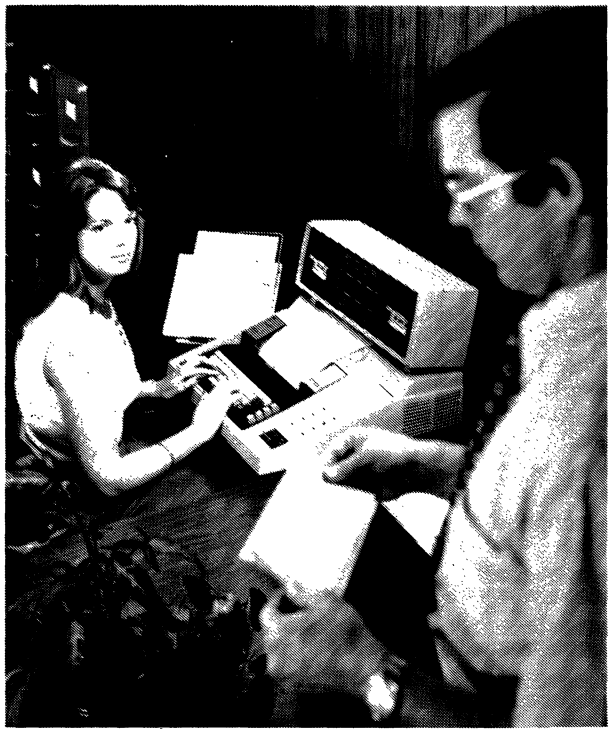
Texas Instruments Model 742 Programmable Data Terminal



The programmable Model 742 is shown in a typical remote order entry application. TI has equipped the 742 with an instruction repertoire and software specifically oriented toward data entry and validation functions.

A microprocessor-based, user-programmable terminal with cassette storage, oriented towards data entry applications.

Capable of performing concurrent on-line and off-line operations, it can be expanded with a 2K memory to support TICOL II, a powerful programming language.

A typical 742, equipped with the memory expansion feature, an integral modem (1200 bps), and an auxiliary printer interface, costs $245 per month on a two-year lease, including maintenance.

MANAGEMENT SUMMARY

The Model 742 microprocessor-based terminal is user-programmable, performs concurrent on- and off-line operations, and is self-supporting. Like the other members of the Silent 700 Series, it features non-impact printing. A simple assembly-like programming language called TICOL is used to create application programs.

Texas Instruments recently enhanced the Model 742 by offering an additional 2K bytes of user memory together with a more powerful programming language, TICOL II, that features a substantially expanded instruction repertoire. This single-package feature is an upward-compatible option intended to satisfy more extensive and complex applications than those served by the basic Model 742.

TI has focused its attention on data entry applications, and has equipped the 742 with a flexible instruction repertoire specifically oriented toward data entry and validation procedures. User programs, keyed onto cassette tape, define an entry format and specify operations to be performed on data entered into each of the

CHARACTERISTICS

VENDOR: Texas Instruments, Inc., Digital Systems Division, 12203 Southwest Freeway, P.O. Box 1444, Houston, Texas 77001. Telephone (713) 494-5115.

DATE OF ANNOUNCEMENT: August 1974.

DATE OF FIRST DELIVERY: September 1974.

NUMBER DELIVERED TO DATE: Over 3000.

SERVICED BY: Texas Instruments.

CONFIGURATION

The basic Model 742 is a desk-top terminal containing keyboard, printer, dual magnetic tape cassette recorders for program and data storage, a microprocessor with 8K bytes of read-only memory (ROM) and 2K bytes of random-access memory (RAM), and a communications interface. Options include the Memory Expansion feature, which includes an additional 2K bytes each of ROM and RAM, an integral Bell 202-compatible modem (1200 bps), an auxiliary EIA RS-232C interface for adding a user-supplied device such as a serial impact printer, and the Extended Communications feature, which includes a 21-character answer-back memory for terminal identification and a reverse channel feature. The Memory Expansion feature provides accommodation for more extensive user programs and is a prerequisite for operation with the TICOL II programming language (an expanded version of TICOL I).

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in the half-duplex mode at switch-selectable speeds of 10, 15, 30, or 120 char/second. The transmission code is 10- or 11-unit, 8-level ASCII, including parity. The 11-unit code includes 1 start and 2 stop bits and is used at a speed of 10 char/second; the 10-unit code includes 1 start and 1 stop bit and is used at speeds of 15, 30, and 120 char/second. Model 742 is transmission-compatible with Teletype teletypewriter Models 33, 35, and 38 at 10 char/second and Model 37 at 15 char/second.

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format's variable fields. During data entry, the format is printed line-by-line as the operator, using the fill-in-the-blanks approach, keys data into the variable fields. Programs can be created to check entries by type, size, and range; to perform arithmetic operations; to require "double key" verification of critical data within selected fields; to generate standard data entries via table look-ups; and to compare data to a specific constant.

User programs can also be created to perform operations on data received from the communications facility, after it is written on tape.

TI's software support is focused upon the TICOL language, which is now available in two versions: TICOL I, the basic language that contains a repertoire of 74 instructions, and TICOL II, the optional extension package consisting of 56 additional instructions. Support also includes the TICOL Generator to aid the operator in debugging syntax errors while keying the source program, the TICOL Translator to convert the completed source program into object code on cassette tape, the TICOL Lister to provide a specialized listing of TICOL programs, and the TICOL Editor to alter existing programs.

User programs are loaded from cassette to the terminal memory, a basic 2K-byte RAM (random-access memory) expandable to 4K bytes via the Memory Extension feature, which also contains processor registers and a 454-byte communications buffer. The basic memory limits the program size to as little as 1338 bytes if simultaneous transmission is required. The Memory Extension feature, of course, adds another 2K bytes of user memory to alleviate the storage limitation. But TI also compensates for the limited storage of the basic memory by providing program linking, which allows several programs to be used during the same task via automatic loading and initiation of the linked programs. Thus, program overlays are transparent to the operator except for possible short delays to locate and load the next program.

The 742 is transmission-compatible with other ASCII members of the TI Silent 700 family and with Teletype teletypewriters. No sophisticated line disciplines are used, and the 742 can transmit unblocked messages as well as blocked messages containing 425 characters per block. The 742 can operate on the dial network or on a multipoint line, in a polling environment, but it must be equipped for either type of operation before installation.

Texas Instruments provides additional systems support for the 742 (only) through its Model 700 TPS Terminal Polling System, which automatically dials and collects cassette-tape data from remote 742 terminals via the dial network; the data is pooled on industry-compatible magnetic tape. The basic 700 TPS consists of a 16-bit minicomputer with 24K bytes of memory, a 9-track 800-bpi or optional 1600 bpi magnetic tape unit (37.5 ips read/write speed), a 733 ASR teleprinter console, and one 1200-bps integral modem with an attached

The 742 contains an EIA Standard RS-232C interface, which can be replaced with an integral hard-wired modem for direct connection to a voice-grade line via a Bell System DAA. The modem operates at speeds up to 1200 bits/second and is compatible with Bell System 202 series modems. The modem also provides control for automatically answering and manually originating calls over the dial network via the DAA.

For transmission speeds up to 300 bps, a Bell System 103A, 103F, 113A, or 113B modem can be used; for speeds up to 1200 bps, a Bell System 202C, 202D, 202E, 202R, or 202S modem can be used. Equivalent modems from independent vendors can be substituted for the Bell System modems.

The optional Extended Communications feature provides Answerback Memory, which transmits a 21-character station ID upon receipt of an ENQ character or automatically when a call is answered; and Reverse Channel, which alerts the transmitting source to an interruption of communications when operating at 1200 bps.

The 742 can be used with another 742 or a computer in a point-to-point arrangement on the dial network or a leased line, or in a leased multipoint arrangement. Usage must be specified when ordering to insure factory installation of the appropriate "line discipline" logic. Multipoint terminals respond to polling via a single ID character, switch-selectable during installation. Status of the terminal's I/O devices can be interrogated by the polling source.

The transmission and reception of blocked or unblocked messages is switch-selectable. Blocked messages contain 425-character data blocks with character and longitudinal parity. The terminal responds to a positive acknowledgement of transmitted data with the next message block, or it retransmits the same block upon request. The terminal can request retransmission of the acknowledgment. Unblocked messages are not checked for parity, and acknowledgment procedures are not used. Transmission can be controlled via X-ON/X-OFF codes.

Odd, even, or mark character parity, as selected, is generated and accompanies all transmitted messages. Parity checking is performed on received data in the block transmission mode only.

DEVICE CONTROL

The nucleus of the 742 is a microprocessor that executes all terminal operations under control of the microprogram in ROM. All data entry functions, including the creation of fixed formats, are user-programmable. Data entry is performed under the direction of the application program in RAM, which is loaded from cassette tape. RAM also supports microprocessor functions and includes 7 general-purpose registers and 1 accumulator (each with 11 decimal digits plus sign), and 86-byte entry buffer, and a 425-byte transmit buffer.

The remaining memory provides 1338 bytes (or 3386 bytes with the Memory Expansion feature) for application program storage. When concurrent on- and off-line operations are not required, the transmission buffer can be used for additional storage to provide a total of 1792 bytes (or 3840 bytes with Memory Expansion) of application program storage.

Operating modes are manually controlled via switches on the operator panel, which permit an I/O device to be

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auto-call unit, which together are compatible with the Bell 202C modem and 801 ACU. Options include 3 additional ports (4 ports total), each with an integral modem and ACU (this arrangement requires 48K bytes of memory). The basic 700 TPS leases for $1,200 per month (1-year lease) to $1,075 per month (4-year lease), including maintenance, and sells for $3,780. Each additional integral modem/ACU leases for $150/month and sells for $1,000.

Texas Instruments provides its own nationwide service.

USER REACTION

A total of four responses, representing an installed base of 1017 units, was received on the TI 742 during our December 1977 survey of teleprinter users. The user's ratings are as follows:

	Excellent	Good	Fair	Poor	WA*
Overall performance	1	2	1	0	3.0
Ease of use	0	2	1	1	2.3
Keyboard feel and usability	1	2	1	0	3.0
Print quality	0	3	0	1	2.5
Hardware reliability	1	2	1	0	3.0
Maintenance service	1	3	0	0	3.3

*Weighted Average based on 4.0 for Excellent.

Specific user comments were few. One user cited reliability as an advantage, while another user noted that the operating speed was a disadvantage. The user having the largest number of terminals provided most of the lower ratings; this user has other TI terminals, as well as those of TI competitors, all of which were rated higher.

These ratings are substantially below those given in the mid-1976 survey. Quite probably, the equipment introduced into the marketplace since the 1974 announcement of the 742 (including TI's own more recent offerings) has altered the frame of reference and the attitude with which the 742 is judged.□

switched off, on-line, or off-line (local operation). The terminal can perform on- and off-line functions concurrently. The 742 records data from keyboard, line, or tape and reads data from tape, which can be transmitted or recorded on a second tape. A printed copy can be produced from keyed or received data or from data read from tape.

Identical controls are provided for each cassette transport; these include Rewind, Load (move tape to beginning of recording), Fast Forward, and Stop Tape. Indicator lamps define the operating mode, tape ready, and end-of-tape conditions. The operating mode is established for both cassette recorders via a common control, which assigns the Record mode to one cassette recorder and the Playback mode to the other, or the converse. Mode assignments can also be established by the application program or remotely via received control codes. Both recorders can operate simultaneously, but only in opposite modes.

Data is recorded in either of two modes, Continuous or Line. Both modes record data in a fixed, 86-character block format. The Continuous mode can record several "print lines" per block, while the Line mode records only one print line per block. In the Line mode, partial lines are terminated with a carriage-return control character and filled with NULL characters. In the continuous mode, the 86th character entered or an EXT initiates recording on tape. Continuous and Line formats can be mixed on the same tape, but are automatically separated during playback. Blocks written in the Line mode are automatically stripped of NULL characters and transmitted in the Continuous mode.

Data read from tape in the Playback mode can be read continuously (block by block), one block at a time, or one character at a time. Block and character playback allow editing to be performed when creating a new tape from an original. Tape can be backspaced on a block-by-block basis to permit re-reading a previous block.

Data is recorded from a 128-byte recirculation buffer. The record buffer receives a block of data while the previous block is being recorded. Data is read from tape a block at a time into a playback buffer, where NULL characters following a CR character are deleted.

Data entry functions are performed on data prior to recording the data on cassette tape. The data enters an 86-character entry buffer where the programmed data validation and arithmetic functions are performed. Error correction of a specific data field or the entire contents of the entry buffer can be performed.

SOFTWARE

Applications programs are created using an assembly-like language called TICOL (Texas Instruments Cassette Operating Language). TICOL is specifically oriented toward data entry and validation for document preparation. In general, a program will center around the creation of a print line (or record) to be recorded on cassette tape. Data accepted from the keyboard can be edited/validated and used in arithmetic calculations during the generation of a print line (cassette tape record or block). Totals or other data can be accumulated or stored for use in subsequent "print lines." Prompts to the operator can be printed without appearing in the final record. A subroutine call facility can be used to conserve memory space for frequently used data checks or calculations. A special data input type permits programming a required "double key" Verification cycle for data fields entered from the keyboard; if this is called for in the program, the operator entering data must rekey such fields, and a comparison is made to verify that the second entry is the same as the first. An automatic linkage to another program stored on cassette tape can be used to provide more extensive programs that can be contained in the rather limited memory space available for user code; data can be stored by one program for access by another program.

The original TICOL language has been substantially expanded to include an additional set of instructions that greatly extend the 742's operating flexibility. The original instruction repertoire, now designated TICOL I, forms the base for the expanded set, TICOL II, which is provided with the Memory Expansion option. TICOL II adds relative addressing and jumping; faster table look-up; manipulation of characters, bytes, and bits in memory; faster searching; enhanced data transfer; decimal/binary conversion; and several other capabilities.

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There are four separate items in the TICOL software package: a Generator, a Lister, an Editor, and a Translator.

Program creation is performed using the Generator, which provides formatting assistance and performs syntax checks to assist in debugging a program while it is being written. The output of this procedure is a syntactically correct source-language program (but not necessarily a logically correct one) that is input to the Translator for conversion into executable object code.

The Lister can be used to obtain a clean copy of the source-language code. It also assigns a line number to every instruction (as does the Translator).

The Editor permits modification of a TICOL source-language program on a line-by-line basis, using the line numbers generated by the Lister or assigned during translation as the reference points. Instructions can be added, deleted, or modified. Syntax is checked as the changes are made.

COMPONENTS

KEYBOARD: The 56-key data entry-style keyboard can produce any of 100 ASCII characters, including upper case alphabetics, numerics, control codes, and special symbols.

PRINTER: The serial, non-impact printer uses an electro-thermal printing technique and prints at speeds up to 30 char/second. Characters are formed within a 5-by-7 dot matrix; character size is 0.105 inch high by 0.080 inch wide. Model 742 can also print lower case characters, 0.0715 inch high by 0.080 inch wide, formed by a 5-by-5 dot matrix.

The printer has a friction-feed platen and accommodates TI thermographic printing paper, which is provided in roll form; a 300-foot roll, contained within the teleprinter, measures 8-1/2 inches wide by 3-5/8 inches in diameter.

Line length is 80 characters (8 inches). Horizontal spacing is 10 char/inch; vertical spacing is selectable at 3 or 6 lines/inch. Carriage return/line feed is performed automatically at column 81; no code is recorded or transmitted.

