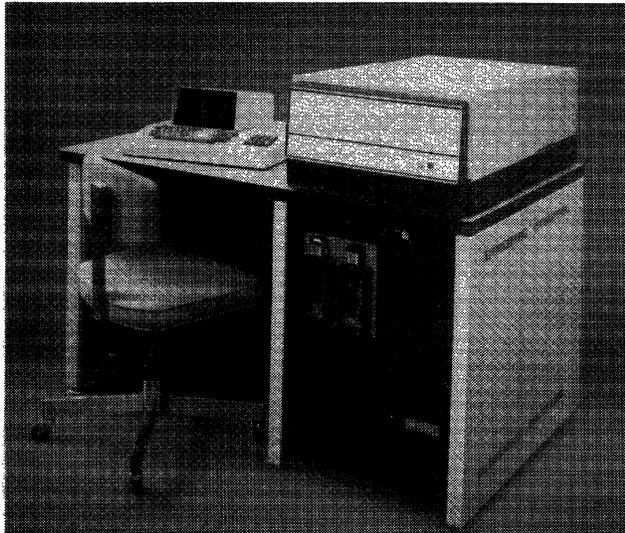# Singer 1500 Intelligent Terminals

At the top of the Series 1500 product line is the Model 1503 Disc Processor. It is designed to provide multiple 1501 or 1502 Workstations with shared access to data files as large as 20 million characters.

The 1500 system is a versatile, desk-top, operator-prompting workstation used for data entry and intelligent terminal functions.

The 8K-byte 1501 model can be extended to a 16K-byte model 1502 or changed to a 1501-40 model that incorporates programmability. The system was recently expanded to include the model 1503, offering disk-based processing and a more powerful processor.

A typical intelligent terminal configuration with synchronous communications and a line printer costs $1,141 on a one-year lease.

MANAGEMENT SUMMARY

The Singer 1500 Intelligent Terminal System is one of the few remaining computer-related product lines still being actively supported by the company since its recent exit from the computer business. While the system is manufactured by Cogar Corporation, a subsidiary of Singer, all marketing responsibility remains with the parent company at this writing.

The Singer 1500 system emphasizes data entry and data processing in a source data environment and is distinguished by certain unique design features. This uniqueness is derived largely from the 1501 Workstation's dual tape transport system, which employs snap-in cartridges instead of cassettes or reels. As the name of the product implies, Singer is also promoting the Workstation and its peripheral devices as key elements in data entry/communications complexes. The Model 1501 Workstation is thus a compact, desk-top, general-purpose data entry device or intelligent terminal, and in either case it can be part of a sophisticated communications system. Since its initial introduction in 1971, the basic system has been expanded to include a more powerful processor and disc memory capability.

The Model 1501 Intelligent Terminal is the heart of the Series 1500 system. Its processor and I/O interfaces form the bases for all of the other terminals in the product line. The attractive console contains a 5-inch CRT display and either a keypunch-style or typewriter-style keyboard. At the top of the console, easy access is provided to the snap-in cartridges of the internal dual tape transports. Other vital parts include a serial I/O interface, a ▷

CHARACTERISTICS

VENDOR: Singer Business Machines, 2350 Washington Avenue, San Leandro, California 94577. Telephone (415) 357-6800.

MANUFACTURER: Cogar Corporation, Cosby Manor Road, Utica, N.Y. 13502. Telephone (315) 797-5750.

DATE OF ANNOUNCEMENT: Information not available.

DATE OF FIRST DELIVERY: 1971.

NUMBER DELIVERED TO DATE: Over 6000.

SERVICED BY: Singer Business Machines.

CONFIGURATION

The hub of the 1500 system is the Singer Model 1501 Video Display Workstation, which can be connected to as many as 64 individual peripheral devices via an internal serial I/O interface. Examples of such devices are the Model 1511, 1512, 1513, and 1514 Tape Drives, the Model 1525 Serial Printer, and the Model 155X series Line Printers.

Singer 1533 Dual Tape Cartridge Drives and the Model 1530 Numeric Keypad interface directly with the internal miniprocessor, as does the Model 1535 Synchronous Communications Adapter or the Model 1534 Asynchronous Communications Adapter, both of which are installed inside the Workstation housing. An appropriate modem, such as the Bell 201A, interfaces a voice-grade communications line to the adapter.

