52,000	376
PROCESSOR OPTIONS AND MEMORY FOR LSI-11/03 (D320's)			
KEV11	Extended Arithmetic Option, including fixed and floating point instructions	190	NC
MSV11-B	8K bytes of MOS memory	625	13
MSV11-C	32K bytes of MOS memory	1,375	19
PROCESSOR OPTIONS AND MEMORY FOR PDP-11/34A (D350's)			
FP11	Floating point processor with double precision (64-bit)	2,900	21
KK11	2K bytes of RAM cache memory	3,900	17
MS11	32K bytes of MOS memory	2,200	25
MASS STORAGE			
RX02	Floppy disk drive; 512,512 bytes of storage; 62K bytes/second transfer rate; 357 msec. average access time	3,350	25
RL01	5.2-megabyte removable disk cartridge drive; 512K bytes/second transfer rate; 67.5 msec. average access time	3,800	50
RK07	Single-access 28-megabyte disk cartridge drive; 538K bytes/second transfer rate; 49 msec. average access time	10,500	115
MAGNETIC TAPE EQUIPMENT (D355 or D358 only)			
TS03	Industry-compatible tape drive; 12.5 inches/second; 9-track; 800 bpi; 10,000 cps transfer rate; 7-inch reel	3,850	50
TE16	Industry-compatible tape drive; 45 inches/second; 9-track; 800/1600 bpi; 72,000 cps transfer rate; 12-inch reel	11,290	60
CARD UNITS (D355 or D358 only)			
CR11	Card reader, 80 column; 300 cpm	6,170	53
PRINTERS			
LA180	132 positions; 96 char.; 7 x 7 matrix; 180 cps	3,770	55
LP11-WA	132 positions; 96 char.; drum; 240 lpm	14,050	114
LP11-VA	132 positions; 64 char.; drum; 300 lpm	11,800	114
LP11-CA	132 positions; 64 char.; drum; 900 lpm	24,000	185
TERMINALS			
VT100	DECscope, CRT/keyboard; 1848 or 1920 characters; alphanumeric keyboard; direct cursor addressing; 64-char. set; 19,200 bps	1,900	17
LA36	DECwriter II; printer/keyboard; 132 positions; 96-char. set; 7 x 7 dot matrix; 300 bps	2,200	19
COMMUNICATIONS			
Software/hardware packages for D320 series:			
DS3CF	2780 RJE Data Communications Package	3,250	NC
DS3CD	Datasystem Interactive Communications Access Method (DICAM)	5,250	NC
Software/hardware packages for D350 series:			
DS3CC	Same as DS3CF except for D355 or D358	4,840	NC
DS3CE	Same as DS3CD except for D355 or D358	5,875	NC

DEC Datasystem 320 and 350 Series

EQUIPMENT PRICES

COMMUNICATIONS (Continued)

		Purchase Price	Monthly Maint.
Single-Line Asynchronous Interfaces:			
DLV11	Modem-Controlling EIA/CCITT Serial Line Unit; with programmable speed, character size, parity, and stop bit; for D320 series	300	5
DL11-E	Modem-Controlling EIA/CCITT Interface; includes 25 feet of cable, customer specifications; for D320 series	770	6
DL11-WC	Serial Line Interface and Real-Time Clock; EIA/CCITT interface; for D350 series	770	5
Single-Line Synchronous Interface:			
DUP11	Full/Half Duplex Synchronous Interface; programmable characteristics; speed to 9600 bps	1,380	9
Asynchronous Multiplexers for D350 Series:			
DZ11-A	EIA/CCITT Asynchronous 8-Line Multiplexer; speeds and formats are programmable on a per-line basis; expandable to 16 lines	2,310	25
DZ11-B	EIA/CCITT 8-Line Multiplexer Expansion Unit for DZ11-A	1,710	21
DZ11-E	EIA/CCITT Asynchronous 16-Line Multiplexer; speeds and formats are programmable on a per-line basis	3,740	46
DZV11-8	EIA/CCITT Asynchronous 4-Line Multiplexer; speeds and formats are programmable on a per-line basis	850	9
DH11-AD	Programmable Asynchronous 16-Line Multiplexer; EIA/CCITT interface and modem controls; cables not included	6,600	56
DH11-AE	Same as DH11-AD without modem controls	5,720	46
Communications Option:			
KG11	Parity check option; computes cyclic redundancy check (CRC), longitudinal redundancy check (LRC), and block check characters (BCC)	1,150	6