Printer timing is 195 milliseconds per carriage return, 33 milliseconds per single-space line feed, and 67 milliseconds per double-space line feed.

CASSETTE TAPE RECORDERS: Dual magnetic tape cassette recorders are standard. Each records data on a "Philips-type" cassette, which contains 275 to 300 feet of 0.15-inch magnetic tape recorded at 800 bits/inch using the phase-encoding technique. Read/write tape speed is 8 inches/second; maximum rewind time is 60 seconds. Data is recorded in fixed blocks of 86 characters each. The cassette storage capacity is rated at 144,000 data char/track, or 288,000 data char/cassette maximum. Off-line playback or record functions while printing are performed at 30 char/second, and tape duplication without printing at up to 200 char/second. On-line playback or record functions are performed at 10, 15, 30 or 120 char/second as determined by the selected transmission speed.

PRICING

The Model 742 is available for purchase or on a one-, two-, three-, or four-year lease that includes prime-shift maintenance within a 100-mile radius of a TI service center. An additional $20/month per terminal is charged to service terminals located outside the service area. A separate maintenance contract is available for purchased units.

	Monthly Charges*					Monthly
	1-Year	2-Year	3-Year	4-Year	Purchase	Maint.**
Model 742	$240	$205	$185	$165	$4,925	$42
Options						
Memory Expansion	20	20	20	20	495	–
Extended Communications	5	5	5	5	100	–
Integral Modem, 1200 bps	20	20	20	20	495	–
Paper, 8.5 inches wide, 300 feet long:						
1-11 rolls, each	–	–	–	–	5.75	–
1-43 cases (12 rolls/case), each roll	–	–	–	–	5.25	–
1-5 pallets (44 cases/pallet), each roll	–	–	–	–	4.75	–
Over 6 pallets, each roll	–	–	–	–	4.25	–
Tape cassettes:						
From factory	–	–	–	–	6.95	–
From the field	–	–	–	–	7.50	–

* Includes monthly maintenance.
**On an annual billing basis.■

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A microprocessor-based, user-programmable terminal with cassette storage, oriented towards data entry applications.

Capable of performing concurrent on-line and off-line operations, it can be expanded with a 2K memory to support TICOL II, a powerful programming language.

A typical 742, equipped with the memory expansion feature, an integral modem (1200 bps), and an auxiliary printer interface, costs $245 per month on a two-year lease, including maintenance.

MANAGEMENT SUMMARY

The Model 742 was unveiled in August 1974 as an intelligent member of TI's now-familiar and widely used Silent 700 Series family of teleprinters. The microprocessor-based terminal is user-programmable, performs concurrent on- and off-line operations, and is self-supporting. Like the other members of the Silent 700 Series, it features non-impact printing. A simple assembly-like programming language called TICOL is used to create application programs.

Texas Instruments recently enhanced the Model 742 by offering an additional 2K bytes of user memory together with a more powerful programming language, TICOL II, that features a substantially expanded instruction repertoire. This single-package feature is an upward-compatible option intended to satisfy more extensive and complex applications than those served by the basic Model 742.

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CHARACTERISTICS

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DATE OF ANNOUNCEMENT: August 1974.

DATE OF FIRST DELIVERY: September 1974.

NUMBER DELIVERED TO DATE: Over 3000.

SERVICED BY: Texas Instruments.

CONFIGURATION

The basic Model 742 is a desk-top terminal containing keyboard, printer, dual magnetic tape cassette recorders for program and data storage, a microprocessor with 8K bytes of read-only memory (ROM) and 2K bytes of random-access memory (RAM), and a communications interface. Options include the Memory Expansion feature, which includes an additional 2K bytes each of ROM and RAM, an integral Bell 202-compatible modem (1200 bps), an auxiliary EIA RS-232C interface for adding a user-supplied device such as a serial impact printer, and the Extended Communications feature, which includes a 21-character answer-back memory for terminal identification and a 1200-bps reverse channel feature. The Memory Expansion feature provides accommodation for more extensive user programs and is a prerequisite for operation with the TICOL II programming language (an expanded version of TICOL I).

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in the half-duplex mode at switch-selectable speeds of 10, 15, 30, or 120 char/second. The transmission code is 10- or 11-unit, 8-level ASCII, including parity. The 11-unit code includes 1 start and 2 stop bits and is used at a speed of 10 char/second; the 10-unit code includes 1 start and 1 stop bit and is used at speeds of 15, 30, and 120 char/second. Model 742 is transmission-compatible with Teletype teletypewriter Models 33, 35, and 38 at 10 char/second and Model 37 at 15 char/second. ▶

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format's variable fields. During data entry, the format is printed line-by-line as the operator, using the fill-in-the-blanks approach, keys data into the variable fields. Programs can be created to check entries by type, size, and range; to perform arithmetic operations; to require "double key" verification of critical data within selected fields; to generate standard data entries via table look-ups; and to compare data to a specific constant.

User programs can also be created to perform operations on data received from the communications facility, after it is written on tape.

TI's software support is focused upon the TICOL language, which is now available in two versions: TICOL I, the basic language that contains a repertoire of 74 instructions, and TICOL II, the optional extension package consisting of 56 additional instructions. Support also includes the TICOL Generator to aid the operator in debugging syntax errors while keying the source program, the TICOL Translator to convert the completed source program into object code on cassette tape, the TICOL Lister to provide a specialized listing of TICOL programs, and the TICOL Editor to alter existing programs.

User programs are loaded from cassette to the terminal memory, a basic 2K-byte RAM (random-access memory) expandable to 4K bytes via the Memory Extension feature, which also contains processor registers and a 454-byte communications buffer. The basic memory limits the program size to as little as 1338 bytes if simultaneous transmission is required. The Memory Extension feature, of course, adds another 2K bytes of user memory to alleviate the storage limitation. But TI also compensates for the limited storage of the basic memory by providing program linking, which allows several programs to be used during the same task via automatic loading and initiation of the linked programs. Thus, program overlays are transparent to the operator except for possible short delays to locate and load the next program.

The 742 is transmission-compatible with other ASCII members of the TI Silent 700 family and with Teletype teletypewriters. No sophisticated line disciplines are used, and the 742 can transmit unblocked messages as well as blocked messages containing 425 characters per block. The 742 can operate on the dial network or on a multipoint line, in a polling environment, but it must be equipped for either type of operation before installation.

Texas Instruments provides additional systems support for the 742 (only) through its Model 700 TPS Terminal Polling System, which automatically dials and collects cassette-tape data from remote 742 terminals via the dial network; the data is pooled on industry-compatible magnetic tape. The basic 700 TPS consists of a 16-bit minicomputer with 24K bytes of memory, a 9-track 800-bpi or optional 1600 bpi magnetic tape unit (37.5 ips read/write speed), a 733 ASR teleprinter console, and one 1200-bps integral modem with an attached

The 742 contains an EIA Standard RS-232C interface, which can be replaced with an integral hard-wired modem for direct connection to a voice-grade line via a Bell System DDA. The modem operates at speeds up to 1200 bits/second and is compatible with Bell System 202 series modems. The modem also provides control for automatically answering and manually originating calls over the dial network via the DAA.

For transmission speeds up to 300 bps, a Bell System 103A, 103F, 113A, or 113B modem can be used; for speeds up to 1200 bps, a Bell System 202C, 202D, 202E, 202R, or 202S modem can be used. Equivalent modems from independent vendors can be substituted for the Bell System modems.

The optional Extended Communications feature provides Answerback Memory, which transmits a 21-character station ID upon receipt of an ENQ character or automatically when a call is answered; and Reverse Channel, which alerts the transmitting source to an interruption of communications when operating as 1200 bps.

The 742 can be used with another 742 or a computer in a point-to-point arrangement on the dial network or a leased line, or in a leased multipoint arrangement. Usage must be specified when ordering to insure factory installation of the appropriate "line discipline" logic. Multipoint terminals respond to polling via a single ID character, switch-selectable during installation. Status of the terminal's I/O devices can be interrogated by the polling source.

The transmission and reception of blocked or unblocked messages is switch-selectable. Blocked messages contain 425-character data blocks with character and longitudinal parity. The terminal responds to a positive acknowledgement of transmitted data with the next message block, or it retransmits the same block upon request. The terminal can request retransmission of the acknowledgment. Unblocked messages are not checked for parity, and acknowledgment procedures are not used. Transmission can be controlled via X-ON/X-OFF codes.

Odd, even, or mark character parity, as selected, is generated and accompanies all transmitted messages. Parity checking is performed on received data in the block transmission mode only.

DEVICE CONTROL

The nucleus of the 742 is a microprocessor that executes all terminal operations under control of the microprogram in ROM. All data entry functions, including the creation of fixed formats, are user-programmable. Data entry is performed under the direction of the application program in RAM, which is loaded from cassette tape. RAM also supports microprocessor functions and includes 7 general-purpose registers and 1 accumulator (each with 11 decimal digits plus sign), and 86-byte entry buffer, and a 425-byte transmit buffer.

The remaining memory provides 1338 bytes (or 3386 bytes with the Memory Expansion feature) for application program storage. When concurrent on- and off-line operations are not required, the transmission buffer can be used for additional storage to provide a total of 1792 bytes (or 3840 bytes with Memory Expansion) of application program storage.

Operating modes are manually controlled via switches on the operator panel, which permit an I/O device to be

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auto-call unit, which together are compatible with the Bell 202C modem and 801 ACU. Options include 3 additional ports (4 ports total), each with an integral modem and ACU (this arrangement requires 48K bytes of memory), or up to 8 ports each containing an EIA standard RS-232C interface for connection to an external customer-supplied modem and ACU (this arrangement requires 64K bytes of memory). The basic 700 TPS leases for $1,200 per month (1-year lease) to $1,075 per month (4-year lease), including maintenance, and sells for $3,780. Each additional integral modem/ACU leases for $150/month and sells for $1,000. The 1600-bpi density feature leases for $275 per month and sells for $5,500.

Texas Instruments provides its own nationwide service.

USER REACTION

Datapro conducted telephone interviews with five users of the Texas Instruments Model 742 who reported on their experience with a total of over 1270 of the terminals. Their ratings, which follow, indicate a high degree of satisfaction with the 742.

	Excellent	Good	Fair	Poor	WA*
Overall performance	4	1	0	0	3.8
Ease of use–operation	4	1	0	0	3.8
Ease of use–programming	2	3	0	0	3.4
Keyboard feel and usability	4	1	0	0	3.8
Print quality**	5	0	0	0	4.0
Hardware reliability	4	1	0	0	3.8
Maintenance service	2	2	1	0	3.2

* Weighted Average on a scale of 4.0 for Excellent.
** By comparison with other non-impact printers.

These users were delighted with the 742 and spoke enthusiastically of its key advantages, which they cited as cost/performance, programmability, ease of use (from an operator's perspective), silent operation, and virtually trouble-free performance. All five of the users required printed copy and, therefore, could not use a display terminal in place of the 742. One user had as few as 7 terminals installed, while another had over 1000 installed nationwide.

All five users commented that the quality of TI's maintenance service was excellent, but one said the response to service calls has been less than adequate in some areas, hence the one fair rating. One user didn't like the cassette drives because he said the pressure pads tend to loosen and the tape creeps when not reading or writing. Conversely, another user liked the cassette storage because it neatly satisfied the needs of his application. Still another user complained about the supporting documentation and technical support, which he said were inferior. But all of the users agreed that the 742 is a good, solid, easy-to-use terminal that should receive serious consideration by other prospective users.□

switched off, on-line, or off-line (local operation). The terminal can perform on- and off-line functions concurrently. The 742 records data from keyboard, line, or tape and reads data from tape, which can be transmitted or recorded on a second tape. A printed copy can be produced from keyed or received data or from data read from tape.

Identical controls are provided for each cassette transport; these include Rewind, Load (move tape to beginning of recording), Fast Forward, and Stop Tape. Indicator lamps define the operating mode, tape ready, and end-of-tape conditions. The operating mode is established for both cassette recorders via a common control, which assigns the Record mode to one cassette recorder and the Playback mode to the other, or the converse. Mode assignments can also be established by the application program or remotely via received control codes. Both recorders can operate simultaneously, but only in opposite modes.

Data is recorded in either of two modes, Continuous or Line. Both modes record data in a fixed, 86-character block format. The Continuous mode can record several "print lines" per block, while the Line mode records only one print line per block. In the Line mode, partial lines are terminated with a carriage-return control character and filled with NULL characters. In the continuous mode, the 86th character entered or an EXT initiates recording on tape. Continuous and Line formats can be mixed on the same tape, but are automatically separated during playback. Blocks written in the Line mode are automatically stripped of NULL characters and transmitted in the Continuous mode.

Data read from tape in the Playback mode can be read continuously (block by block), one block at a time, or one character at a time. Block and character playback allow editing to be performed when creating a new tape from an original. Tape can be backspaced on a block-by-block basis to permit re-reading a previous block.

Data is recorded from a 128-byte recirculation buffer. The record buffer receives a block of data while the previous block is being recorded. Data is read from tape a block at a time into a playback buffer, where NULL characters following a CR character are deleted.

Data entry functions are performed on data prior to recording the data on cassette tape. The data enters an 86-character entry buffer where the programmed data validation and arithmetic functions are performed. Error correction of a specific data field or the entire contents of the entry buffer can be performed.

SOFTWARE

Applications programs are created using an assembly-like language called TICOL (Texas Instruments Cassette Operating Language). TICOL is specifically oriented toward data entry and validation for document preparation. In general, a program will center around the creation of a print line (or record) to be recorded on cassette tape. Data accepted from the keyboard can be edited/validated and used in arithmetic calculations during the generation of a print line (cassette tape record or block). Totals or other data can be accumulated or stored for use in subsequent "print lines." Prompts to the operator can be printed without appearing in the final record. A subroutine call facility can be used to conserve memory space for frequently used data checks or calculations. A special data input type permits programming a required "double key" Verification cycle for data fields entered from the keyboard; if this is called for in

Texas Instruments Model 742 Programmable Data Terminal

the program, the operator entering data must rekey such fields, and a comparison is made to verify that the second entry is the same as the first. An automatic linkage to another program stored on cassette tape can be used to provide more extensive programs that can be contained in the rather limited memory space available for user code; data can be stored by one program for access by another program.

The original TICOL language has been substantially expanded to include an additional set of instructions that greatly extend the 742's operating flexibility. The original instruction repertoire, now designated TICOL I, forms the base for the expanded set, TICOL II, which is provided with the Memory Expansion option. TICOL II adds relative addressing and jumping; faster table look-up; manipulation of characters, bytes, and bits in memory; faster searching; enhanced data transfer; decimal/binary conversion; and several other capabilities.

There are four separate items in the TICOL software package: a Generator, a Lister, an Editor, and a Translator.

Program creation is performed using the Generator, which provides formatting assistance and performs syntax checks to assist in debugging a program while it is being written. The output of this procedure is a syntactically correct source-language program (but not necessarily a logically correct one) that is input to the Translator for conversion into executable object code.

The Lister can be used to obtain a clean copy of the source-language code. It also assigns a line number to every instruction (as does the Translator).

The Editor permits modification of a TICOL source-language program on a line-by-line basis, using the line numbers generated by the Lister or assigned during translation as the reference points. Instructions can be added, deleted, or modified. Syntax is checked as the changes are made.