MODEL 1501 WORKSTATION: As the center of system activity, this unit serves both as a data entry device and as an intelligent terminal. It is a single desk-top console that incorporates two cartridge tape drives (exactly like the Model 1533, but internally mounted), a keyboard, a CRT display, a solid-state 8K-byte memory, a miniprocessor, and a serial I/O interface. Data transfer on the coaxial cable connected to the I/O interface is bidirectional; hence, one line can service all attached peripheral devices. The transfer rate is 24,000 bytes/second in bit-serial form. When a system configuration includes multiple 1501 can communicate with any other station and any other I/O device under program control. ▶

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▷ miniprocessor and 8K-byte semiconductor memory, and an optional communications interface, asynchronous or binary synchronous (BSC).

A recently introduced model of the 1501, designated the 1501-40, employs an integral 2.5-million-character hard disc for program storage and instant random access to data files. One tape cartridge drive is provided for removable data media. The Model 1501-40 is designed to compete with floppy disc systems by providing reliable hard disc storage at low cost. The unique design of the Model 1501-40 allows for virtually unlimited program overlays for complex validation requirements.

Another extension of the Model 1501 is the Model 1502. This terminal provides a powerful 16K-byte processor and a 1920-character visual display. The large CRT provides document reproduction on the screen for users whose applications require this feature. In addition to the ability to display large amounts of data, an editing capability is enhanced by dual intensity, flashing field, and underline functions. Upper and lower case graphics are standard.

At the top of the Series 1500 product line is the Model 1503 Disc Processor. Designed to provide multiple 1501's (or 1502's) with shared access to data files as large as 20 million characters, the Model 1503 supplies all of the required data structuring and manipulating capabilities. The basic system consists of up to eight discs cabled to an independent processor which performs two functions: the data base management of multiple files and an interface to the central processor. The Model 1503 is software-compatible with all the other Series 1500 Intelligent Terminals and provides full file processing at the remote site.

As an intelligent terminal, the 1501 Workstation can be useful in many kinds of business applications. The tape cartridge system makes it easy to change the programming from one application to another. One merely snaps in another cartridge containing the new application program, and the tape transport loads it into the processor. In either data entry or intelligent terminal service, the addition of a synchronous or asynchronous communications adapter turns the Workstation into a communications center, day or night.

Let us see what makes Singer tape cartridge transport unusual. The mechanism employs reel-to-reel design principles, although a cartridge rather than an open reel is employed. The advantage of a simple replacement of cartridges is thereby gained without sacrificing the reliability of reel-to-reel operation. Tape is automatically threaded and rewound. A friction capstan is used to drive the tape, and the tape speed itself is under servo control.

Data records on the 0.15-inch-wide cartridge tape must be converted to computer-compatible format for entry into a computer. However, data on the cartridge tape can be transmitted over communications lines, as can data on standard tape. The 100 feet of tape in a standard cartridge ▷

▶ MODEL 1501-40 INTELLIGENT TERMINAL: The unit is a programmable intelligent terminal designed for high-performance data entry, data validation, and communications functions. It is a desk-like device that includes a keyboard, CRT, tape cartridge drive, solid-state 16K-byte memory, miniprocessor, and 2.5-million-byte hard disc. Also included is a serial I/O interface with the same characteristics as that of the 1501.

MODEL 1502 INTELLIGENT TERMINAL: This terminal is an extension of the Model 1501. It includes, in a desk-like enclosure, a keyboard, a 1920-character visual display, two tape cartridge drives, a solid-state memory of 16K bytes, and a miniprocessor. The 1920 VDU is a self-contained unit that functions as a fully buffered I/O device. The editing functions are controlled by a 4K read-only memory built into the display unit itself; no user space in the 1502's 16K processor memory is used to control the functions of the display. Also included is a serial I/O interface with the same characteristics as that of the 1501.

MODEL 1503 DISC PROCESSOR: This unit is designed to provide full file processing at a remote site. It includes a keyboard, 5-inch diagonal CRT, two tape cartridge drives, solid-state memory of 16K bytes, disc controller, up to eight disc drives, and a miniprocessor. Multiple 1501's or 1502's can access a 1503's disc storage by being cable-connected through the serial I/O channel. All required data base management functions are performed by the 1503. Software packages (provided by Singer) permit communication of disc files to a central processing unit or within a self-contained Singer Series 1500 network.

TRANSMISSION SPECIFICATIONS

One medium of communication among two or more 1501 Workstations is the coaxial line of the serial I/O channel. For transmission over substantial distances, however, one of two data communications adapters must be installed.

The Model 1535 Synchronous Communications Adapter, when coupled to an appropriate modem such as the Singer 2024, the Bell 201A or 201B, or equivalent, permits communication over switched or leased networks with any computer employing IBM binary synchronous communications (BSC) protocol, including the Singer System Ten computer and the Singer 4300 Magnetic Data Recording System. The interface conforms with EIA RS-232C and CCITT V.24 standards. The Model 1535 SCA is available with or without unattended answer capability. Transmission speeds up to 9600 bits/second are possible on half-duplex two- or four-wire lines. The 1535 can also be interfaced to asynchronous modems, such as the Bell 202C or equivalent, and operate at a rate of 600, 900, 1200, or 1800 bits/second. Normally, the program sets the transmission rate, which is then controlled by the internal system clock.

Alternatively, the Model 1534 Asynchronous Communications Adapter provides a start-stop transmission capability. It interfaces with the previously mentioned asynchronous modems.

DEVICE CONTROL

All operations are software-controlled by application programs that reside on cartridge tape. These programs direct the execution of specific operations and produce a sequence of displayed options on the CRT screen that guide the operator in selecting a proper operating mode and in specifying certain job functions within the selected mode. ▶

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▷ can hold 900 records of 136 bytes each. A 200-foot cartridge is also available for applications that require data files on the cartridge.

The disadvantage of the cartridge arrangement stems from the same factor that gives it its strength; i.e., it is unique. The number of suppliers handling the cartridges is limited.

An integral facility of the 1501 Workstation is a serial I/O interface, to which up to 64 I/O devices can be connected. These include several models of printers with speeds ranging from 30 cps to 650 lpm, as well as a number of magnetic tape units that can be used to transcribe data from the cartridges to computer-compatible tape. Also available are paper tape and punched card readers. Data transfer over the I/O cable is bidirectional, so that one line suffices for all activity. Phase-encoded techniques and address polling make operation economical and flexible without degrading reliability and throughput. The data transfer rate is 24,000 bytes/second.

Other I/O devices, such as the keyboard, the 1530 Numeric Keypad, and add-on 1533 Dual Cartridge Transports, interface directly with the internal processor. The CRT display has direct access to the memory. As mentioned previously, the optional communications interfaces can be mounted internally. Data can then be directed to a transmission line through an appropriate modem. All major system functions are under the direct control of the controlling processor program. These provisions enable the user to add compatible peripherals and interfaces at will without interruption to Workstation activity. Furthermore, system functions can be changed or modified by simply loading a new tape program from the software library, or by selecting options within a single program.

The procedure for preparing a Workstation for use has implications that should be understood. Fully developed and tested programs are stored on cartridge tape. An appropriate cartridge is inserted into the tape transport mechanism, and when the tape is run, the program is entered into memory. Now the Workstation is capable of performing specific functions. It can generate and print an accounting form such as an inventory control sheet, a tax form, a purchase requisition, or a bill of lading, to name a few examples. Arithmetic operations such as add, subtract, and multiply can be carried out.

Alternatively, the programs read from the tape can prepare the system for data entry. The record formats intended for a specific job are written at the beginning of every tape. Instructions to link the formats automatically in either direction are included. Instructions for skipping, right and left justification, and duplicating are a basic part of the record format. Constants and constant fields can be stored in memory. Several categories of omission detection can be implemented. Range tables can be stored, and table look-up operations can be performed. Instructions for comparisons can be included, as well as instructions for field balancing and batch balancing. The ▷

▶ The 1500 system operator begins by inserting the cartridge that contains the desired application program in the cartridge recorder. After automatic threading of the take-up reel is completed, an index or "menu" of operations accompanied by corresponding index symbols is read from the tape and displayed on the CRT screen. The operator selects one of these operations by keying its index symbol. The system then executes a search of the application tape for the designated program. When located, the program is read from the tape and stored in memory. Then the application tape is rewound for removal. Operation as prescribed by the stored program now ensues.