COMPONENTS

KEYBOARD: The 56-key data entry-style keyboard can produce any of 100 ASCII characters, including upper case alphabetics, numerics, control codes, and special symbols.

PRINTER: The serial, non-impact printer uses an electro-thermal printing technique and prints at speeds up to 30 char/second. Characters are formed within a 5-by-7 dot matrix; character size is 0.105 inch high by 0.080 inch wide. Model 742 can also print lower case characters, 0.0715 inch high by 0.080 inch wide, formed by a 5-by-5 dot matrix.

The printer has a friction-feed platen and accommodates TI thermographic printing paper, which is provided in roll form; a 300-foot roll, contained within the teleprinter, measures 8-1/2 inches wide by 3-5/8 inches in diameter.

Line length is 80 characters (8 inches). Horizontal spacing is 10 char/inch; vertical spacing is selectable at 3 or 6 lines/inch. Carriage return/line feed is performed automatically at column 81; no code is recorded or transmitted.

Printer timing is 195 milliseconds per carriage return, 33 milliseconds per single-space line feed, and 67 milliseconds per double-space line feed.

CASSETTE TAPE RECORDERS: Dual magnetic tape cassette recorders are standard. Each records data on a "Philips-type" cassette, which contains 275 to 300 feet of 0.15-inch magnetic tape recorded at 800 bits/inch using the phase-encoding technique. Read/write tape speed is 8 inches/second; maximum rewind time is 60 seconds. Data is recorded in fixed blocks of 86 characters each. The cassette storage capacity is rated at 144,000 data char/track, or 288,000 data char/cassette maximum. Off-line playback or record functions while printing are performed at 30 char/second, and tape duplication without printing at up to 200 char/second. On-line playback or record functions are performed at 10, 15, 30 or 120 char/second as determined by the selected transmission speed.

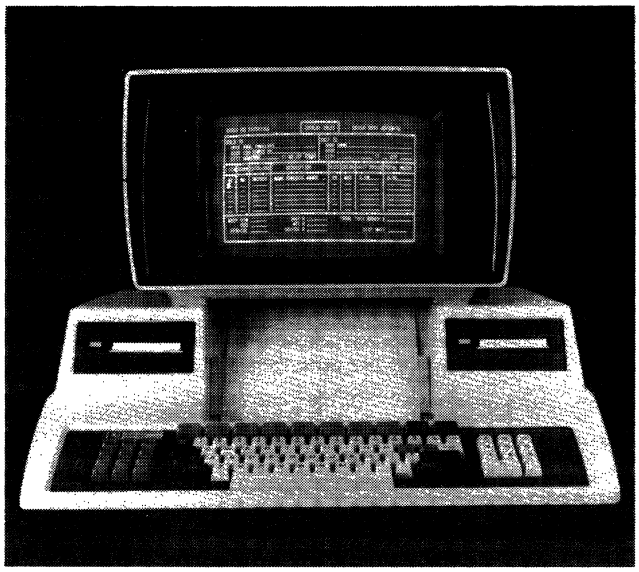
PRICING

The Model 742 is available for purchase or on a one-, two-, three-, or four-year lease that includes prime-shift maintenance within a 100-mile radius of a TI service center. An additional $20/month per terminal is charged to service terminals located outside the service area. A separate maintenance contract is available for purchased units.

	Monthly Rental*					Monthly
	1-Year	2-Year	3-Year	4-Year	Purchase	Maint.**
Model 742	$240	$205	$185	$165	$4,925	$42
Options						
Memory Expansion	20	20	20	20	495	—
Extended Communications	5	5	5	5	100	—
Integral Modem, 1200 bps	20	20	20	20	495	—
Paper, 8.5 inches wide, 300 feet long:						
1-11 rolls, each	—	—	—	—	5.75	—
1-43 cases (12 rolls/case), each roll	—	—	—	—	5.25	—
1-5 pallets (44 cases/pallet), each roll	—	—	—	—	4.75	—
Over 6 pallets, each roll	—	—	—	—	4.25	—
Tape cassettes:						
From factory	—	—	—	—	6.95	—
From the field	—	—	—	—	7.50	—

* Includes monthly maintenance.
**On an annual billing basis. ■

Texas Instruments 770 & 771 Intelligent Terminals



The Texas Instruments Model 770/2 features a 1920-character display, typewriter-style keyboard, two integral 3M mini-cartridge tape drives, and an integral 30-cps thermal printer.

Stand-alone user-programmable display terminals available with or without an integral non-impact printer.

Standard features include up to 28K bytes of user memory, either integral dual minicartridge drives or a separately-housed dual-diskette unit, a 1920-character display, and a typewriter-style keyboard. Software support includes TI's own TPL 700 data entry language, a BASIC interpreter (Model 771 only), and emulators for IBM 2780/3780, Teletype 33/35, Burroughs Poll/Select, and TI's 742.

A Model 770/1 with display, keyboard, dual minicartridge drives, and asynchronous communications interface, but no software support, is priced at $6,275, or $229 on a three-year lease, including maintenance.

A Model 771/2 with display, keyboard, dual-diskette unit, integral printer, asynchronous communications interface, and full software support is priced at $11,725, or $373 per month on a three-year lease, including maintenance.

One-year and 90-day lease plans, and OEM and end-user quantity-purchase discounts are available.

MANAGEMENT SUMMARY

Texas Instruments currently offers four models in its Series 700 Distributed Processing Systems family, which are manufactured by its Computer Systems Division in Austin, Texas, and marketed through the Digital Systems Group in Houston. The terminals are designed for remote data entry, preprocessing, and interactive or batch data transmission in a distributed processing environment. Each model is a compact, stand-alone display terminal. Model 770/1 is equipped with integral dual 3M-type minicartridge tape drives, located above the keyboard to the left and to the right of the unit. Model 771/1 does not employ minicartridge tape drives, but is equipped with a separate desktop diskette storage unit that accommodates two single-sided, single-density diskettes. Models 770/2 and 771/2 are identical to Models 770/1 and 771/1 respectively, except that each includes an integral thermal printer. The four models are completely software-compatible, and Model 770s can be field-upgraded to Model 771.

Model 770 terminals feature 32K bytes of ROM memory and 32K bytes of RAM memory; operating software requires 4K bytes of RAM, leaving up to 28K bytes for user storage. Model 771 terminals feature 64K bytes of RAM memory, twice the RAM capacity of the 770, but the operating system is diskette-resident and requires at least 40K bytes of RAM, leaving up to 24K bytes for user storage.

The 770/2's and 771/2's integral, non-impact printer, a TI thermal 80-column, 30-cps printer, is located in the mid-section of the terminal between keyboard and CRT; its ▷

CHARACTERISTICS

VENDOR: Texas Instruments (TI) Incorporated, Digital Systems Group, P.O. Box 1444, Houston, Texas 77001. Telephone (713) 937-2000.

DATE OF ANNOUNCEMENT: Models 770/1 and 770/2—March 1977; Models 771/1 and 771/2—June 1978.

DATE OF FIRST DELIVERY: Models 770/1 and 770/2—June 1977; Models 771/1 and 771/2—July 1978.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: Texas Instruments.

MODELS

MODEL 770/1: A self-contained unit that consists of TMS 9900 16-bit microprocessor with 32K bytes of ROM and 32K bytes of RAM memory (of which 28K bytes is available to the user), a CRT display module, two integral 3M mini-cartridge tape drives, and a keyboard. Options include a graphics kit, an integral modem or interface for an external modem, and an auxiliary I/O port for a Model 810 Printer or auxiliary I/O device.

MODEL 770/2: Identical with Model 770/1, but includes an integral thermal printer. The printer's buffer requires 2K bytes of user memory. Model 770/1 options are the same as those for Model 770/2. ▶

Texas Instruments 770 & 771 Intelligent Terminals

100-foot roll of thermal paper is contained within the unit. The integral printer provides hard copy of displayed or received data under program control, and requires 2K bytes of user memory for buffering. A line printer, the TI Omni 810 (a 150-cps, 132-column matrix printer) or a user-supplied printer, can be used to produce forms.

Designed with emphasis on data entry preprocessing and batch transmission, the terminals feature a multi-tasking operating system and a high-level, business-oriented, programming language called TPL 700. Model 771 terminals can also be provided with the TX BASIC interpreter, Texas Instrument's enhanced version of the ANSI-standard BASIC programming language. TPL 700 consists of two parts: Forms and Procedures. Forms is designed for forms creation and is supported by an optional graphics package, which features line-drawing symbols. Procedures provides editing, arithmetic, and logic functions as well as logical I/O support for generation, testing, and debugging application programs; it is supported with an interactive general-purpose editor for generating and editing source code, a compiler, and module linker for linking Procedures to Forms or Procedures to Procedures in an overlay or subroutine fashion. A set of utility programs supports the manipulation of data or program files on diskette or cartridge tape. Emulation programs are provided for IBM 2780/3780, Teletype, Burroughs Poll/Select and TI 742 protocols. All software is supplied on diskette or cartridge tape and is priced separately.

The 770 and 771 are available with a broad variety of asynchronous or synchronous communications interfaces with or without an integral modem and with or without auto answer and auto-call features.

USER REACTION

In early April 1980, Datapro conducted telephone interviews with four Texas Instruments Model 770 and 771 users, who reported their experience with a total of 292 units. All of the terminals were purchased directly from TI and have been installed for an average of two years. TI provides maintenance service for all of these units. The terminals are being used for a variety of data entry, editing, and validation applications, including accounting, inventory control, and customer file maintenance.

These users' ratings are as follows:

	Excellent	Good	Fair	Poor	WA*
Overall performance	1	3	0	0	3.3
Ease of operation	2	2	0	0	3.0
Display clarity	2	1	0	0	3.7
Keyboard feel and usability	2	1	0	0	3.7
Ease of programming	0	2	2	0	2.5
Manufacturer's software	1	2	1	0	3.0
Hardware reliability	1	3	0	0	3.3
Maintenance service	0	3	1	0	2.8
Technical support	1	2	0	0	3.3

*Weighted Average on a scale of 4.0 for Excellent.

MODEL 771/1: A self-contained unit that appears the same as the 770/1 and consists of a TMS 9900 16-bit microprocessor with 64K bytes of RAM memory (of which 24K bytes is available to the user), a CRT display module, and a keyboard. A separate, desk-top dual-diskette unit is attached to the display unit. Options include a graphics kit, an integral modem or interface for an external modem, and an auxiliary I/O port for a Model 810 Printer or auxiliary I/O device. Model 771/1 is available with or without operating software.

MODEL 771/2: Identical with Model 771/1 but includes an integral thermal printer. The printer's buffer requires 2K bytes of user memory. Model 771/2 options are the same as those for Model 771/1.

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous or synchronous in the half- or full-duplex mode. Asynchronous transmission is performed at rates up to 1200 bits per second using 8-level, 10- or 11-unit ASCII code. Synchronous transmission is performed at 2400 or 4800 bits per second using 8-level EBCDIC code. Emulators are available that provide protocol emulation for the IBM 2780/3780 (BSC), the TI Model 742 Programmable Terminal, Burroughs Poll/Select, and Teletype 33/35 teleprinters. Model 770 is also transmission-compatible with the TI 700 Terminal Polling System via the 742 emulator.

Options include an asynchronous or synchronous integral modem or an RS-232C interface with or without an RS-366 (auto-call) interface for an external asynchronous or synchronous modem. The asynchronous integral modem is compatible with the Bell System 202S and 202T. The synchronous intergral modem is compatible with the Bell System 201C. Both types of integral modems are available for dial-up operation (with auto-answer or with auto-answer and auto-call features) or for leased operation. Asynchronous modem interfaces are available that provide compatibility with the Bell System 103 and 113 modems at rates up to 300 bps or the Bell System 202 and 212 modems at rates up to 1200 bps. Synchronous modem interfaces provide compatibility with Bell System 201 or 208 modems at rates of up to 4800 bps. Both asynchronous and synchronous interfaces are available with an RS-366 auto-call unit interface that provides compatibility with Bell System 801A6 and 801C6 auto-call units.

DEVICE CONTROL

Terminal operation is performed under control of a real-time, multi-tasking operating system. The basic firmware supports communications, basic file management, task scheduling, and device input/output.

Cursor controls position the cursor up, down, left, right, home, and to the beginning of the next line. Edit controls provide character insertion and deletion and character and field erasure.

SOFTWARE

Vendor-supplied software includes TPL 700 (assembly language); File Management Utilities; a BASIC interpreter (Model 771 only); and four emulators for the IBM 2780/3780, Teletype 33/35, Burroughs Poll/Select, and the Texas Instruments 742.

The TPL 700 language is fully supported with an interactive general-purpose editor for generation and editing of source code, a compiler for compilation of loadable object code, and a module linker for linking Procedures to Forms or Procedures to Procedures in an overlay or subroutine fashion. The TPL 700 Procedures facility provides I/O support for tape or diskette files, the integral and/or external printers, and auxiliary I/O devices. TPL 700 Procedures features Enter statements for displaying operator prompts; relative and

Texas Instruments 770 & 771 Intelligent Terminals

These users were well pleased with their TI 770s and 771s. From a price/performance point of view, all considered their terminals a really good buy. Two users found that the terminals are particularly advantageous in rural "country-store" sites, partially because learning to operate the terminals is so simple that even personnel with no experience in data processing can be trained to use the units in a few hours, and partially because TI's field service is so geographically widespread. According to these users, although the quality of maintenance can vary from site to site, TI generally provides better-than-average responsiveness to service calls, even in out-of-the-way places.

Only one disadvantage was mentioned by more that one user: two of the four users had experienced mechanical problems with the cartridge tape transport on the 770.

One user seemed to summarize well the general feelings of the others when he said, "After experiencing a three-year relationship with TI, if we had to make the decision all over again, we would still go with them."□

absolute cursor control; input from keyboard with reformatting (character strings to binary numbers); and character validation via predefined character sets. Also provided are nested Repeat and Until statements for loop control and nested If, Then, and Else statements for testing with a selection of seven different relational operators. TPL 700 also supports data transfers with reformatting including character strings to binary numbers, binary numbers to strings, or character strings to character strings; single and triple precision integer arithmetic with up to 14 elements per expression; the generation of source code via the interactive 770 test editor utility which provides scrolling, character or line insertion and deletion, tabbing, and full cursor control; and the generation of loadable object code via the TPL 700 compiler with complete source listing and syntax error reporting.

The TPL Forms facility is used to create forms for data entry/validation, and includes both the graphic capability to produce the lines within the form and the logic capability to establish the checking parameters and arithmetic or logic operations within the fields via attribute codes. The Graphic option is required for line drawing. Checking functions include data validation, range-checking, table look-up, and cross-field validation. Arithmetic operations (add, subtract, multiply, and divide), left or right justification with spaces or zeroes, and branching (fixed and conditional) can also be specified by field attributes. TPL 700 Forms also has forms chaining and multi-page forms features, which permit a form to exceed the display capacity. For special cases, Procedure language code can be invoked to accommodate more complex validation or processing requirements. Forms are executed via the operating system.