Operating modes of the 1500 system consist of Program Entry, two classes of Data Entry, Data Verify, Search, Copy, Communications, Edit, and Print.

The three data entry software packages currently available for the Singer 1500 are called Advanced Data Entry (or ADE), Complex Data Entry (or CDE), and Disc Data Entry (or DDE). All three packages organize keyed data into appropriate fields (alphabetic or numeric, as defined), and also implement the usual operational functions such as automatic skipping and duplicating and right and left field justification (left zero fill and blank insertion). Accuracy testing procedures, such as check digit verification, and certain field accumulations and balancing operations are also carried out. Other details are presented under the SOFTWARE heading.

Record formats can be keyed into memory or prepared formats can be entered from tape in the Program Entry mode. (Note that a record format is the data entry equivalent of an application program.)

Either sight or key verification can be utilized. In the latter case (Data Verify mode), a complete record is read into memory from a previously recorded entry tape and compared character for character with data rekeyed by the operator. Verified records are then written on a second tape. Corrections must be reverified within a field before verification can continue. An important feature of this tape-to-tape technique is the ability to insert or delete records during the verification process. This enables record updating to be accomplished.

The High-Speed Search mode allows the operator to locate a record with the same identifier as that keyed in; any portion of the record can be used as an identifier.

The Copy mode permits duplication of entire tape files or selected records from special files. The operator can select either of the two cartridge tape drives at a given moment, and can select among the externally connected computer-compatible tape drives if there is more than one.

In the Edit mode, data records on cartridge tapes can be transcribed to a computer-compatible format on standard tape. The Edit program can alternately switch between two cartridge drives to provide continuous transcription through overlapped rewind and read operations. In addition, the Edit program provides for code translation, reformatting, and insertion and deletion of data.

Conventional read-after-write checking is performed as tape records are written, and cyclic redundancy checking is performed as tape records are read. Data written on tape is compared bit for bit with the data retained in memory. The 1500 system automatically rereads a record up to eight consecutive times subsequent to a detected error, after which operator intervention is required. The tape system ▶

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▷ user can devise his own check digits. And he can change any program at will simply by introducing a new cartridge that holds the desired program.

All programs include instructions for the display of advisories to the station operator. The required procedure is described in simple statements, and the operator is told what data to enter.

Is the 1500 Intelligent Terminal System a sensible replacement for the old keypunch? There are two situations for which a frank answer of "No" must be given. When the objective is nothing more than electronic keying in place of mechanical operations, with little need for records over 80 characters in length and little concern for advanced editing and balancing operations, the 1500 system is simply too expensive compared with a keypunch. On the other hand, if huge volumes of data must be processed, requiring many entry stations at a single location, the 1500 system is equally unsuited. But in the vast middle ground between these extremes, especially in a source data environment where a modest cluster of 1501 Workstations would be ample for the data requirements, and particularly when the site requires data processing independent of that provided by the central computer facility, the 1500 system appears admirably well suited. It is compact, fairly inexpensive, and equipped with processing flexibility that can be readily adapted to new applications needs.

The history of the Singer 1500 Intelligent Terminal System is interesting. The basic concepts, including the unique magnetic tape cartridge, were developed by Cogar Corporation and introduced in that company's System/4 product in January 1971. Datapro viewed the product favorably at that time, and regretted having to report the demise of the system as an end-user product a few months later. Singer had and still maintains a sizeable financial interest in Cogar. Singer Business Machines took the basic concepts and added its own ideas to come up with the 1500 system, which is uniquely Singer's. Singer now holds exclusive worldwide marketing rights to the Cogar System/4 concepts. Cogar manufactures the Singer 1500 systems in Schuyler, New York, to Singer's specifications.

USER REACTION

In May 1976, Datapro talked in detail with five users of the Singer 1500 system. A total of 251 units were represented. Most of these were basic 1501's, but there were several expanded 1501's and a few 1503's included in the sample.