File Management Utilities support user file maintenance on diskette or cartridge tape. Tape utility functions include catalog display, tape initialization, file detection or creation, and file listing or copying. The catalog display utility provides tape ID, version, percentage of tape used, and file information including name, time and date of creation, physical record length, maximum number records; and current EOF marker. The tape initialize utility creates the tape catalog, writes the tape ID, conditions the tape, and optionally erases the tape. The file creation utility establishes catalog entries and the tape is formatted for file name, record length, and the number of records specified. The file listing utility presents a formatted display of the specified file one page at a time; a printed copy is made available by depressing the print key. The file copy utility produces a copy of a specified file.

Diskette utility functions include diskette initialization, file copying, file creation or deletion, file name or protection modification, catalog listing, volume name modification, file display, and IBM format copy. The diskette initialize utility deletes and files on an initialized diskette, copies and/or verifies individual files or groups of files from one diskette to another. The copy utility copies a specified file to another file or up to three specified files into a single file. Relative or sequential files can be created. Sequential file creation produces a volume catalog entry and allocates diskette storage for a file that will accommodate blank-compressed, variable-length sequential records. Relative file creation produces a random-access file in a given volume in a specified record length. File deletion and modification also update the volume catalog. The file display utility displays a selected sequential file with scrolling.

The TX BASIC interpreter, which is available for Model 771 only, provides Texas Instrument's enhanced version of the ANSI minimal-standard (X3.4 1978) BASIC programming language for business-oriented applications. TX BASIC provides for decimal-type data, flexible report formatting, and extensive file support for the development, debugging, and execution of business applications programs via simple statements and operator commands. Enhanced features include 13-digit precision decimal arithmetic and file and data formatting facilities. Statements can be executed interactively on a line-by-line basis by keyed commands, or stored for later execution. Programs written in TX BASIC can be made upward-compatible with other Texas Instrument versions of BASIC via TI-provided utilities.

COMPONENTS

CRT DISPLAY UNIT: A 12-inch (diagonal measurement) CRT with a viewing area 6 inches high by 9 inches wide. The display arrangement is 24 lines of 80 characters each for a total display capacity of 1920 characters. A character set of 96 ASCII characters including upper and lower case alphabetics, numerics, and specials is displayed in white. The Graphics option provides 32 graphic symbols.

Each character is formed within a 5-by-7 dot (upper case) or 5-by-5 dot (lower case) matrix. Highlighting features include full and half intensity, and blanking (non-display of data).

KEYBOARD: An 88-key, typewriter-style non-detachable keyboard. The keyboard includes a separate numeric pad to the right, a cursor and function keypad to the left, and a row of eight program function keys located over the main keygroup. Key functions within the main keygroup include Return, Escape, Tab Skip, Enter, Upper Case Lock, Shift, and Control Shift. The cursor control and function keypad includes Erase Field, Erase Input, Paper Advance, Print, Repeat, Character Insert, Character Delete, and five cursor control keys (Up, Down, Left, Right, and Home). The keyboard can generate any of 128 ASCII character codes and also features eight status indicator lights.

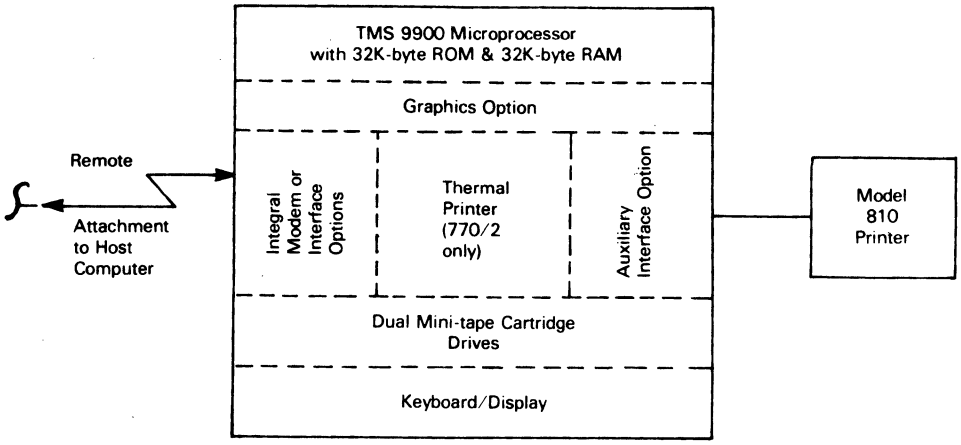
DISKETTE STORAGE: A desk-top, dual-diskette unit that accommodates single-sided, single-density diskettes. The drives are compatible with the IBM 3740 format, which organizes a diskette into 77 tracks including 74 data tracks, 2 spare tracks, and one index track. Each track is divided into 26 sectors; each sector contains 128 bytes. Formatted data storage capacity is 256,256 bytes.

The diskettes are rotated at 360 rpm for an average rotational delay of 83 milliseconds. Positioning time is 8 milliseconds track-to-track and 211 milliseconds average (including settling time). Head settling time is 8 milliseconds; head loading time is 35 milliseconds. The data transfer rate is 31,250 bytes/second.

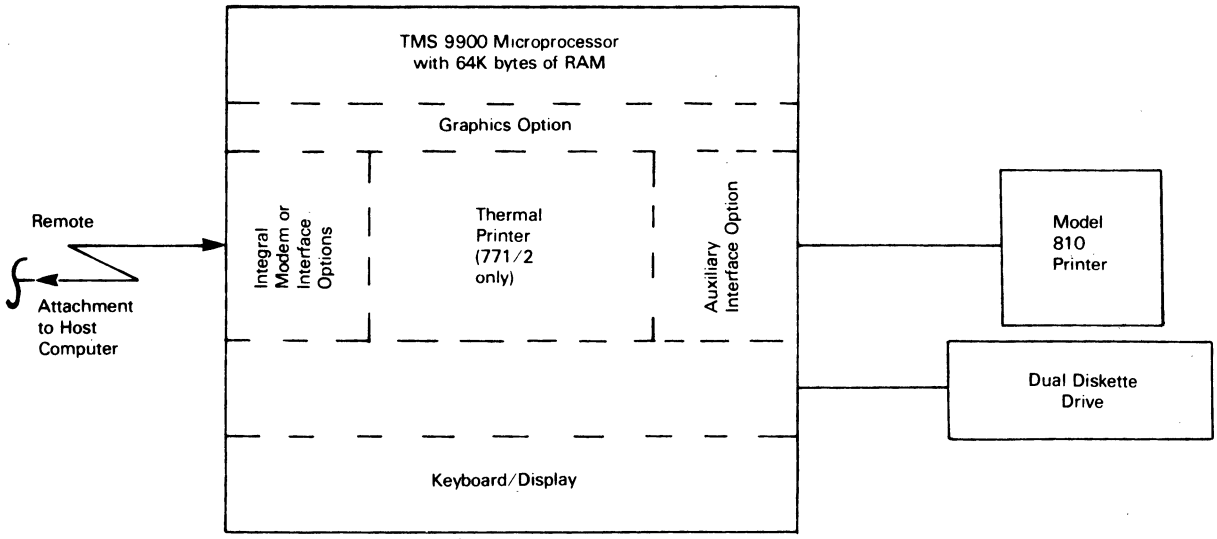
Texas Instruments 770 & 771 Intelligent Terminals

CONFIGURATIONS

770/1 and 770/2



771/1 and 771/2



CARTRIDGE TAPE DRIVE: Each of the two integral cartridge tape drives accommodates a 3M DC100A minitape cartridge, which contains 140 feet of magnetic tape. Data is recorded in two tracks at a recording density of 800 bpi, the recording is phase-encoded. Block length is variable; at 256 char./block, the tape capacity is 196K bytes. The tape speed is 20 inch/second (read/write) and 60 inch/second (search/rewind).

INTEGRAL PRINTER: Non-impact, using an electro-thermal printing technique. Characters are formed within a 5-by-7 dot matrix. The printer is rated at 30 char./second (60 cps spacing) and provides 80 print positions and 96 ASCII print symbols. Spacing is 10 char./inch and 6 lines/inch. A friction-feed platen is standard; a 100-foot roll of paper is contained within the unit.

EXTERNAL PRINTER: The Model 810 is a bidirectional impact matrix printer with 132 print positions and a rated speed of 150 char./second. The standard character set includes 96 upper and lower case ASCII symbols. Each character is formed via a 9-by-7 dot matrix. Spacing is 10 char./inch and 6 or 8 (selectable) line/inch. The printer features adjustable tractor feed and accommodates 6-part, continuous pin-fed forms from 3 to 14⅞ inches wide. Continuous forms can be fed from the rear or bottom of the printer. Options include compressed print, which permits selection of 10 or 16.5 char./inch horizontal spacing, and vertical formatting, which permits selection of up to 8 different vertical formats.

PRICING

The Model 770 and 771 are available for purchase, on a 90-day rental, or on a 1- or 3-year lease. A 5-year lease is available on an RPQ basis. Rental and lease rates include prime-shift maintenance. Quantity discounts for OEM's and end-users are available on purchased units. A separate maintenance contract is available for purchased units. Prime shift maintenance included in rental and lease prices covers installations located within a 100-mile radius of a TI service center. Maintenance beyond the 100-mile limit is available for an additional charge. Rentals are available on a 90-day minimum lease term, which is automatically extended on a month-to-month basis. Rentals and leases can be cancelled upon 30 days written notice prior to the expiration or rental or lease term. Installation charges for installations within a 100-mile radius of a TI service center are $250 for Model 770. $275 for Model 771, and $75 for a Model 810 printer.

Texas Instruments 770 & 771 Intelligent Terminals

		Monthly Charge*				
		90-day Lease	1-Year Lease	3-Year Lease	Purchase	Monthly Maint.**
5100	770/1 Terminal; includes 32K bytes of ROM and 32K bytes of RAM (28K bytes user memory), display unit, dual mini-cartridge drives, keyboard, and power supply	$299	$234	$211	$ 5,745	$ 64/58
5101	770/2 Terminal; identical to 770/1 terminal plus integral thermal printer and one roll of paper	407	312	274	6,845	78/71
	771/1 Terminal; includes 64K bytes of RAM (24K bytes user memory), display unit, dual diskette drives, keyboard, and power supply;					
5112	Without software license	387	297	272	8,595	88/80
5110	With software license and one-year subscription service	397	307	282	10,095	88/80
	771/2 Terminal; identical to 771/1 terminal plus integral thermal printer and one roll of paper:					
5113	Without software license	495	375	345	9,695	102/93
5111	With software license and one-year subscription service	505	385	355	11,195	102/93
5115	Conversion Upgrade Kit; converts 770 terminal to 771 terminal (for field upgrade of purchased units only)	—	—	—	4,700	—
Options						
6050	Graphics Kit	10	9	8	150	—
	Asynchronous Interface:					
6057	For external 103/113 modem	24	20	18	530	—
6058	For external 103/113 modem and ACU	42	35	31	830	—
6059	For external 202 modem	24	20	18	530	—
6060	For external 202 modem and ACU	42	35	31	830	—
6051	Integral 202 Modem with Auto-Answer	53	44	41	1,065	—
6052	Integral 202 Modem with Auto-Answer and Auto Call	79	65	60	1,385	—
6053	Integral 202 Modem (for leased line operation)	53	44	41	1,065	—
6063	For external asynchronous devices with RS-232C interface	24	20	18	530	—
	Synchronous Interfaces:					
6061	For external 201/208 modem	30	25	24	625	—
6062	For external 201/208 modem and ACU	48	40	36	925	—
6054	Integral 201 Modem with Auto Answer	81	65	60	1,755	—
6055	Integral 201 Modem with Auto-Answer and Auto-Call	107	86	79	2,075	—
6056	Integral 201 Modem (for leased line operation)	81	65	60	1,755	—
6064	For external synchronous devices with RS-232C interface	30	25	24	625	—
	Printers:					
6068	Basic 810A Printer; with serial interface	176	137	125	2,545	36/33
6069	810B Printer; with compressed print and vertical forms control options	189	150	138	2,705	36/33

*Includes prime-shift maintenance.
**First maintenance price is for monthly billing, second price is for annual billing.

Software

	License Fee	Annual Subscription Service
Model 770 TPL System Software	$ 350	$200
Teletype Emulator for 770	150	150
2780/3780 Emulator for 770	150	100
742 Emulator for 770	150	100
Burroughs Poll/Select Emulator for 770	150	100
ACU communications for 770	150	100
Program Library I for 770	150	100
Model 771 TPL System Software	1,500	375
Teletype Emulator for 771	500	300
2780/3780 Emulator for 771	500	300
742 Emulator for 771	500	300
Burroughs Poll/Select Emulator for 771	500	300
TX BASIC Interpreter for 771	800	400 ■

Texas Instruments Models 770 & 771 Intelligent Terminals

User-programmable, stand-alone display terminals for remote data entry, preprocessing, and batch transmission in a distributed processing environment.

Standard features include dual minicartridge tape drives and 4K bytes of user memory (Model 770) or dual diskette drives and 24K bytes of user memory (Model 771) and a 1920-character display screen. Optional features include an integral, non-impact, 130-cps, 80-column printer, 8K or 16K bytes of added user memory (Model 770), an external 150-cps, 132-column matrix printer, a wide variety of communications interfaces with or without an integral modem, an auxiliary I/O port, a graphics feature, program development software, and emulators for the IBM 3780, Teletype 33, and TI 742.

The basic Model 770 terminal with an asynchronous communications interface leases for $223 per month, including maintenance, under a one-year lease and sells for $5,525. The basic Model 771 terminal (software version) with an asynchronous communications interface leases for $333 per month, including maintenance, under a one-year lease and sells for $7,980.

A full-blown Model 770 with 32K bytes of memory, integral printer, graphics, and an integral 202-type modem with auto answer and auto call features leases for 365 per month, including maintenance, under a one-year lease and sells for $8150. A full-blown Model 771 (software version) with 64K bytes of memory and the above options leases for $427 per month including maintenance, under a one-year lease and sells for $9,530.

OEM and end-user quantity discounts are available for purchased units. Model 771 is available with or without operating software. Model 771 provides IBM-3740 diskette compatibility.

MANAGEMENT SUMMARY

Texas Instruments introduced two new members of the 770 family of programmable display terminals at the June 1978 National Computer Conference. Models 771/1 and 771/2 are similar to the earlier Models 770/1 and 770/2, except that the 771/1 and 771/2 feature 500K bytes of dual-diskette storage in place of the 770's minicartridge tape drives and twice the total memory capacity of the earlier models. The new upward-compatible models are completely software-compatible with the earlier models, and the earlier Model 770's can be field-upgraded to a Model 771.

The earlier Model 770 terminals feature a ROM-resident operating system which uses 24K bytes of ROM memory; its operating software also requires 4K bytes of RAM memory, leaving a mere 4K bytes of RAM for user storage. TI acknowledges this memory limitation by offering an additional 8K or 16K bytes of RAM for a total memory capacity of 24K bytes. Model 771 terminals feature 64K bytes of RAM memory, twice the total memory capacity of the basic 770, but the operating system is diskette-resident and requires 40K bytes of RAM memory when loaded, leaving 22.5K (with printer) to 24K bytes of RAM for user storage. TI currently does not intend to offer more memory for the 771.

The compact, stand-alone display terminals, available with or without an integral non-impact printer, maintain the same low-profile physical appearance that has been a distinguishing attribute of the TI family of data terminals. As a standard feature, the 770 is equipped with integral, dual 3M-type minicartridge tape drives, located above the keyboard to the left and to the right of the unit. The 771 does not employ minicartridge tape drives, but is equipped ➢

CHARACTERISTICS

VENDOR: Texas Instruments (TI) Inc., Digital Systems Division, 9777 West Gulfbank, Houston Texas 77001. Telephone (713) 937-2000.

DATE OF ANNOUNCEMENT: Models 770/1 and 770/2—March 1977; Models 771/1 and 771/2—June 1978.

DATE OF FIRST DELIVERY: Models 770/1 and 770/2—June 1977; Models 771/1 and 771/2—July 1978. ➢

Texas Instruments Models 770 & 771 Intelligent Terminals

with a separate desk-top diskette storage unit that accommodates two standard-density single-sided diskettes. The optional, integral, non-impact printer, a TI thermal 80-column, 30-cps printer, is located in the mid-section of the terminal between keyboard and CRT; its 100-foot roll of thermal paper is contained within the unit. The integral printer provides hard copy of displayed or received data under program control. A line printer, the TI Omni 810 (a 150-cps, 132-column matrix printer) or a user-supplied printer, can be used to produce forms.

Designed with emphasis on data entry preprocessing and batch transmission, the terminals feature a multi-tasking operating system and a high-level, business-oriented, programming language called TPL 700. However, memory must be expanded to the full 24K-byte limit on the 770 to create TPL 700 programs. TPL 700 consists of two parts: Forms and Procedures. Forms is designed for forms creation and is supported by an optional graphics package, which features line-drawing symbols. Procedures provides editing, arithmetic, and logic functions as well as logical I/O support for generation, testing, and debugging application programs; it is supported with an interactive general-purpose editor for generating and editing source code, a compiler, and module linker for linking Procedures to Forms or Procedures to Procedures in an overlay or subroutine fashion. A set of utility programs supports the manipulation of data or program files on diskette or cartridge tape. Emulation programs are provided for IBM 3780, Teletype, and TI 742 protocols. Communications concurrent with data entry and local processing are supported on 771 terminals and on 16K-byte 770 terminals using Teletype or TI 742 emulators and on 24K-byte 770 terminals using the IBM 3780 emulator. All software is supplied on diskette or cartridge tape and is priced separately.

The 770 and 771 are available with a broad variety of asynchronous or synchronous communications interfaces with or without an integral modem and with or without auto answer and auto-call features.

USER REACTION

Datapro contacted 5 users who reported on their experience with 16 Model 770 Intelligent Terminals. Their ratings are presented as follows.

	Excellent	Good	Fair	Poor	WA*
Overall performance	5	0	0	0	4.0
Ease of operation	4	1	0	0	3.8
Display clarity	3	2	0	0	3.6
Keyboard feel & usability	1	4	0	0	3.2
Hardware reliability	3	2	0	0	3.6
Maintenance service	1	1	0	0	3.5
Software & technical support	2	1	2	0	3.0

*Weighted Average on a scale of 4.0 for Excellent.

These users, as indicated, are well pleased with the TI 770 and cited low cost, flexibility, reliability, programmability, and compact size as the principal advantages of the

NUMBER DELIVERED TO DATE: Over 1000 units.

SERVICED BY: Texas Instruments

MODELS

MODEL 770/1: A self-contained unit that consists of a TMS 9900 16-bit microprocessor with 24K bytes of ROM and 8K bytes of RAM memory, a CRT display module, two integral 3M mini-cartridge tape drives, and a keyboard. Options include an 8K or 16K byte RAM memory expansion, a graphics kit, an integral modem or interface for an external modem, and an auxiliary I/O port for a Model 810 Printer or auxiliary I/O device.

MODEL 770/2: Identical with Model 770/1, but includes an integral thermal printer. Model 770/1 options are the same as those for Model 770/2.

MODEL 771/1: A self-contained unit that appears the same as the 770/1 and consists of a TMS 9900 16-bit microprocessor with 64K bytes of memory (of which 24K bytes of RAM is available to the user), a CRT display module, and a keyboard. A separate, desk-top dual-diskette unit is attached to the display unit. Options include a graphics kit, an integral modem or interface for an external modem, and an auxiliary I/O port for a Model 810 Printer or auxiliary I/O device.

MODEL 771/2: Identical with Model 771/1 but includes an integral thermal printer. Model 771/2 options are the same as those for Model 771/1.

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous or synchronous in the half- or full-duplex mode. Asynchronous transmission is performed at rates up to 1200 bits per second using 8-level, 10- or 11-unit ASCII code. Synchronous transmission is performed at 2400 or 4800 bits per second using 8-level EBCDIC code. Emulators are available that provide protocol emulation for the IBM 3780 (BSC), the TI Model 742 Programmable Terminal, and Teletype 33/35 teleprinters. Model 770 is also transmission-compatible with the TI 700 Terminal Polling System via the 742 emulator.

Options include an asynchronous or synchronous integral modem or an RS-232C interface with or without an RS-366 (auto-call) interface for an external asynchronous or synchronous modem. The asynchronous integral modem is compatible with the Bell System 202S and 202T. The synchronous integral modem is compatible with the Bell System 201C. Both types of integral modems are available for dial-up operation (with auto-answer or with auto-answer and auto-call features) or for leased operation. Asynchronous modem interfaces are available that provide compatibility with the Bell System 103 and 113 modems at rates up to 300 bps or the Bell System 202 modem at rates up to 1200 bps. Both asynchronous interfaces are available with an RS-366 auto-call unit interface that provides compatibility with Bell System 801A6 and 801C6 auto-call units.

DEVICE CONTROL

Terminal operation is performed under control of a real-time, multi-tasking operating system. The basic firmware supports communications, basic file management, task scheduling, and device input/output.

Cursor controls position the cursor up, down, left, right, home, and to the beginning of the next line. Edit controls provide character insertion and deletion and character and field erasure.

SOFTWARE

Vendor-supplied software includes TPL 700 (assembly language); TPL 700 Forms (a forms generator); File Manage-

Texas Instruments Models 770 & 771 Intelligent Terminals

terminal. Three users have not required maintenance since their terminal was installed 10 months ago. Three users are using the TI 810 printer with the TI 770 for forms printing; these users rated the printer's reliability and print quality as excellent. The users also reported that the TPL 700 language satisfied their needs and was easy to use. However, two users rated software support as only fair because TI's customer engineers had not been very knowledgeable of the programming for the TI 770, although they said it is improving with time. Most of these users are systems houses that use their 770's for program development.□

ment Utilities; and three emulators for the IBM 3780, Teletype 33/35, and the Texas Instruments 742.

The TPL 700 language is fully supported with an interactive general-purpose editor for generation and editing of source code, a compiler for compilation of loadable object code, and a module linker for linking Procedures to Forms or Procedures to Procedures in an overlay or subroutine fashion. TPL 700 Procedures provides I/O support for tape or diskette files, the integral and/or external printers, and auxiliary I/O devices. TPL 700 Procedures features Enter statements for displaying operator prompts; relative and absolute cursor control; input from keyboard with reformatting (character strings to binary numbers); and character validation via predefined character sets. Also provided are nested Repeat and Until statements for loop control and nested If, Then, and Else statements for testing with a selection of seven different relational operators. TPL 700 also supports data transfers with reformatting including character strings to binary numbers, binary numbers to strings, or character strings to character strings; single and triple precision integer arithmetic with up to 14 elements per expression; the generation of source code via the interactive 770 text editor utility which provides scrolling, character or line insertion and deletion, tabbing, and full cursor control; and the generation of loadable object code via the TPL 700 compiler with complete source listing and syntax error reporting.

TPL Forms is used to create forms for data entry/validation, and includes both the graphic capability to produce the lines within the form and the logic capability to establish the checking parameters and arithmetic or logic operations within the fields via attribute codes. The Graphic option is required for line drawing. Checking functions include data validation, range-checking, table look-up, and cross-field validation. Arithmetic operations (add, subtract, multiply, and divide), left or right justification with spaces or zeroes, and branching (fixed and conditional) can also be specified by field attributes. TPL 700 Forms also has forms chaining and multi-page forms features, which permit a form to exceed the display capacity. For special cases, Procedure language code can be invoked to accommodate more complex validation or processing requirements. Forms are executed via the operating system.

File Management Utilities support user file maintenance on diskette or cartridge tape. Tape utility functions include catalog display, tape initialization, file detection or creation, and file listing or copying. The catalog display utility provides tape ID, version, percentage of tape used, and file information including name, time and date of creation, physical record length, maximum number records; and current EOF marker. The tape initialize utility creates the tape catalog, writes the tape ID, conditions the tape, and optionally erases the tape. The file creation utility establishes catalog entries and the tape is formatted for file name, record length, and the number of records specified. The file listing utility presents a formatted display of the specified file one page at a time; a printed copy is made available by depressing the print key. The file copy utility produces a copy of a specified file.

Diskette utility functions include diskette initialization, file copying, file creation or deletion, file name or protection modification, catalog listing, volume name modification, file display, and IBM format copy. The diskette initialize utility deletes and files on an initialized diskette, copies and/or verifies individual files or groups of files from one diskette to another. The copy utility copies a specified file to another file or up to three specified files into a single file. Relative or sequential files can be created. Sequential file creation produces a volume catalog entry and allocates diskette storage for a file that will accommodate blank-compressed, variable-length sequential records. Relative file creation produces a random-access file in a given volume and in a specified record length. File deletion and modification also update the volume catalog. The file display utility displays a selected sequential file with scrolling.

COMPONENTS

CRT DISPLAY UNIT: A 12-inch (diagonal measurement) CRT with a viewing area 6 inches high by 9 inches wide. The display arrangement is 24 lines of 80 characters each for a total display capacity of 120 characters. A character set of 96 ASCII characters including upper and lower case alphabetics, numerics, and specials is displayed in white. The Graphics option provides 32 graphic symbols.

Each character is formed within a 5-by-7 dot (upper case) or 5-by-5 dot (lower case) matrix. Highlighting features include full and half intensity, and blanking (non-display of data).

KEYBOARD: An 88-key, typewriter-style non-detachable keyboard. The keyboard includes a separate numeric pad to the right, a cursor and function keypad to the left, and a row of eight program function keys located over the main keygroup. Key functions within the main keygroup include Return, Escape, Tab Skip, Enter, Upper Case Lock, Shift, and Control Shift. The cursor control and function keypad includes Erase Field, Erase Input, Paper Advance, Print, Repeat, Character Insert, Character Delete, and five cursor control keys (Up, Down, Left, Right, and Home). The keyboard can generate any of 128 ASCII character codes and also features eight status indicator lights.

DISKETTE STORAGE: A desk-top, dual-diskette unit that accommodates single-sided, standard density diskettes. The drives are compatible with the IBM 3740 format, which organizes a diskette into 77 tracks including 74 data tracks, 2 spare tracks, and one index track. Each track is divided into 26 sectors; each sector contains 128 bytes. Formatted data storage capacity is 256,256 bytes.

The diskettes are rotated at 360 rpm for an average rotational delay of 83 milliseconds. Positioning time is 8 milliseconds track-to-track and 211 milliseconds average (including settling time). Head settling time is 8 milliseconds; head loading time is 35 milliseconds. The data transfer rate is 31,250 bytes/second.

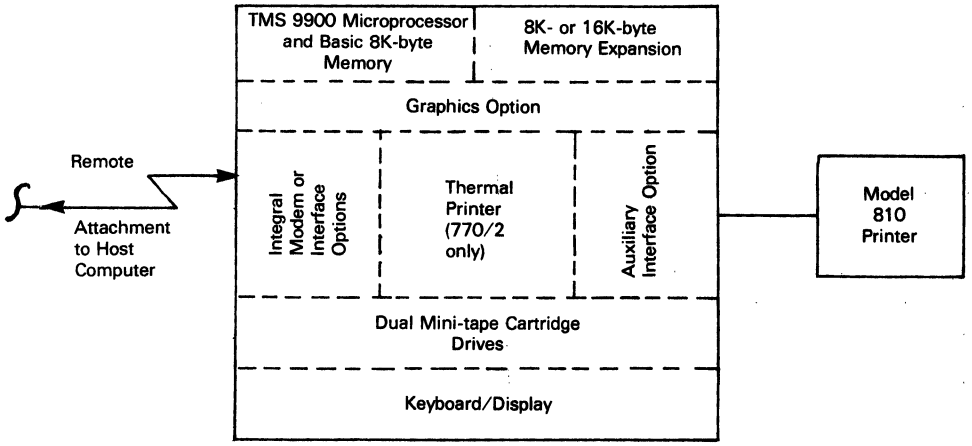
CARTRIDGE TAPE DRIVE: Each of the two integral cartridge tape drives accommodates a 3M DC100A minitape cartridge, which contains 140 feet of magnetic tape. Data is recorded in two tracks at a recording density of 800 bpi; the recording is phase-encoded. Block length is variable; at 256 char./block the tape capacity is 196K bytes. The tape speed is 20 inch/second (read/write) and 60 inch/second (search/rewind).

INTEGRAL PRINTER: Non-impact, using an electrothermal printing technique. Characters are formed within a 5-by-7 dot matrix. The printer is rated at 30 char./second (60 cps spacing) and provides 80 print positions and 96 ASCII print symbols. Spacing is 10 char./inch and 6 lines/inch. A friction-feed platen is standard; a 100-foot roll of paper is contained within the unit.

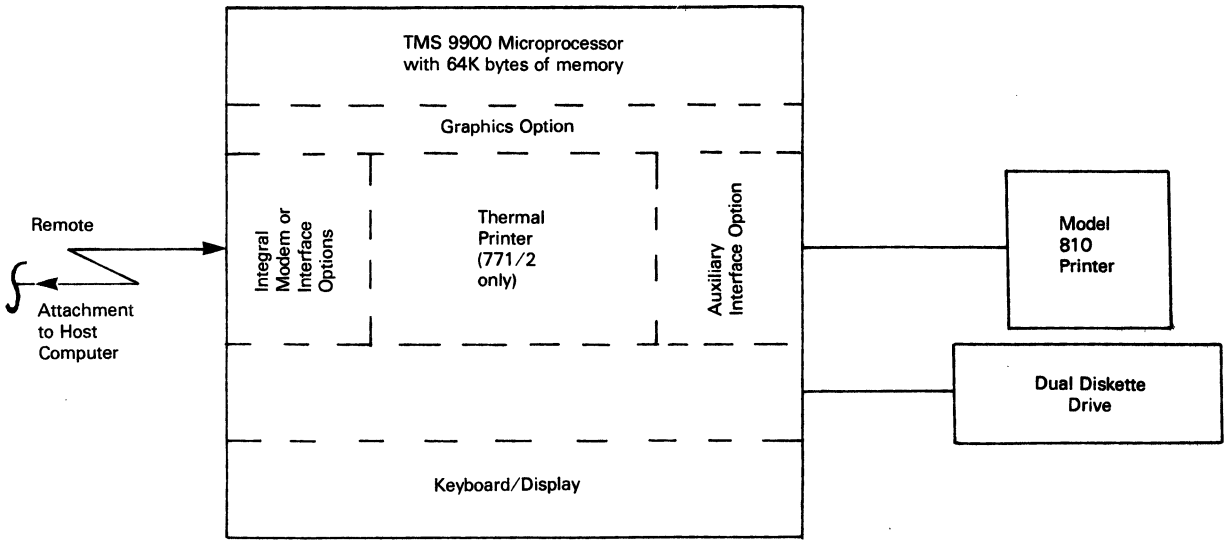
Texas Instruments Models 770 & 771 Intelligent Terminals

CONFIGURATIONS

770/1 and 7701



771/1 and 771/2



EXTERNAL PRINTER: The Model 810 is a bidirectional impact matrix printer with 132 print positions and a rated speed of 150 char./second. The standard character set includes 96 upper and lower case ASCII symbols. Each character is formed via a 9-by-7 dot matrix. Spacing is 10 char./inch and 6 or 8 (selectable) line/inch. The printer features adjustable tractor feed and accommodates 6-part, continuous pin-fed forms from 3 to 14⅞ inches wide. Continuous forms can be fed from the rear or bottom of the printer.