Three of the users were using the 1500 as an intelligent terminal for validating data prior to entry into a host computer system via a communications link. Another user had several 1501's that were doing free-standing accounting processing. The fifth user collected data from several remote 1500's for processing on local 1500's. ▷

▶ also features automatic compensation to offset apparent speed changes that arise from physical changes in the tape itself.

The 1500 system has a variety of interlocks to guard against operator error. These interlocks provide file detection sensing, ensure that that cartridges are in place, prevent conflicting action when the cartridges are in use, and provide end-of-tape detection. Tape rewinding can be accomplished with or without interlock protection.

Keying errors detected by the operator can be corrected by backspacing and rekeying.

SOFTWARE

The *Advanced Data Entry* package contains various selectable programs that add, to the standard functions described under Device Control, the following features: interfield products and accumulations (up to eight batch totals); up to eight job formats available to the operator on the program tape and, within each format, eight levels that can be linked automatically; logical and string formatting; range checking; equality and inequality comparisons; a record counter and column counter; date validation; check digit verification; and a print format generator. One job format is called from the program tape and stored in memory at a time.

The *Complex Data Entry* package includes all features of the Advanced Data Entry package plus the following: high-level interfield dependency checks; an unlimited number of interpreters for special data checks without reprogramming; and up to 12 job formats available to the operator on the program tape, with 15 levels that can be linked automatically within each job format. The operator is notified in the event of entry error, and all necessary error-recovery capabilities are included. Entry of formatted or unformatted data is permitted at 120 characters per tape block.

The *Disc Data Entry* package is an extension of the Complex Data Entry package. In addition to providing the features available with CDE, Disc Data Entry provides the advantages inherent in a disc-based system. Large amounts of interrelated data can be stored on disc and accessed during the data entry job. Disc Data Entry programs themselves are also stored on the disc, thus making the operation of the system easier and faster than a tape-loaded system. The DDE system provides great flexibility for processing and manipulating data right at the entry point.

The *Sort/Merge* package allows the operator to sort or merge data records contained in tape cartridges and write the data onto other tape cartridges or computer-compatible tape. Supervisory instructions are displayed on the CRT.

The *Copy File Utility* package implements changes to either data files or program files, whether on cartridge tape or computer tape. It is this package that makes possible the procedures of the Copy and Edit modes. Thus, the user can copy complete files of data records or programs, or copy only indicated portions. Furthermore, he can copy up to a specified record, or he can skip records and start with a particular one. He can display designated records. A particularly useful utility is a tape advance function that allows the operator to add records at the end of an existing file. New parameters can be introduced whenever an input tape has been completed, but throughout a job the input and output devices originally selected remain the same. Finally, there is a program interrupt that enables the user to override any selected functions.

The *High-Speed Search and Update Generator* package allows the user to construct a specialized program tape ▶

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▷ The users were engaged in a wide variety of industries and application types. One government-related application involved submission of data from several regional offices to a central computing facility; extensive interfield data manipulation was required to validate the data records prior to transmission. A telephone company was using the 1500 to edit trouble tickets prior to transmission to the central facility. A third user employed the units as remote batch terminals transmitting large volumes of data to a central site and receiving extensive print listings back; *average* volumes quoted were 33,000 card images per day and 120,000 print lines per day for a group of about 20 terminals. A major agricultural products firm was using its 1500's to collect data from branches; local processing included billing and inventory control. A bank was using several 1500's as individual data processing systems to do general ledger accounting, transit route accounting, and reject/re-entry processing for handling nonreadable MICR items.

We also talked to a sixth user, a university department that had just purchased a 1500 but had not yet installed it. This department had grown tired of waiting weeks for the return of printed reports on jobs submitted to the central processing facility. It now plans to submit verified data to the central facility on ½-inch magnetic tape, obtain the results on tape, and print its own reports. The expectation is that turnaround time will be reduced to a day or so.