PRICING

The Model 770 and 771 are available for purchase, on a 90-day rental, or on a 1-, 3-, or 5-year lease. Rental and lease rates include prime-shift maintenance. Quantity discounts are available on purchased units. A separate maintenance contract is available for purchased units. Prime shift maintenance includes rental and lease prices covers installations located within a 100-mile radius of a TI service center. Maintenance beyond the 100-mile limit is available at an added $20 per month per terminal and $20 per month per external printer (U.S. only). Rentals are available on a 90-day minimum lease term, which is automatically extended on a month-to-month basis. Rentals and leases can be cancelled upon 30 days written notice prior to the expiration of rental or lease term. Installation and removal charges for installations within a 100 mile radius of a TI service center are: $110 per installed terminal or external printer and $60 per each additional installed terminal or external printer at the same site; $60 per removed terminal or external printer and $25 per each additional removed terminal or external printer at the same site.

End-user quantity discounts on purchased terminals are as follows:

Quantity, units	Discount %
3 to 4	3
5 to 6	6
7 to 9	11
10 to 14	17
15 to 19	19
20 to 24	21
25 to 29	23
30 to 39	24
40 to 49	25

OEM discounts are substantially greater, but TI declined to release the actual discount rates.

Texas Instruments Models 770 & 771 Intelligent Terminals

		Monthly Charge*					
		90-day Lease	1-Year Lease	3-Year Lease	5-Year Lease	Purchase	Monthly Maint.
100	770/1 Terminal; includes 32K bytes of memory (4K bytes user memory), display unit, dual mini-cartridge drives, keyboard, and power supply	$270	$210	$190	$175	$4,995	$64/58
101	770/2 Terminal; identical to 770/1 terminal plus integral thermal printer and one roll of paper	378	288	253	238	6,095	78/71
	771/1 Terminal; includes 64K bytes of memory (24K bytes user memory), display unit, dual diskette drives, keyboard, and power supply:						
112	Without software license	400	310	285	255	7,450	88/80
110	With software license and one-year subscription service	410	320	295	265	7,450	88/80
	771/2 Terminal; identical to 771/1 terminal plus integral thermal printer and one roll of paper:						
113	Without software license	508	388	358	328	8,550	102/93
111	With software license and one-year subscription service	518	398	368	338	8,550	102/93
115	Conversion Upgrade Kit; converts 770 terminal to 771 terminal (for field upgrade of purchased units only)	—	—	—	—	4,200	—
Options							
	770 Terminal Memory Expansion:						
120	8K bytes	20	16	13	12	675	—
121	16K bytes	20	24	21	19	1,075	—
130	Graphics Kit						
	Asynchronous Interface:	8	7	6	5	150	—
140	For external 103/113 modem	17	13	11	10	530	—
141	For external 103/113 modem and ACU	29	22	18	16	830	—
142	For external 202 modem	17	13	11	10	530	—
143	For external 202 modem and ACU	29	22	18	14	830	—
144	Integral 202 Modem with Auto-Answer	40	31	28	27	1,065	—
145	Integral 202 Modem with Auto-Answer and Auto Call	60	46	41	39	1,385	—
150	Integral 202 Modem (for leased line operation)	40	31	28	27	1,065	—
156	For external asynchronous devices with RS-232C interface	17	13	11	10	530	—
	Synchronous Interfaces:						
151	For external 201/208 modem)	23	18	16	15	625	—
152	For external 201/208 modem and ACU)	35	27	23	21	925	—
153	Integral 201 Modem with Auto Answer	68	52	47	45	1,755	—
154	Integral 201 Modem with Auto-Answer and Auto-Call	88	67	60	57	2,075	—
155	Integral 201 Modem (for leased line operation)	68	52	47	45	1,755	—
157	For external synchronous devices with RS-232C interface	23	18	16	15	625	—
	Printers:						
165	Basic 810A Printer; with serial interface	167	128	116	105	2,445	33
166	810B Printer; with compressed print and vertical forms control options	180	141	129	118	2,745	33

*Includes prime-shift maintenance.
**First maintenance price is for monthly billing, second price is for annual billing.

Terminal Supplies

		Purchase Price
185	Workstation Table	$250
186	Blank Minicartridge Magnetic Tape	15
187	Thermal Printing Paper, 8 ½-inch wide, 100-foot roll:	
	1 to 23 rolls	2.25/roll
	1 to 43 cases @ 24 rolls/case	2.00/roll
	1 to 5 pallets @ 1056 rolls/pallet	1.90/roll
	6 or more pallets (12 month contract)	1.75/roll
	6 or more pallets (single shipment date)	1.60/roll
188	Cartridge Cleaning Kit	5
189	Blank diskette	10

Texas Instruments Models 770 & 771
Intelligent Terminals

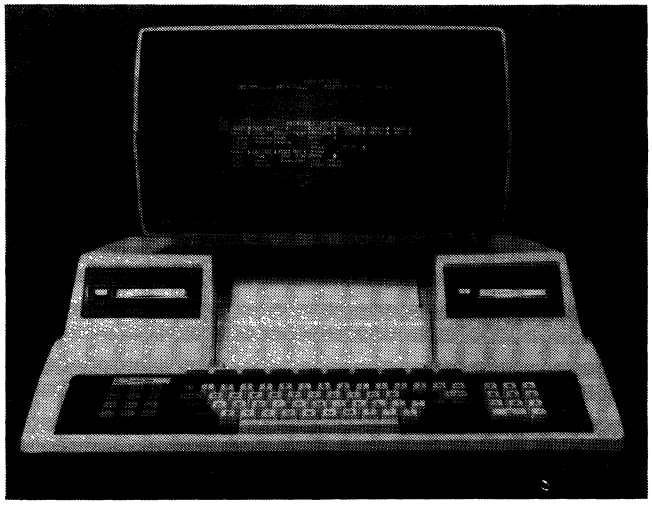
	Terminal Supplies (Continued)	Purchase Price
	810 Printer supplies:	
198	Model 810 Paper Tray, machine mount	25
199	Model 810 Printer Stand	100
200	Model 810 Paper Tray for stand	50
210	Model 810 Ribbon, ½-inch by 40 yards:	
	1 to 23 boxes @ 6 ribbons/box	27/box
	24 or more boxes @ 6 ribbons/box	24/box

Software

			Subscription Service*	
		License Fee**	Start-Up or Update	Renewal Fee
230	770 Program Development Software (on minicartridge)	—	$350	$200
232	Teletype Emulator for 770	—	150	100
234	3780 Emulator for 770	—	150	100
236	742 Emulator for 770	—	150	100
238	ACU communications for 770	—	150	100
240	Program Library I for 770	—	150	100
250	771 Program Development software (on diskette)	1,500	750	375
252	Teletype Emulator for 771	500	400	300
254	3780 Emulator for 771	500	400	300
256	742 Emulator for 771	500	400	300

*Subscription service is for one year from date of purchase.
**License fees are discountable.

Texas Instruments Model 770 Intelligent Terminal



A user-programmable, stand-alone display terminal for remote data entry, preprocessing, and batch transmission in a distributed processing environment.

Standard features include two minicartridge tape drives, 8K bytes of user memory, and a 1920-character display screen. Optional features include an integral, non-impact, 30 cps, 80-column printer, 8K or 16K bytes of added memory, an external 150-cps, 132-column line printer, a wide variety of communications interfaces with or without an integral modem, a graphics feature, program development software, and emulators for the IBM 3780, Teletype ASCII, and TI Model 742.

The basic terminal with a 300-bps asynchronous interface leases for $233 per month, including maintenance, under a one-year lease.

A full-blown terminal with 24K bytes of memory, integral printer, graphics, and an integral 201-type modem with auto answer and auto call features leases for $398 per month, including maintenance, under a one-year lease.

OEM and end-user quantity discounts are available for purchased units.

MANAGEMENT SUMMARY

Texas Instruments, a well-known leading manufacturer of non-impact teleprinters with its prominent Silent 700 family, has joined the ranks of the CRT display terminal vendors with its March 1977 introduction of the 770 Intelligent Terminal. Model 770, although TI's first display terminal, is its second programmable terminal, following the August 1974 introduction of the 742 Programmable Data Terminal (Report C21-840-101).

A compact, stand-alone display terminal available with or without an integral printer, the 770 maintains the same low-profile physical appearance that has been a distinguishing attribute of the TI family of data terminals. As a standard feature, the 770 is equipped with integral, dual 3M-type minicartridge tape drives, located above the keyboard to the left and to the right of the unit. The optional integral printer (a TI thermal 80-column, 30-cps printer) is located just above the keyboard between the two tape drives; its 100-foot roll of electrothermal paper is contained within the unit. The integral printer provides a hard copy of the displayed or received data under program control. A line printer (the TI Model 810 or a user-supplied printer with serial interface) can be used to produce forms.

Designed with emphasis on source data entry, preprocessing, and batch transmission, the basic 8K-byte microprocessor-based 770 is driven by a ROM-resident multitasking operating system. User programmability is supported by TPL 700, a high-level, business-oriented programming language which requires memory expansion to the full 24K bytes. TPL 700 consists of two parts: Forms and Procedures. Forms is designed for forms creation and is supported by an optional graphics package, which features line-drawing symbols. Procedures provides editing, arithmetic, and logic functions, as well ▷

CHARACTERISTICS

VENDOR: Texas Instruments (TI), Inc., Digital Systems Division, 12203 Southwest Freeway, P.O. Box 1444, Houston, Texas 77001. Telephone (713) 494-5115.

DATE OF ANNOUNCEMENT: March 1977.

DATE OF FIRST DELIVERY: June 1977.

NUMBER DELIVERED TO DATE: —

SERVICED BY: Texas Instruments.

CONFIGURATION

Model 770/1 is a self-contained unit that consists of a TMS 9900 16-bit microprocessor with 8K bytes of RAM memory, a CRT display module, two integral 3M mini-cartridge tape drives, and a keyboard. Model 770/2 is identical to Model 770/1 but includes an integral thermal printer. Options include an 8K or 16K byte RAM memory expansion, a graphics kit, an integral modem or interface for an external modem, an external Model 810 Printer, or a serial printer interface.

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous or synchronous in the half- or ▶

Texas Instruments Model 770 Intelligent Terminal

as logical I/O support for generation, testing, and debugging application programs; it is supported with an interactive general-purpose editor for generating and editing source code, a compiler, and a module linker for linking Procedures to Forms or Procedures to Procedures in an overlay or subroutine fashion. A set of utility programs support the manipulation of data or program files on the tape cartridges. Tape-resident emulation programs are provided for IBM 3780, Teletype, and TI 742 emulation. Communications concurrent with data entry and local processing are supported on 16K-byte terminals using Teletype or TI 742 emulators and on 24K-byte terminals using the IBM 3780 emulator. All software is supplied on cartridge tape and is priced separately.

The 770 is available with a broad variety of asynchronous or synchronous communications interfaces with or without an integral modem and with or without auto-answer and auto-call features.□

full-duplex mode. Asynchronous transmission is performed at rates up to 1200 bits per second using 8-level, 10- or 11-unit ASCII code. Synchronous transmission is performed at 2400 or 4800 bits per second using 8-level EBCDIC code. Emulators are available that provide protocol emulation for the IBM 3780 (BSC), the TI Model 742 Programmable Terminal, and Teletype 33/35 teleprinters. Model 770 is also transmission-compatible with the TI 700 Terminal Polling System via the 742 emulator.

Options include an asynchronous or synchronous integral modem or an RS-232C interface with or without an RS-366 (auto-call) interface for an external asynchronous or synchronous modem. The asynchronous integral modem is compatible with the Bell System 202S and 202T. The synchronous integral modem is compatible with the Bell System 201C. Both types of integral modems are available for dial-up operation (with auto-answer or with auto-answer and auto-call features) or for leased operation. Asynchronous modem interfaces are available that provide compatibility with the Bell System 103 and 113 modems at rates up to 300 bps or the Bell System 202 modem at rates up to 1200 bps. Both asynchronous interfaces are available with an RS-366 auto-call unit interface that provides compatibility with Bell System 801A6 and 801C6 auto-call units.

DEVICE CONTROL

Terminal operation is performed under control of the ROM—resident TX 770 real-time, multi-tasking operating system. The basic firmware supports communications, basic file management, task scheduling, and device input/output.

Cursor controls position the cursor up, down, left, right, home, and to the beginning of the next line. Edit controls provide character insertion and deletion and character and field erasure.

SOFTWARE

Vendor-supplied software includes TPL 700 (assembly language); TPL 700 Forms (a forms generator); File Management Utilities; and three emulators for the IBM 3780, Teletype 33/35, and the Texas Instruments 742.

The TPL 700 language is fully supported with an interactive general-purpose editor for generation and editing of source code, a compiler for compilation of loadable object code, and a module linker for linking Procedures to Forms or Procedures to Procedures in an overlay or subroutine fashion. TPL 700 Procedures provides I/O support for tape files, the integral and/or external printers, and auxiliary I/O devices. TPL 700 Procedures features Enter statements for displaying operator prompts; relative and absolute cursor control; input from keyboard with reformatting (character strings to binary numbers); and character validation via predefined character sets. Also provided are nested Repeat and Until statements for loop control and nested If, Then, and Else statements for testing with a selection of seven different relational operators. TPL 700 also supports data transfers with reformatting including character strings to binary numbers, binary numbers to strings, or character strings to character strings; single and triple precision integer arithmetic with up to 14 elements per expression; the generation of source code via the interactive 770 text editor utility which provides scrolling, character or line insertion and deletion, tabbing, and full cursor control; and the generation of loadable object code via the TPL 700 compiler with complete source listing and syntax error reporting.

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COMPONENTS

CRT DISPLAY UNIT: A 12-inch (diagonal measurement) CRT with a viewing area 6 inches high by 9 inches wide. The display arrangement is 24 lines of 80 characters each for a total display capacity of 120 characters. A character set of 96 ASCII characters including upper and lower case alphabetics, numerics, and specials is displayed in white. The Graphics option provides 32 graphic symbols.

Each character is formed within a 5-by-7 dot (upper case) or 5-by-5 dot (lower case) matrix. Highlighting features include full and half intensity, and blanking (non-display of data).

KEYBOARD: An 88-key, typewriter-style non-detachable keyboard. The keyboard includes a separate numeric pad to the right, a cursor and function keypad to the left, and a row of eight program function keys located over the main keygroup. Key functions within the main keygroup include Return, Escape, Tab Skip, Enter, Upper Case Lock, Shift, ▶

Texas Instruments Model 770 Intelligent Terminal

and Control Shift. The cursor control and function keypad includes Erase Field, Erase Input, Paper Advance, Print, Repeat, Character Insert, Character Delete, and five cursor control keys (Up, Down, Left, Right, and Home). The keyboard can generate any of 128 ASCII character codes and also features eight status indicator lights.

CARTRIDGE TAPE DRIVE: Each of the two integral cartridge tape drives accommodates a 3M DC100A mini-tape cartridge, which contains 140 feet of magnetic tape. Data is recorded in two tracks at a recording density of 800 bpi; the recording is phase-encoded. Block length is variable; at 256 char./block the tape capacity is 196K bytes. The tape speed is 20 inch/second (read/write) and 60 inch/second (search/rewind).

INTEGRAL PRINTER: Non-impact, using an electro-thermal printing technique. Characters are formed within a 5-by-7 dot matrix. The printer is rated at 30 char./second (60 cps spacing) and provides 80 print positions and 96 ASCII print symbols. Spacing is 10 char./inch and 6 lines/inch. A friction-feed platen is standard; a 100-foot roll of paper is contained within the unit.

EXTERNAL PRINTER: The Model 810 is a bidirectional impact matrix printer with 132 print positions and a rated speed of 150 char./second. The standard character set includes 96 upper and lower case ASCII symbols. Each character is formed via a 9-by-7 dot matrix. Spacing is 10 char./inch and 6 or 8 (selectable) lines/inch. The printer features adjustable tractor feed and accommodates 6-part, continuous pin-fed forms from 3 to 14⅞ inches wide. Continuous forms can be fed from the rear or bottom of the printer.

PRICING

The Model 770 is available for purchase, on a 90-day rental, or on a 1-, 3-, or 5-year lease. Rental and lease rates include prime-shift maintenance. Quantity discounts are available on purchased units. A separate maintenance contract is available for purchased units. Prime shift maintenance included rental and lease prices covers installations located within a 100-mile radius of a TI service center. Maintenance beyond the 100-mile limit is available at an added $20 per month per terminal and $20 per month per external printer (U.S. only). Rentals are available on a 90-day minimum lease term, which is automatically extended on a month-to-month basis. Rentals and leases can be cancelled upon 30 days written notice prior to the expiration of rental or lease term. Installation and removal charges for installations within a 100 mile radius of a TI service center are: $110 per installed terminal or external printer and $60 per each additional installed terminal or external printer at the same site; $60 per removed terminal or external printer and $25 per each additional removed terminal or external printer at the same site.

End-user quantity discounts on purchased terminals are as follows:

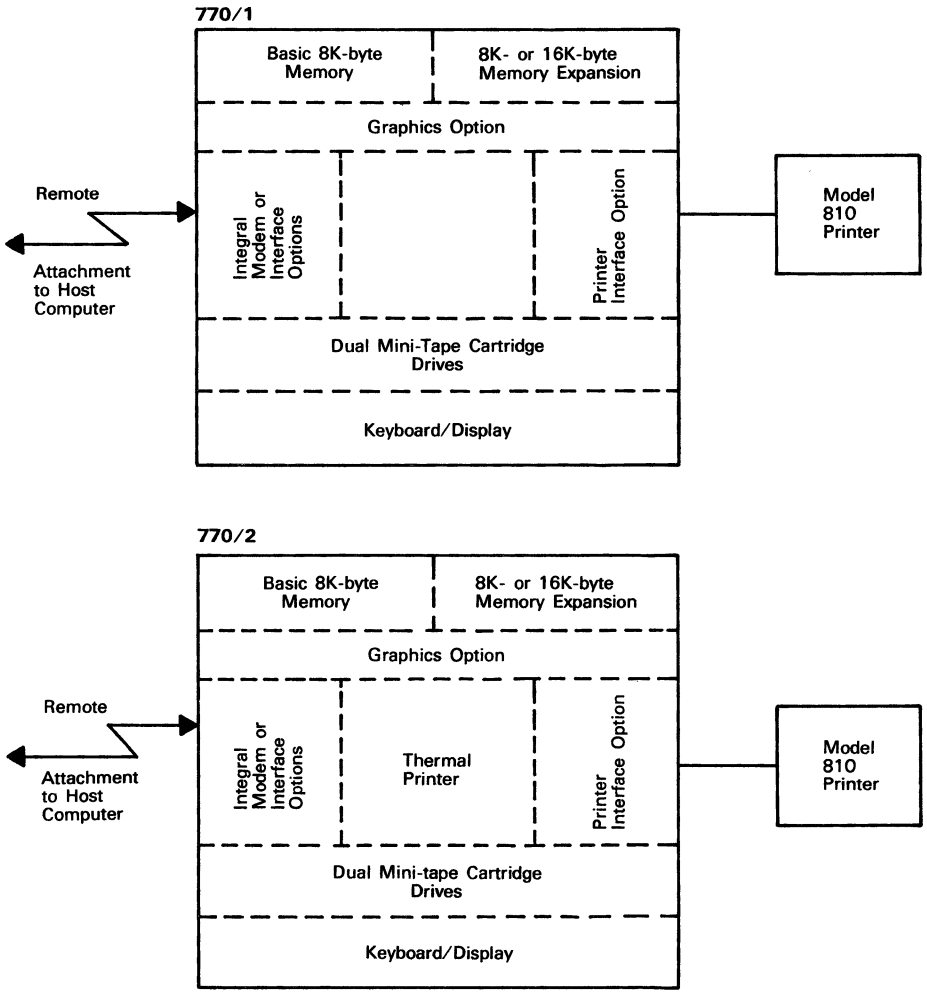
Quantity, units	Discount %
5 to 9	12
10 to 14	17
15 to 24	22
25 to 49	26
50 to 99	29

OEM discounts are substantially greater, but TI declined to release the actual discount rates.

		Monthly Charge*					
		90-day Rental	1-Year Lease	3-Year Lease	5-Year Lease	Purchase	Monthly Maint.**
100	770/1 Terminal (includes 8K bytes of memory with parity, display unit, dual mini-cartridge drives, keyboard, and power supply)	$280	$220	$200	$185	$6,400	$72/68
101	770/2 Terminal (identical to 770/1 Terminal plus integral printer and one roll of paper)	390	300	265	250	7,500	87/83
	Options						
120	Memory Expansion, 8K bytes	20	16	13	12	675	—
121	Memory Expansion, 16K bytes	29	24	21	19	1,075	—
130	Graphics Kit	8	7	6	5	150	—
135	Serial Printer Interface	26	20	17	15	795	
140	Integral 202 Modem with Auto-Answer	40	31	28	27	1,065	—
141	Integral 202 Modem with Auto-Answer and Auto-Call	60	46	41	39	1,385	—
142	Integral 202 Modem (for leased line operation)	40	31	28	27	1065	—
143	Integral 201 Modem with Auto-Answer	68	52	47	45	1,755	
144	Integral 201 Modem with Auto-Answer and Auto-Call	88	67	60	57	2,075	—
145	Integral 201 Modem (for leased line operation)	68	52	47	45	1,755	—
150	Interface Kit (for external 103/113 modem)	17	13	11	10	530	—
151	Interface Kit (for external 103/113 modem and ACU)	29	22	18	16	830	—
152	Interface Kit (for external 202 modem)	17	13	11	10	530	—
153	Interface Kit (for external 202 modem and ACU)	29	22	18	14	830	—
154	Interface Kit (for external 201/208 modem)	23	18	16	15	625	—
155	Interface Kit (for external 201/208 modem and ACU)	35	27	23	21	925	—
160	Workstation Table	—	—	—	—	250	—
170	Basic 810A Printer with serial interface	180	128	117	112	2,875	42/40
171	810B Printer with options (compressed print and vertical forms control)	190	135	124	119	3,175	42/40

Texas Instruments Model 770 Intelligent Terminal

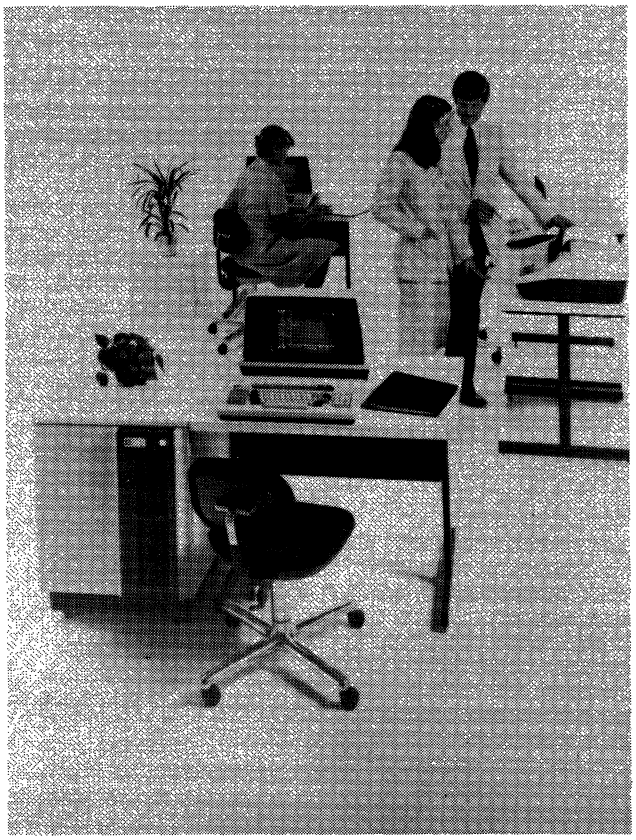
CONFIGURATION



	Software	Purchase Price
190	770 Programmer's Kit (includes program development software minicartridge, 3 blank cartridges, and TPL 700 programming manual)	$175
191	770 Program Development Software (on minicartridge)	130
192	3780 Emulator Program (on minicartridge)	50
193	Teletype and 742 Emulator Programs (on minicartridge)	50
	Terminal Supplies	
161	Blank Minicartridge, per box of 5	75
162	EIA Extension Cable	35
163	Thermal Printer Paper, 100-foot roll of 8.5 inch wide paper:	
	1 to 23 rolls, per roll	2.25
	1 to 43 cases @ 24 rolls/case, per roll	2.00
	1 to 5 pallets @ 1056 rolls/pallet, per roll	1.90
	6 or more pallets @ 1056 rolls/pallet, per roll (12 month contract)	1.75
	6 or more pallets @ 1056 rolls/pallet, per roll (single shipment date)	1.60
	810 Printer Supplies	
180	810 Paper Tray, machine mount	25
181	810 Printer Stand	100
182	810 Paper Tray (for stand)	50
183	810 Ribbon (0.5 inch by 40 yds.), 1 to 23 boxes @ 6 per box, per box	27
184	810 Ribbon, 24 or more boxes, per box	24

*Includes prime-shift maintenance.
**First maintenance price is for monthly billing, second price is for annual billing.■

Texas Instruments Model 774 Intelligent Terminal System



A multitask, programmable terminal that clusters up to 4 or 8 display stations for remote data entry, off-line processing and batch or interactive transmission in a distributed processing environment.

Features include 64K to 352K bytes of memory, diskette and or 20 megabytes of fixed disk storage, one or two communications ports, and three printer models including 150-cps bidirectional and 300- or 600-lpm line printers. Program development software includes a format generator, high-level language, file utilities, and emulators for the IBM 3780 and Teletype 33/35.

The entry-level 774/1 with 64K bytes of memory, two diskette drives, a display station, and a communications interface leases for $543 per month under a one-year lease, including maintenance, and sells for $13,480.

A 160K-byte 774/4 with 10 megabytes of fixed disk storage, 5 display stations, and a communications interface leases for $2,255 per month under a one-year lease, including maintenance, and sells for $36,255.

MANAGEMENT SUMMARY

TI addressed itself to the distributed processing environment with the introduction of its clustered Model 774 family of programmable, display terminals just one year after it addressed itself to the data entry market with its stand-alone Model 770 terminal.

The 774 family, consisting of four upward-compatible members, offers users a broad spectrum of expanding capabilities and performance levels. Built around the TI 990 microprocessor, the 774 family ranges from the entry-level 774/1 (with 64K bytes of memory, one to four display stations, one or two 150-cps printers, and one to four diskette drives) to the 774/4, the leading member (with 160K to 352K bytes of memory, five to eight display stations, up to four printers including a 300- or 600-lpm line printer, and diskette and/or disk storage ranging up to 20 million bytes).

The terminals support one or two communications ports; the use of integral or external modems can be specified. TI provides its own Model 810 bidirectional printer for low-volume printing and a Dataproducts 300- or 600-lpm printer for high-volume operation on its high performance models. Multipart forms can also be handled on the TI printer as well as the line printers. The display station is a TI Model 911 which TI uses with its 990 Series minicomputers.

CHARACTERISTICS

VENDOR: Texas Instruments (TI), Inc., Digital Systems Division, 12203 Southwest Freeway, P.O. Box 1444, Houston, Texas 77001. Telephone (713) 491-5115.

DATA OF ANNOUNCEMENT: Model 774/1—March 1978; Models 774/2, 774/3 and 774/4—June 1978.

DATE OF FIRST DELIVERY: Model 774/1—April 1978; Models 774/2, 774/3, and 774/4—July 1978.

NUMBER DELIVERED TO DATE: 50.

SERVICED BY: Texas Instruments.

CONFIGURATION

The Model 774 Intelligent Terminal System is available in four models. Model differences are presented in the accompanying table.

The basic 774 (Model 774/1) is composed of a TI 990 processor with 64K bytes of memory, one to four diskette drives, one to four Model 911 display stations, and one or two Model 810 printers. The processor, memory, and one or two diskette drives are housed in an office style cabinet. Model 774/1 is equipped with 4K RAM memory modules; Models 774/2, 774/3, and 774/4 are equipped with 16K RAM memory modules. One or two communications features are optional. The three additional models feature expanded capabilities including expanded memory, up to eight 911 display stations, one or two disk drives, and a line printer.

Texas Instruments Model 774 Intelligent Terminal System

System Components	774 Model 1	2	3	4
Memory capacity, bytes	64K-128K	96K-352K	96K-352K	160K-352K
Display Stations (911)	1 to 4	1 to 4	1 to 4	5 to 8
Diskette Drives	1 to 4	1 to 4	0 to 2	0 to 2
Fixed Disk Units (DS10)	None	None	1 or 2	1 or 2
Serial Printer (810)	0 to 2	0 to 2*	0 to 2*	0 to 4
Line Printer (2230/2260)	None	0 to 1*	0 to 1*	0 to 1
Communication Ports	0 to 2	0 to 2*	0 to 2*	0 to 2

*Any combination of two devices maximum.

Software support is similar to that provided by TI for its Model 770 stand-alone terminal. Designed for data entry, file management, and off-line processing, TI's software package currently includes TPL 700 and diskette-oriented file maintenance utilities. TPL 700 consists of segments: 1) Forms, a fill-in-the-blanks style form generation package for data entry applications, and 2) Procedures, a high-level business-oriented language for creating application programs. TPL 700 Forms includes forms generation, data validation, arithmetic, right and left justification, and logical branching capabilities; it handles multipage forms. Procedures provides editing, arithmetic, and logic functions, as well as logical I/O support for generation, testing, and debugging application programs; it is supported with an interactive general-purpose editor for generating and editing source code, a compiler for compilation of source code, and a module linker for linking Procedures to Forms, or Procedures to Procedures in an overlay or subroutine fashion. TI also provides software emulators for the IBM 3780 and Teletype 33/35. Software is supplied on diskette and is priced separately. Programs created for the Model 770 can be run on the Model 774.□

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous or synchronous in the half- or full-duplex mode. Asynchronous transmission is performed at rates up to 1800 bits/second using 8-level, 10- or 11-unit ASCII code. Synchronous transmission is performed at 2400 to 4800 bits/second using 8-level EBCDIC code. Emulators are available that provide protocol emulation for the IBM 3780 (BSC) batch terminal and the Teletype 33/35 teleprinters.