Ratings were assigned to various aspects of the 1500 system by five of the users. All had been using the systems for more than one year. The ratings reflected a general endorsement of the intelligent terminal concept as well as satisfaction with the Singer equipment. The specific ratings were as follows:

	Excellent	Good	Fair	Poor	WA*
Overall performance	4	1	0	0	3.8
Ease of programming	0	3	0	0	3.0
Ease of operation	5	0	0	0	4.0
Hardware reliability	2	3	0	0	3.4
Maintenance service:					
Promptness	0	4	0	1	2.6
Quality	1	2	2	0	2.8
Technical support	1	2	1	0	3.0
Software	2	3	0	0	3.4

*Weighted Average on a scale of 4.0 for Excellent.

The users were enthusiastic about the concept of intelligent terminals, citing the advantages of finding and correcting errors at the source. Two of the users indicated that control of input errors was critical to the efficiency of their operations. One felt that the CRT terminal was inherently superior to a keypunch for promoting accurate keying. The second, who had had experience with shared-processor key/disk systems, felt that the 1500 was able to accomplish much more than a key/disk system in data validation operations. Other advantages mentioned were simplicity of operation, the capability of the 1500 for handling long records, and the availability of large-diameter (10.5-inch) tape reel units. ▷

capable of both random retrieval and display of cartridge tape records from either of the two drives in the workstation. This package can also be used for file inquiry and selected record updating. Supervisory messages are displayed.

Communications packages allow replacement of teletypewriter and Telex networks at improved efficiency. A number of synchronous packages are also available for 1500-to-1500 communications (SQUIC), as are several industry-compatible emulators. Transmission speeds up to 9600 bits/second are supported.

Software routines are also available to accumulate operator and production statistics, such as operator (station) code, number of records keyed, elapsed time, number of keystrokes, number of error conditions, and number of records verified.

COMPONENTS

CONTROL PROCESSOR: This unit has 45 instruction types plus a serial I/O channel, a 3 to 6 microsecond instruction cycle time, 1 accumulator, 7 index registers for each 2K bytes of memory, a 16-member instruction address stack, a stack pointer, and a hardware bootstrap loader. Supporting the miniprocessor is a solid-state memory of 8K or 16K bytes. External tape transports and the keyboard interface with the processor via separate channels rather than the I/O interface.

KEYBOARD: The keyboard comprises 53 keys, which can be arranged in either a keypunch or typewriter pattern. Other arrangements are available upon request. An audible keying cue is provided.

CRT DISPLAY: Up to 256 characters can be displayed in 8 lines of 32 characters each on a 5-inch CRT screen. Characters are formed from a 5-by-8 dot matrix. The screen is refreshed directly from the MOS memory. For the information it displays, the screen has direct access to memory areas as well, and these are program-selectable from any one of 16 memory pages (256 bytes per page). Selective interlacing of half-pages is possible. Other provisions include a nondestructive cursor (underscore), selective blanking, and the ability to vary the display characters in accordance with special user needs, such as German umlauts, Arabic symbols, etc.

The larger 1920-character CRT (standard on the 1502, optional on the 1503) includes many of the above features as well as flashing field, underline, and dual intensity functions.

CARTRIDGE TAPE DRIVES: Each Workstation contains two mechanically independent tape transports that employ polyester magnetic tapes one mil in thickness and 150 mils wide. These transports utilize a special heart-shaped cartridge. The cartridges, which hold either 100 or 200 feet of tape, are snapped into place, and the tape is then automatically threaded and loaded on the take-up reel. The manufacturer claims exceptional reliability for this unique design.

Tape formatting, read forward/backward, and read/write checking are all under processor control. Record size, interrecord gaps, check data, and number of retrys are software parameters. Under the standard software, each cartridge has a nominal capacity of 1000 records of 128 bytes each.

Data is serially recorded by bit at 1600 bpi by means of phase encoding. The record length can be specified as either 128 or 80 bytes. Read/write tape speed is 10 inches/second. A high-speed mode, utilized during rewind and for ▶

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▷ The users showed little trepidation about Singer's exit from the computer and retail automation (POS) fields. Several had just expanded their equipment base, and several were contemplating expanding their scope of applications. In general, the users had good things to say about Singer's history of product improvement.

On the negative side, maintenance was labeled as spotty. It should be noted that four of the five users rating maintenance were operating equipment in several locations and had had experience with several different maintenance centers. The difficulties with maintenance in some areas did not keep these users from giving high overall ratings to the system.