One or two communications features are optional. Options include 1) an RS-232C interface for an external modem equivalent to the Bell System 103/113, 202, 201, or 208 modem for leased line operation or with auto answer for dial-up operation; 2) an integral modem (equivalent to the Bell System 202) with or without auto answer for synchronous dial-up or leased line operation at 2400 bps or with auto answer and an integral 801 Bell-compatible auto call unit for dial-up operations; and 3) an integral modem (equivalent to the Bell System 201) with or without auto answer for asynchronous dial-up or leased-line operation at 1200 or 1800 bps or with auto answer and an integral 801 Bell-compatible auto call unit for dial-up operation.

DEVICE CONTROL

Terminal operation is performed under control of the ROM—resident TX 774 real-time, multi-tasking operating system, which requires 40K bytes of memory. The basic firmware supports communications, basic file management, task scheduling, and device input/output. Cursor controls position the cursor up, down, left, right, home, and to the beginning of the next line. Edit controls provide character insertion and deletion and character and field erasure.

SOFTWARE

Vendor-supplied software includes TPL 700 (assembly language); TPL 700 Forms (a forms generator); File Management Utilities; and two emulators for the IBM 3780 and Teletype 33/35.

The TPL 700 language is fully supported with an interactive general-purpose editor for generation and editing of source code, a compiler for compilation of loadable object code, and a module linker for linking Procedures to Forms or Procedures to Procedures in an overlay or subroutine fashion. TPL 700 Procedures provides I/O support for disk files and printers. TPL 700 Procedures features Enter statements for displaying operator prompts; relative and absolute cursor control; input from keyboard with reformatting (character strings to binary numbers); and character validation via predefined character sets. Also provided are nested Repeat and Until statements for loop control and nested If, Then, and Else statements for testing with a selection of seven different relational operators. TPL 700 also supports data transfers with reformatting including character strings to binary numbers, binary numbers to strings, or character strings to character strings; single and triple precision integer arithmetic with up to 14 elements per expression; the generation of source code via the interactive text editor utility which provides scrolling, character or line insertion and deletion, tabbing, and full cursor control; and the generation of loadable object code via the TPL 700 compiler with complete source listing and syntax error reporting.

TPL Forms is used to create forms for data entry/validation, and includes both the graphic capability to produce the lines within the form and the logic capability to establish the checking parameters and arithmetic or logic operations within the fields via attribute codes. The Graphic option is required for line drawing. Checking functions include data validation, range-checking, table look-up, and cross-field validation. Arithmetic operations (add, subtract, multiply, and divide), left or right justification with spaces or zeroes, and branching (fixed and conditional) can also be specified by field attributes. TPL 700 Forms also has forms chaining and multi-page forms features, which permit a form to exceed the display capacity. For special cases, Procedure language code can be invoked to accommodate more complex validation or processing requirements. Forms are executed via the ROM-resident operating system.

File Management Utilities support user file maintenance on diskette or fixed disk. The utilities are operator-selectable from displayed indexes (menus). Utility functions include diskette initialization; file creation, deletion, modification, display, or copying; catalog listing, file and volume name modification, file protection modification, and diskette copying to an IBM-compatible format. Diskette initialization deletes all files on an initialized copy and copies and/or

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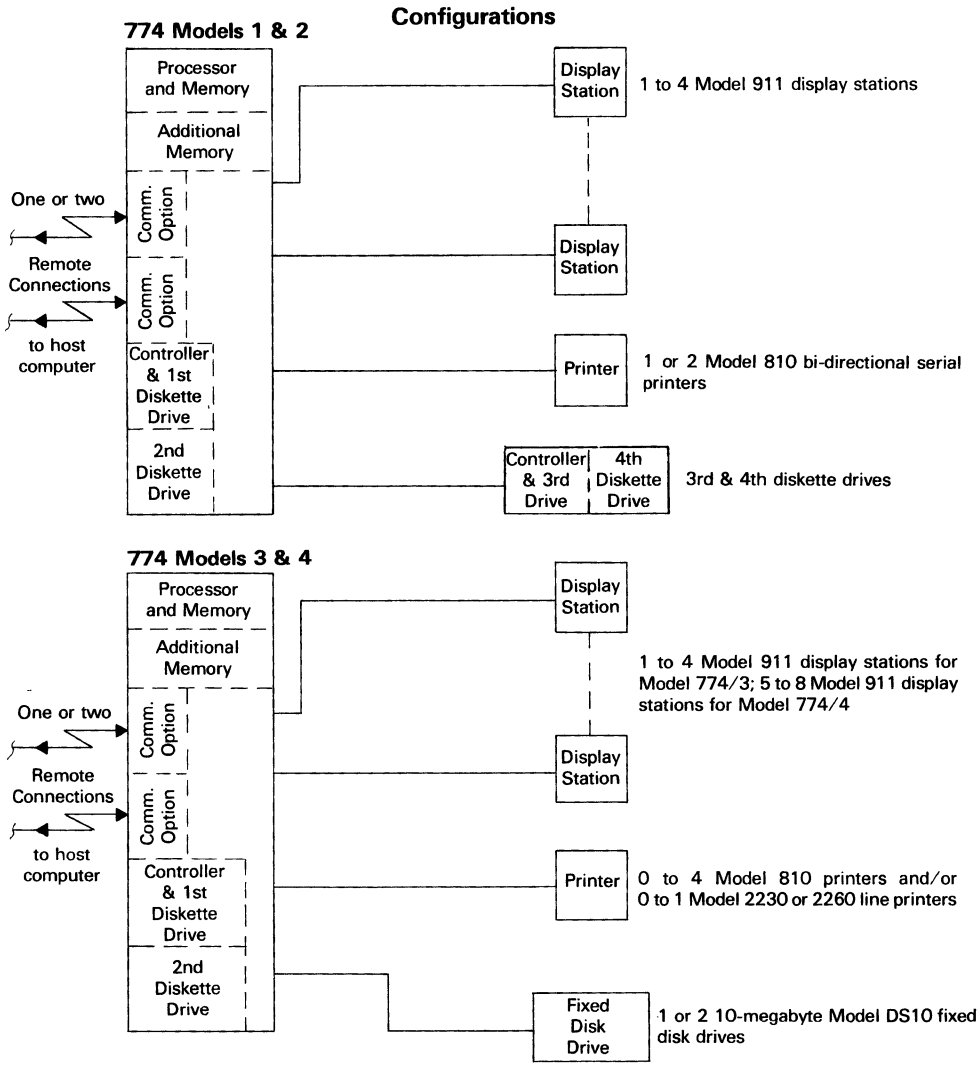
Configurations



verifies individual files or groups of files from one diskette to another. A specified file can be copied to another file or up to three files can be copied into a single file. Two file creation utilities are provided, sequential and random access. The Create Sequential File utility makes a volume catalog entry and allocates diskette storage for a file that will accommodate blank-suppressed, variable-length, sequential records. The Create Relative Record File utility creates a random-access file in a given volume using a specified record length. Catalog listing displays the diskette volume catalog; the ID, description, amount of remaining diskette storage, amount of diskette storage used, and file name and type.

COMPONENTS

CRT DISPLAY UNIT: Model 911 contains a 12-inch (diagonal measurement) CRT with a viewing area 6 inches high by 9 inches wide. The display arrangement is 24 lines of 80 characters each for a total display capacity of 120 characters. A character set of 96 ASCII characters including upper and lower case alphabetics, numerics, and specials is displayed in white. The Graphics option provides 32 graphic symbols.

Each character is formed within a 5-by-7 dot (upper case) or 5-by-5 dot (lower case) matrix. Highlighting features include full and half intensity, and blanking (non-display of data).

KEYBOARD: An 88-key, typewriter-style non-detachable keyboard. The keyboard includes a separate numeric pad to the right, a cursor and function keypad to the left, and a row of eight program function keys located over the main keygroup. Key functions within the main keygroup include Return, Escape, Tab Skip, Enter, Upper Case Lock, Shift, and Control Shift. The cursor control and function keypad includes Erase Field, Erase Input, Paper Advance, Print, Repeat, Character Insert, Character Delete, and five cursor control keys (Up, Down, Left, Right, and Home). The keyboard can generate any of 128 ASCII character codes and also features eight status indicator lights.

SERIAL PRINTER: The Model 810 is a bidirectional impact matrix printer with 132 print positions and a rated speed of 150 char./second. The standard character set includes 96 upper and lower case ASCII symbols. Each character is formed via a 9-by-7 dot matrix. Spacing is 10 char./inch and 6 or 8 (selectable) lines/inch. The printer features adjustable tractor feed and accommodates 6-part, continuous pin-fed forms from 3 to 14⅞ inches wide. Continuous forms can be fed from the rear or bottom of the printer.

DISKETTE STORAGE: The basic diskette subsystem housed in the processor cabinet contains a diskette drive controller and one drive that accommodates a single-sided, standard-density diskette. A second drive is optional. An optional second diskette subsystem housed in a table-top cabinet contains a controller and one or two drives.

The drives are compatible with the IBM 3740 format, which organizes a diskette into 77 tracks including 74 data tracks, 2

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spare tracks, and one index track. Each track is divided into 26 sectors, and each sector into 128 bytes. Formatted data storage capacity is 256,256 bytes.

The diskettes are rotated at 360 rpm for an average rotational delay of 83 milliseconds. Positioning time is 8 milliseconds track-to-track and 211 milliseconds average (including settling time). Head settling time is 8 milliseconds; head loading time is 35 milliseconds. The data transfer rate is 31,250 bytes/second.

FIXED DISK STORAGE: The DS10 Disk Subsystem consists of a controller and two fixed and removable cartridge disk drives housed in a separate cabinet. Each DS10 has a capacity of 9.4 million bytes (formatted) for a total of 18.8 million bytes.

Data is stored on four surfaces, each organized into 405 data tracks plus 3 spares per surface. Each track is divided into 20 288-byte sectors. Total track capacity is 7812 bytes unformatted and 5760 bytes formatted. Total subsystem storage capacity is 9,400,320 bytes.

The rotational delay is 12.5 milliseconds. Track-to-track, average, and maximum head positioning times are 7, 35, and 60 milliseconds, respectively. The data transfer rate is 312,500 bytes/second. An IBM 5440-type disk cartridge is used.

LINE PRINTER: A drum printer rated at 300 or 600 (64 character set) lines/minute with 136 print positions. It is produced by Dataproducts as Model 2230 or 2260, respectively. The printer is available with a 64 or 96 character print set. Horizontal spacing is 10 characters per inch; vertical spacing is 6 or 8 (selectable) lines per inch. Adjustable tractor feed accommodates continuous 6-part forms from 4 to 16.75 inches wide. A vertical format unit is optional.

PRICING

The Model 774 is available for purchase, on a 90-day rental, or on a 1-, 3-, or 5-year lease. Rental and lease rates include prime-shift maintenance. All prices include software and installation. Quantity discounts are available on purchased units. A complete software package is available for $1,500 with quantity orders that include OEM or end-user discounts. A separate maintenance contract is available for purchased units. Prime shift maintenance includes rental and lease prices and covers installations located within a 100-mile radius of a TI service center. Maintenance beyond the 100-mile limit is available at an added $20 per month per terminal and $20 per month per external printer (U.S. only). Rentals are available on a 90-day minimum lease term, which is automatically extended on a month-to-month basis. Rentals and leases can be cancelled upon 30 days written notice prior to the expiration of rental or lease term. Installation and removal charges for installations within a 100 mile radius of a TI service center are: $110 per installed terminal or printer and $60 per each additional installed terminal or printer at the same site; $60 per removed terminal or printer and $25 per each additional removed terminal or printer at the same site.

		Monthly Charge*					
		90-day Rental	1-Year Lease	3-Year Lease	5-Year Lease	Purchase	Monthly Maint.
1000	Model 774/1 with 64K bytes of memory, one display station, and two diskette drives	$ 760	$ 515	$ 480	$ 440	$12,950	$140
1020	Model 774/2 with 96K bytes of memory, one display station, and two diskette drives	945	645	600	540	15,450	158
1030	Model 774/3 with 96K bytes of memory, one display station, and one DS-10 disk drive	1,460	1,010	945	845	23,200	233
1040	Model 774/4 with 160K bytes of memory, five display stations, and one DS-10 disk drive	2,210	1,510	1,410	1,270	35,725	361
1100	Additional Memory; 16K bytes with controller; for Model 774/1 only; 1 max.	**	**	**	**	1,500	8
1110	Additional Memory; 16K bytes; requires #1100; for Model 774/1 only	**	**	**	**	1,000	7
1120	Additional Memory, 32K bytes, requires #1100; for Model 774/1 only	**	**	**	**	2,000	14
1130	Additional Memory, 48K bytes; requires #1100; for Model 774/1 only	**	**	**	**	3,000	21
1140	Additional Memory, 64K bytes; all models but 774/1	220	145	135	120	4,650	28
1150	Additional Memory, 128K bytes; all models but 774/1	380	260	240	210	8,150	56
1160	Additional Memory, 192K bytes; all models but 774/1	550	370	345	305	11,650	84
1170	Additional Memory, 256K bytes; Models 774/2 & 774/3 only	715	485	450	400	15,150	112
1200	Model 810A printer, basic unit	167	128	116	105	2,520	33
1220	Model 810B printer with option package	180	141	129	118	2,745	33
1240	Model 2230 Line Printer, 300 lpm	735	500	465	425	13,500	105
1300	Model 911 Video Display Terminal; for second or fourth display station in cluster	85	60	54	48	1,200	15
1320	Model 911 Video Display Terminal; for third display station in cluster	130	100	95	84	2,000	24
1400	Additional diskette drive and controller	165	135	120	110	2,950	35
1420	Additional diskette drive; requires item 1400	85	62	55	45	1,100	17
1440	Second DS 10 Disk Drive, 10 Megabytes	575	395	370	340	8,600	100

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		Monthly Charge*					
		90-day Rental	1-Year Lease	3-Year Lease	5-Year Lease	Purchase	Monthly Maint.
1500	External RS 232C modem interface for Bell System 103/113, 202, 201, and 208 modems (with or without auto answer) or equivalent modems	45	28	24	20	530	17
1510	Integral Bell System 202-compatible modem with auto answer for DDD	85	60	51	47	1,130	15
1512	Integral Bell System 202-compatible modem for leased line operation	85	60	51	47	1,130	15
1515	Integral Bell System 202-compatible modem with auto answer and 801-compatible auto call unit for DDD	115	90	74	67	1,580	25
1520	Integral Bell System 201-compatible modem with auto answer for DDD	115	90	79	70	1,805	16
1522	Integral Bell System 201- compatible modem for leased line operation	115	90	79	70	1,805	16
1525	Integral Bell System 201-compatible modem with auto answer and 801-compatible auto call unit for DDD	145	115	100	90	2,255	26

* Includes prime-shift maintenance.
**Available for purchase only.■