The experience of these Singer 1500 users clearly justifies the early sales promotion of the "Cogar System/4" back in 1971. From the indications we received in talking with users, Singer is apparently continuing its support and development efforts on this attractive product line.□

▶ bidirectional searching, moves the tape at 40 inches/second. Records are counted during high-speed searching.

Hardware logic is provided to allow reading backward without the need of software intervention to invert and shift the data. An 8-bit buffer holds a character on cue for 512 microseconds; during this time, data can be processed before the character is released.

MODEL 1533 DUAL TAPE CARTRIDGE TRANSPORT: These units are duplicates of the dual-transport drives that are self-contained in each Workstation. Up to three additional dual-drive units can be connected in series with the 1501 Workstation to expand the total tape facility of the Workstation to a maximum of eight drives. The external drives serve as an auxiliary storage medium for the 1500 system. They can also be used with standard 1500 software for cartridge file sort/merges.

COMPUTER-COMPATIBLE MAGNETIC TAPE UNITS: Aside from data communications, information exchange between the Model 1501 Workstation and other data processing systems is effected by means of the Model 1511/1512 and 1513/1514 tape drives. The main purpose

of these drives is to permit data recorded on cartridge tape to be transcribed to standard half-inch, computer-compatible magnetic tape for direct computer entry or other purposes. The first pair of drives employs 7-inch reels, and the other pair employs standard 10½-inch reels. The 1511 produces output tape recorded at 556 or 800 bpi on 7-track tape, while the 1512 records at 800 bpi on 9-track tape. The 1513 records at 800 bpi and the 1514 records at 1600 bpi, both on 9-track tape.

MODEL 1525 IMPACT PRINTER: This low-cost serial printer operates asynchronously at speeds up to 30 characters/second. Line length is 132 characters. Spacing is 10 characters/inch horizontally and 6 lines/inch vertically. A 64-character ASCII set is employed.

MODEL 1553-57 LINE PRINTERS: Prints on continuous paper forms at speeds up to 650 lpm, 132 characters/line. Horizontal character spacing is 10 characters/inch, and vertical line spacing is 6 lines/inch. Coding is ASCII.

PRICING

The Singer 1500 Intelligent Terminal System can be obtained by lease or purchase. Lease contracts are available for one, three, and five years. Maintenance costs are included in the lease prices that appear below; purchased units are serviced under a separate maintenance arrangement. Standard maintenance, including preventive maintenance procedures, is performed during the prime-shift hours of 8 a.m. to 5 p.m. on weekdays.

Singer offers the following quantity discounts on the net equipment lease rates (exclusive of maintenance charges) for Models 1501, 1502, 1503, 1511, 1512, 1513, 1514, and 1525:

No. of Units	Discount
10 to 24	4%
25 to 49	6%
50 to 99	8%
100 or more	

Magnetic tape cartridges are priced as follows:

1 dozen	$69/dozen
2 to 4 dozen	66/dozen
5 to 7 dozen	63/dozen
8 to 11 dozen	60/dozen
12 dozen or more	57/dozen

Monthly Rentals

		1-Year Lease	5-Year Lease	Purchase Price	Monthly Maint.
1501	Workstation	$ 280	$212	$ 7,611	$ 40
1502	Workstation	474	341	12,222	60
1501-40	Workstation	533	384	13,667	70
1503-43	Disc Processor	790	615	21,333	130
	Mag. Tape Units:				
1511	7-track, 556/800 bpi, 7-in. reels	231	181	6,611	30
1512	9-track, 800 bpi, 7-in. reels	231	181	6,611	30
1513	9-track, 800 bpi, 10.5-in. reels	297	230	8,778	30
1514	9-track, 1600 bpi, 10.5-in. reels	474	359	13,889	42
1525	Serial Printer, 30 cps	129	96	3,000	28
1553	Line Printer	553	379	13,750	62
1554	Line Printer	633	438	15,950	72
1555	Line Printer	735	520	18,150	102
1556	Line Printer	815	591	20,350	122
1557	Line Printer	1,286	906	33,333	162
1530	Numeric Keypad	11	9	278	2
1533	Dual Cassette Transport	75	58	1,861	15
1535	Synchronous Communications Adapter	42	30	1,222	2